


October 16, 2020

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Administrator Andrew R. Wheeler
U.S. Environmental Protection Agency
EPA Docket Center Reading Room
Docket ID No. EPA-HQ-OAR-2018-0276
WJC West Building, Room 3334
1301 Constitution Avenue, NW
Washington, DC 20229

**Re: Notice of Proposed Rulemaking (NPRM): Control of Air Pollution From Airplanes and Airplane Engines (Docket EPA-HQ-OAR-2018-0276)**

Dear Administrator Wheeler:

This letter presents comments on EPA's proposal to set greenhouse gas (GHG) emissions standards to control pollution from airplanes and airplane engines. Control of Air Pollution from Airplanes and Airplane Engines: GHG Emission Standards and Test Procedures, 85 Fed. Reg. 51,556 (Aug. 20, 2020) ("NPRM" or "Proposal"). These comments are submitted jointly by the Center for Biological Diversity, Earthjustice, on behalf of the Sierra Club and Friends of the Earth, and the Natural Resources Defense Council.

Section 231 of the Clean Air Act (CAA) requires EPA to set standards to reduce emissions from aircraft that cause and contribute to air pollution that endangers public health and welfare.[1] Congress's purpose in enacting the CAA was to promote "pollution prevention," which it defined as the "reduction or elimination, through any measure, of the amount of pollutants produced or created at the source."[2] Thus, in promulgating emissions standards, EPA must act to reduce pollution and mitigate the harms these emissions cause. EPA's proposed standards fail to accomplish this obligation. Indeed, the Proposal and supporting documentation

[1] 42 U.S.C. § 7571(a).
[2] 42 U.S.C. § 7401.

are virtually silent on the need to reduce greenhouse gases, any consideration of standards that would accomplish this goal, and the significant costs that failure to reduce greenhouse gas emissions from aircraft are imposing on current and future generations. For these reasons, the Proposal is arbitrary and capricious and violates the Clean Air Act. EPA must quickly replace the Proposal with strong, technology-forcing standards that decarbonize the aviation industry in line with what climate science and equity demand.

## I. Aircraft Contribute Significantly to Climate Change and Harm Human Health and Welfare.

### *A. Climate change is one of the greatest challenges facing the United States and the world.*

Global warming is occurring on an unprecedented scale as a result of human activities.[3] The combustion of fossil fuels since the Industrial Revolution is the most prominent force driving climate change.[4] The United States government, and EPA in particular, have repeatedly recognized that this anthropogenic climate change is causing widespread, severe harms across the country, requiring immediate and substantial greenhouse gas emissions reductions.[5] The impacts of more frequent and intense extreme weather events, intensifying droughts, hazardous air quality associated with wildfire and ozone pollution, rising water temperatures, ocean acidification, and sea level rise "are already being felt in communities across the country."[6]

Conclusive scientific evidence undergirds these conclusions. The five-year period from 2016–2020 is expected to be the warmest on record with an average global mean surface temperature of 1.1°C above the pre-industrial level, arctic sea-ice continues its long-term downward trend, global mean sea-levels are rising, and communities across the globe are experiencing major impacts from extreme weather and climate events.[7] A 2018 report from the Intergovernmental Panel on Climate Change made clear that global industry sectors must

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[3] NASA Global Climate Change, Facts: Evidence – Climate Change: How Do We Know?, https://climate.nasa.gov/evidence/ (last visited October 14, 2020). The Fourth National Climate Assessment, comprised of the 2017 Climate Science Special Report (Volume I) and the 2018 Impacts, Risks, and Adaptation in the United States (Volume II), concluded that "there is no convincing alternative explanation" for the observed warming of the climate over the last century other than human activities. U.S. Global Change Research Program, Climate Science Special Report: Fourth National Climate Assessment, Vol. I (2017), https://science2017.globalchange.gov/ at 10 ("Fourth National Climate Assessment 2017"). "[E]vidence of human-caused climate change is overwhelming and continues to strengthen, that the impacts of climate change are intensifying across the country, and that climate-related threats to Americans' physical, social, and economic well-being are rising." U.S. Global Change Research Program, Impacts, Risks, and Adaptation in the United States, Fourth National Climate Assessment, Volume II (2018) at 36 ("Fourth National Climate Assessment 2018").

[4] NASA Global Climate Change, Facts: Causes – The Causes of Climate Change, https://climate.nasa.gov/causes/ (last visited October 14, 2020).

[5] *See, e.g.*, Fourth National Climate Assessment 2017; Fourth National Climate Assessment 2018. EPA contributed to the drafting of both volumes of the Fourth National Climate Assessment.

[6] Fourth National Climate Assessment 2018 at 25.

[7] World Meteorological Organization et al., United in Science 2020 (Sept 9, 2020), https://public.wmo.int/en/resources/united_in_science at 2.

decarbonize by mid-century to keep warming to 1.5°C and avoid devastating climate damages.[8] If global temperatures rise above this level and approach 2°C, the impacts will become catastrophic. Impacts will include, but will not be limited to, longer and more deadly heatwaves, droughts, and flooding; increased risk of multi-meter sea level rise; widespread species extinctions; enhanced thawing of permafrost and the associated release of the super-polluting greenhouse gas methane; increased ozone-related respiratory illnesses and premature deaths; the proliferation of mosquito-borne diseases like malaria and dengue fever; and up to several hundred million more people exposed to climate-related harms and susceptible to poverty by 2050.[9] These impacts fall disproportionately on low-income communities and communities of color. Limited resources make these populations "more vulnerable to ongoing climate-related threats, less able to adapt to anticipated changes, and less able to recover. . . ."[10] The IPCC report concludes that pathways to limit warming to 1.5°C with little or no overshoot require "a rapid phase out" of carbon dioxide ($CO_2$) emissions and "deep emissions reductions in other GHGs and climate forcers."[11]

To limit warming to 1.5°C, global $CO_2$ emissions must be cut in half by 2030—ten years from now—and reach near zero by 2050,[12] with faster reductions needed in the U.S.[13] Thus, to avoid the devastating climate change-driven damages that would come with exceeding 1.5°C warming, we must implement deep greenhouse gas emissions reductions without delay across all sectors, including aviation.

The costs of overshooting the 1.5°C to 2°C temperature rise targets set by the Paris Climate Agreement are in many ways so overwhelming and widespread that they defy quantification. In addition, it is not possible to accurately quantify costs that might be associated with large-scale shifts in the climate system, known as tipping points, and the compound effects of simultaneous extreme climate events. Nonetheless, according to the Fourth National Climate Assessment, the number of extreme weather events per year costing more than one billion dollars per event has increased significantly since 1980, with total costs exceeding $1.1 trillion.[14] The National Oceanic and Atmospheric Administration estimated that, between 2015 and April 2018, 44 billion-dollar weather and climate disasters struck the United States, producing nearly $400 billion in damages.[15] The 2017 Atlantic Hurricane season alone is estimated to have caused more than $250 billion in damages and hundreds of deaths throughout the U.S. Caribbean, Southeast, and Southern Great Plains.[16] By the end of the century, the Fourth National Climate Assessment, of which EPA was a co-author, estimates that warming on our current trajectory

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[8] Intergovernmental Panel on Climate Change, Global Warming of 1.5°C, An IPCC special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty (2018) ("IPCC Special Report") at 7-14, *available at* https://www.ipcc.ch/sr15/.
[9] *Id.*; Fourth National Climate Assessment 2017; Fourth National Climate Assessment 2018.
[10] *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, 54,454 (Aug. 15, 2016).
[11] IPCC Special Report at 112.
[12] IPCC Special Report at 12-14, Figure 2.6.
[13] Climate Equity Reference Project, Climate Equity Reference Calculator, https://calculator.climateequityreference.org/ (last visited Oct. 14, 2020).
[14] Fourth National Climate Assessment 2018 at 81.
[15] *Id.* at 66.
[16] *Id.*

would cost the U.S. economy hundreds of billions of dollars each year and up to ten percent of U.S. gross domestic product due to damages including lost crop yields, lost labor, increased disease incidence, property loss from sea level rise, and extreme weather damage.[17]

*B. Aviation is among the fastest-growing contributors to climate change.*

Aviation adds $CO_2$ and smaller amounts of nitrous oxide, a potent greenhouse gas, into our atmosphere.[18] When these pollutants are emitted from aircraft, they have a larger impact on climate, as aviation emissions "occur in the climatically sensitive upper troposphere and lower stratosphere where they may have a disproportionate impact on climate."[19] Moreover, due to contrails and aviation-induced cirrus cloud formation, "aviation has a larger impact on radiative forcing" than that caused by $CO_2$ emissions alone.[20]

Aviation is one of the fastest-growing sources of greenhouse gas emissions.[21] Flights departing from airports in the United States and its territories were responsible for almost a full quarter of global aviation's passenger transport-related carbon dioxide emissions in 2018.[22] Globally, aviation was responsible for 2.4 percent of energy-related total carbon dioxide emissions in 2018, and 3.5 percent of anthropogenic effective radiative forcing after accounting for nitrogen oxides, black carbon, and aviation-induced cloudiness.[23] Due to the radiative

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[17] *Id.* at 1358, 1360. Ultimately, the magnitude of financial burdens imposed by climate change depends on how effectively we curb emissions. For example, annual damages associated with additional extreme temperature-related deaths are projected at $140 billion (in 2015$) under a higher emissions scenario compared with $60 billion under a lower scenario by 2090. *Id.* at 552. Annual damages to labor would be approximately $155 billion under a higher emissions scenario. *Id.* at 1349. While coastal property damage would carry an annual cost of $118 billion under RCP 8.5 in 2090, 22 percent of this cost would be avoided under RCP 4.5. *Id.*

[18] Emissions from aircraft consist of approximately 70 percent $CO_2$, 30 percent water vapor, and less than one percent each of oxides of nitrogen or NOx (including nitrous oxide), carbon monoxide (CO), oxides of sulfur (SOx), and other trace components such as particulate matter (PM) and hydrocarbons like methane ($CH_4$). Federal Aviation Administration, Office of Environment and Energy, Aviation Emissions, Impacts & Mitigation: A Primer (Jan. 2015) at 2, *available at* https://www.faa.gov/regulations_policies/policy_guidance/envir_policy/media/Primer_Jan2015.pdf. Nitrous oxide ($N_2O$), a powerful, long-lived greenhouse gas, has a warming effect 300 times that of $CO_2$. U.S. Environmental Protection Agency, Overview of Greenhouse Gases, http://epa.gov/climatechange/ghgemissions/gases/n2o.html.

[19] Federal Aviation Administration, Office of Environment and Energy, Aviation Emissions, Impacts & Mitigation: A Primer (Jan. 2015) at 10.

[20] Lee, David S. et al., Aviation and global climate change in the 21st century, 43 Atmospheric Env't 3520, 3523 (2009).

[21] Graver, Brandon et al., $CO_2$ emissions from commercial aviation, 2018, International Council on Clean Transportation (2019) ("Graver 2019"), https://theicct.org/sites/default/files/publications/ICCT_CO2-commercl-aviation-2018_20190918.pdf at 1-2.

[22] *Id.* at 1. Two thirds of the emissions from flights departing from U.S. airports are associated with domestic flights. *Id.* Just in the U.S., aviation constitutes 12 percent of transportation emissions. Olmer, Naya and Dan Rutherford, U.S. Domestic Airline Fuel Efficiency Ranking, 2015-2016, The International Council on Clean Transportation (Dec. 2017), https://theicct.org/sites/default/files/publications/US-Airline-Ranking-2015-16_ICCT-White-Paper_14122017_vF.pdf.

[23] Graver 2019, *supra* n.21; Lee, David S. et al., The contribution of global aviation to anthropogenic climate forcing for 2000 to 2018, Atmospheric Env't. (2020), https://doi.org/10.1016/j.atmosenv.2020.117834.

forcing effect of pollutants emitted at altitude, those emissions are estimated to account for about five percent of warming.[24]

Over the last ten years, aviation emissions increased by 44 percent, as growing passenger and cargo traffic outpaced efficiency improvements.[25] Emissions are expected to triple again by 2050 under a business-as-usual scenario.[26] The aviation sector is on pace to emit approximately 56 billion tonnes of $CO_2$ from 2015-2050. This would constitute more than a quarter of the total emissions consistent with a global carbon budget that keeps temperature rise below 1.5°C.[27]

The United States is by far the largest aviation carbon polluter. In 2015, EPA estimated that emissions from U.S. aircraft "are *about 7 times higher* than aircraft greenhouse gas emissions from China," which is ranked second in the world for its aircraft emissions.[28] Maintaining this business-as-usual path will cause additional greenhouse gas pollution that we cannot afford.

Aviation is also responsible for the emission of criteria and hazardous pollutants that directly harm the health of residents living close to airports, who disproportionately come from disadvantaged and minority communities.[29] The ill effects of this pollution, exacerbated by aircraft take-off and landing operations, include premature death, respiratory and cardiovascular disorders and other serious health effects.[30] Failing to rein in aviation greenhouse gas emissions also leaves these emissions unabated.

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[24] Fahey, David W. & Lee, David S., Aviation and Climate Change. A Scientific Perspective. In: Carbon & Climate Law Review 2: 7 (2016).

[25] Zheng, Sola & Dan Rutherford, Fuel burn of new commercial jet aircraft: 1960 to 2019, International Council on Clean Transportation (2020) ("Zheng 2020") https://theicct.org/publications/fuel-burn-new-comm-aircraft-1960-2019-sept2020 at 1,.

[26] *Id.* The International Civil Aviation Organization (ICAO) also expects "[t]he 4.3 billion airline passengers carried in 2018 . . . to grow to about 10.0 billion by 2040." ICAO, The World of Air Transport in 2018 (2018), https://www.icao.int/annual-report-2018/Pages/the-world-of-air-transport-in-2018.aspx. International air travel and tourism associations do not expect the pandemic to reduce air travel levels in the long-term. International Air Transport Association and Tourism Economics, Air Passenger Forecasts: Potential Paths for Recovery into the Medium- and Long-run (July 2020), https://resources.oxfordeconomics.com/hubfs/Webinar%20presentations/Air-Passenger-Forecasts-potential-paths-for-recovery-into-medium-and-long-run.pdf.

[27] Pidcock, R., et al. Aviation could consume a quarter of 1.5C carbon budget by 2050, Carbon Brief (Aug., 2016), https://www.carbonbrief.org/aviation-consume-quarter-carbon-budget; *see also* Öko-Institut, Emission Reduction Targets for International Aviation and Shipping (2015) at 28, https://www.europarl.europa.eu/RegData/etudes/STUD/2015/569964/IPOL_STU(2015)569964_EN.pdf.

[28] *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, 37,788 (July 1, 2015) (emphasis added). In total, greenhouse gas emissions from U.S. "covered" aircraft are "about 6 times" more than corresponding emissions from China. *Id.*

[29] Hudda, Neelakshi et al., Emissions from an International Airport Increase Particle Number Concentrations 4-fold at 10km Downwind, 48 Environ. Sci. Technol. 6628 (May 29, 2014), https://pubs.acs.org/doi/full/10.1021/es5001566.

[30] Manisalidis, Ioannis et al., Environmental and Health Impacts of Air Pollution: A Review, 8 Frontiers in Public Health 14 (Feb. 20, 2020) ("Manisalidis 2020"), *available at* https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7044178/#.

## II. Statutory and Regulatory Background

### *A. Clean Air Act Section 231*

The Clean Air Act[31] requires EPA to regulate the emission of pollutants from aircraft engines and vests the authority to do so in the EPA Administrator. Section 231(a)[32] of the Act establishes a regulatory framework for the establishment of standards to reduce air pollutants from aircraft. This section directs the Administrator to study and investigate emissions of air pollutants from aircraft to determine the extent to which aircraft emissions affect air quality in the United States and the technological feasibility of controlling those emissions.[33] Under section 231(a)(2)(A), 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."[34] Accordingly, if the Administrator determines that greenhouse gas emissions from aircraft engines contribute to air pollution, he or she must issue proposed standards to regulate these pollutants.[35]

On July 30, 2008, EPA issued an Advance Notice of Proposed Rulemaking (2008 ANPR) seeking input on approaches to regulating greenhouse gases under the Clean Air Act.[36] The 2008 ANPR considered a wide range of mechanisms available to EPA under the Clean Air Act to control greenhouse gases from the aviation sector, including regulating aircraft engines, aircraft (or airframes), and, in collaboration with the Federal Aviation Administration (FAA), aircraft operations.[37] It also discussed "a continuum of regulatory approaches" ranging from "near- and long-term GHG exhaust emission standards" to "emission averaging, banking and trading (ABT) programs" applied to manufacturers and fleet operators "to provide more flexibility in phasing-in and phasing-out engine models."[38] Notably, the ANPR considered standards for in-service as well as newly built airplanes, in light of the fact that section 231 applies to all aircraft.[39]

On June 10, 2015, EPA published proposed findings that greenhouse gas emissions from aircraft cause and contribute to air pollution that endangers public health and welfare (Proposed Endangerment Findings) and another ANPR.[40] Significantly, this 2015 ANPR abandoned the flexible approach to controlling greenhouse gases from aircraft considered in the 2008 ANPR and was instead limited to the approach then under development at ICAO.[41] In tracking the ICAO standards, EPA noted ICAO's "intent . . . to achieve aircraft $CO_2$ emissions reductions

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[31] 42 U.S.C. §§ 7401 *et seq.*
[32] *Id.* § 7571(a).
[33] *Id.* § 7571(a)(1).
[34] *Id.* § 7571(a)(2)(A).
[35] *Id.* § 7571(a)(2).
[36] 73 Fed. Reg. 44,354.
[37] *Id.* at 44,470-71.
[38] *Id.* at 44,472.
[39] *Id.*
[40] *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 (July 1, 2015).
[41] *Id.* at 37,797.

beyond that which would have occurred in the absence of a standard,"[42] and contemplated "the possibility of the EPA adopting a more stringent aircraft engine emissions standard than ICAO."[43]

On August 15, 2016, EPA finalized its findings that greenhouse gas emissions from aircraft cause or contribute to air pollution that may reasonably be anticipated to endanger public health and welfare.[44] EPA concluded that "the public health of current generations is endangered and that 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."[45] "Children, the elderly, and the poor, are among the most vulnerable to climate change-related health risks."[46] The findings document how greenhouse gas emissions and resultant climate change endanger welfare through increased likelihood and severity of extreme events such as wildfires, flooding and drought; impacts to water quality and supply; and adverse effects on diverse sectors including food production and agriculture; forestry, energy, infrastructure, and ecosystems and wildlife.[47] As discussed above, the documented damage from greenhouse gas pollution has only accelerated since EPA's 2016 endangerment findings. Finally, the Administrator concluded that emissions of greenhouse gases from "covered aircraft, which are subsonic jet aircraft with a maximum takeoff mass (MTOM) greater than 5,700 kilograms and subsonic propeller driven (e.g., turboprop) aircraft with a MTOM greater than 8,618 kilograms, contribute to the air pollution that endangers public health and welfare."[48]

The 2016 endangerment findings triggered EPA's obligation to regulate greenhouse gas pollutants from aircraft in accordance with CAA section 231.

### *B. The International Civil Aviation Organization's $CO_2$ Standards*

The 1944 Convention on International Civil Aviation, known as the Chicago Convention, established the rules governing airspace, aircraft registration, and the safety and sustainability of international air travel. It also created the International Civil Aviation Organization (ICAO), a UN specialized agency, to manage the administration and governance of the Chicago Convention and establish standards and recommended policies for the civil aviation sector.

While ICAO seeks to reach consensus on aircraft standards, the Chicago Convention does not automatically commit ICAO members to a single set of standards. On the contrary, "it is expected that States will adopt their own airworthiness standards, and it is anticipated that some states may adopt standards that are more stringent than those agreed upon by ICAO."[49] In

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[42] *Id.* at 37, 804.
[43] *Id.* at 37,805.
[44] *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 (Aug. 15, 2016).
[45] *Id.* at 54,452.
[46] *Id.*
[47] *Id.* at 54,455.
[48] *Id.* at 54,461.
[49] *Control of Air Pollution From Aircraft and Aircraft Engines; Emission Standards and Test Procedures*, 70 Fed. Reg. 69,664, 69,667, n.11 (Nov. 17, 2005); *see also* Convention on International Civil Aviation, Ninth Edition at art. 33 (2006), https://www.icao.int/publications/Documents/7300_cons.pdf ("Chicago Convention").

the event that a state sets a standard that deviates from the ICAO standard, that state must notify other Member States that it deems different regulations necessary.[50] Thus, the Convention gives member states the freedom and flexibility to establish national standards that are more stringent than ICAO standards; setting a different standard would not interfere with the United States' participation in ICAO.

In 2016, ICAO's technical committee, the Committee on Aviation Environmental Protection (CAEP), established international airplane $CO_2$ emission standards. As EPA has acknowledged, "[a]t CAEP nearly every nation is represented by their transportation and/or aircraft industry. Environmental protection is not a priority for these nations—growing their airline industry and domestic manufacturing industry is the priority."[51] Accordingly, CAEP designed its $CO_2$ standards to avoid compelling any $CO_2$ reductions from aircraft beyond those which industry already expected to achieve under existing business practices.[52] It did so by defining technological feasibility to exclude aircraft fuel efficiency technologies that were set to be delivered starting in 2016, even though the ICAO standards do not take full effect until 2028.[53] Thus, all affected in-production and new-type airplanes will pass the standards since existing non-compliant types are expected to cease production by 2028.[54] Indeed, the ICAO standards lag years behind the existing technology curve. The standards will require $CO_2$ reductions from new aircraft of just four percent over 12 years, which is less than market forces alone are predicted to achieve.[55] A recent report found that in 2016 average new commercial jets already met ICAO's $CO_2$ emissions standards.[56] As of last year, average new jets surpassed the standards, with multiple aircraft designs doing better than the standards by 10-20 percent.[57] Nonetheless, EPA proposes to "adopt and implement the corresponding international Airplane $CO_2$ Emission Standards domestically as a CAA section 231 GHG standard"[58] in response to the endangerment findings.

ICAO's $CO_2$ emissions metric "measures the fuel efficiency from the perspective of whole airplane design—an airframe and engine combination."[59] Accordingly, the emissions test procedures measure "the performance of the whole airplane rather than the airplane engines alone," taking into account "aerodynamics, airplane weight, and engine propulsion technologies" in determining overall $CO_2$ emissions.[60] These test procedures do not quantify emissions of any

[50] Chicago Convention at art. 38.
[51] E-mail from William Charmley, Director, to U.S. EPA Office of Transportation and Air Quality Assessment and Standards Division (Feb. 16, 2016, 8:35 AM) ("Charmley email 2/16/2016").
[52] U.S. Environmental Protection Agency, EPA-420-D-20-004, *Draft Airplane Greenhouse Gas Standards Technical Support Document* (July 2020) ("Technical Support Document") at 15.
[53] ICAO, Tenth Meeting Committee on Aviation Environmental Protection Report (CAEP/10-WP/92) (2016) at Appendix C p. 5C-15 (defining "technical feasibility" to mean "technology expected to be demonstrated to be safe and airworthy proven to Technology Readiness Level 8 . . . by 2016 or shortly thereafter").
[54] 85 Fed. Reg. 51,558.
[55] International Council on Clean Transportation, New ICAO recommended standard for aircraft CO2 emissions is a missed opportunity on climate policy (Feb. 9, 2016), https://theicct.org/news/press-stmt-icao-co2-proposed-std-20160209.
[56] Zheng 2020 *supra* n.25 at 15.
[57] *Id.*
[58] 85 Fed. Reg. at 51,561.
[59] *Id*.
[60] *Id*. at 51,561-62.

single chemical compound. Instead, they "measure fuel efficiency based on how far an airplane can fly on a single unit of fuel at the optimum cruise altitude and speed."[61] Following ICAO's approach, EPA proposes to use "airplane fuel efficiency as a surrogate for GHG emissions from covered airplanes" and "adopt [Maximum Takeoff Mass, or MTOM, thresholds] as a correlating parameter to be used when setting emissions limits."[62]

The proposed regulations would only apply to new aircraft designs[63] and new in-production[64] aircraft—they would not apply to airplanes that are already in-service[65]—and would set emissions thresholds based on an aircraft's MTOM. The standards applicable to new aircraft designs go into effect in 2020 but no new designs are currently in development, and none are expected for certification for at least ten years.[66] The standards applicable to new in-production aircraft do not go into effect until 2028.[67] CAEP also established "exemption" procedures which allow in-production planes to be modified between 2023 and 2028 without triggering any emission reduction obligations as long as those modifications do not exceed the proposed fuel efficiency metric by more than 1.5 percent.[68]

For both in-production and new type design airplanes, CAEP analyzed ten stringency options[69] and selected a stringency level that all affected in-production and new-type airplanes would meet by the time the standards went into effect.[70] In adopting ICAO's $CO_2$ emission standards, EPA was clear that its proposed greenhouse gas standards "are meant to be technology following standards" and "reflect[] the performance and technology achieved by existing airplanes (in-production and in-development airplanes)."[71]

## III. The Proposal Violates Section 231 of the Clean Air Act.

When it passed the Clean Air Act, Congress was specific about its purpose: the Act "promote[s] reasonable Federal, State, and local government actions . . . for pollution prevention."[72] Congress specifically defined "pollution prevention" as the "reduction or elimination, through any measure, of the amount of pollutants produced or created at the

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[61] *Id*. at 51,562.
[62] *Id*. at 51,565.
[63] "New type designs" include "[a]irplane types for which original certification is applied for (to the FAA) on or after the compliance date of a rule, and which have never been manufactured prior to the compliance date of a rule." 85 Fed. Reg. at 51,566.
[64] "In-production" refers to "newly-manufactured or built after the effective date of the regulations—and already certificated to pre-existing rules." 85 Fed. Reg. at 51,566 n.79.
[65] *Id*. at 51,566.
[66] 85 Fed. Reg. 51,566; *see also* Technical Support Document at 39 ("The EPA is currently not aware of a specific model of a new type design airplane that is expected to enter service after 2020 (no announcements have been made by airplane manufacturers).")
[67] *Id*. at 51,567-71.
[68] *Id*. at 51,571 (noting that certification applications for modified aircraft on or after January 1, 2023 trigger compliance with the proposed rule if "the airplane's GHG emissions metric value for the modified version increases *by more than 1.5 percent* from the prior version of the airplane") (emphasis added).
[69] Technical Support Document at 121.
[70] *Id*. at 106 (explaining that "all the airplanes in the [growth and replacement] fleet either meet the stringency or are out of production when the standards take effect according to [EPA's] expected technology responses").
[71] 85 Fed. Reg. at 51,570.
[72] 42 U.S.C. § 7401(c).

source."[73] To implement this purpose, the Clean Air Act's provisions require EPA to issue endangerment findings for those pollutants emitted by specified sources that endanger human health and welfare, and then issue emission standards to meaningfully regulate those emissions. Thus, the purpose of EPA's endangerment findings and standard-setting practices under the Act is not merely to slightly alter an ever upwards-bending curve of pollution increases, or hold the pollution level steady, but to reduce or eliminate altogether the pollution from sources subject to its regulation.

Section 231 carries out this purpose. It provides "a comprehensive scheme for the regulation of harmful aircraft emissions, of which paragraph 231(a)(2)(A) is the centerpiece."[74] In issuing the 2016 Endangerment Findings, EPA recognized that its "duties regarding aircraft air pollution emissions under CAA section 231 reflect a combination of the CAA's goals to protect public health and welfare and encourage improved emissions performance."[75] But the Proposal adopting ICAO's $CO_2$ standards achieves neither of these goals.

The Proposal does nothing to reduce emissions from aircraft beyond reductions that will occur absent any regulation, despite the fact that EPA has determined that those emissions harm public health and welfare. Indeed, EPA acknowledges that the Proposal would have no effect on greenhouse gas emissions from aircraft. In discussing the implications of the Proposal, EPA stated that it "is not projecting emission reductions associated with these proposed GHG regulations."[76] The Proposal "[is] not expected to result in reductions in fuel burn and GHG emissions beyond the baseline."[77] EPA "does not project that the proposed GHG rule would cause manufacturers to make technical improvements to their airplanes that would not have occurred in the absence of the rule."[78] On the contrary, "EPA projects that the manufacturers would meet the proposed standards *independent of* the EPA standards" because ICAO premised its international Airplane $CO_2$ Emission Standards 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."[79] As such, "most or nearly all in-production and on-order airplanes already meet the levels of the proposed standards," with the exception of a "few in-production airplane models that . . . are at the end of their production life and are expected to go out of production in the near term."[80] Similarly, "a technology response is not necessary for new type design airplanes to meet the GHG rule proposed."[81] In plain English, the Proposal requires no technical changes, has no effect on greenhouse gas emissions, and, aside from some $16,000 annually for preparing reports,[82] imposes no costs.

EPA's wholesale adoption of ICAO's technology-following emission standards violates section 231. Section 231(b) provides that standards should take effect "after such period as

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[73] 42 U.S.C. § 7401(a)(3).
[74] *Center for Biological Diversity v. EPA*, 794 F. Supp. 2d 151, 160 (D.D.C. 2011).
[75] 81 Fed. Reg. at 54,425; *see also* 42 U.S.C. § 7401(b).
[76] 85 Fed. Reg. at 51,558.
[77] *Id*. at 51,583.
[78] *Id.* at 51,586.
[79] *Id* (emphasis added).
[80] *Id.*
[81] *Id*. at 51,587.
[82] *Id*. at 51,588.

[EPA] finds necessary . . . to permit the development . . . of the requisite technology."[83] Thus, as EPA explained in its first rulemaking under section 231, "the standards set by EPA may reflect technology which may reasonably be obtained within a given time frame but which is not yet available."[84] EPA does not have to "demonstrate that a [necessary] technology is currently available universally or over a broad range of aircraft" to require implementation of its standards.[85]

The legislative history of the 1970 Clean Air Act Amendments further demonstrates Congress's intent to prompt effective and technology-forcing regulatory action. In 1970, Congress expanded EPA's authority to regulate mobile sources of pollution "to include authority to set air pollution emission standards for aircraft."[86] Explaining the implications of the 1970 amendments on EPA's authority to regulate mobile sources, the Committee on Public Works stated that "standards should be a function of the degree of control required" based "on the contribution of moving sources to deterioration of air quality," "not the degree of technology available today."[87]

EPA posits that the proposed rule is an "anti-backsliding cap on future emissions of airplanes by ensuring that all new type design airplanes are at least as efficient as today's airplanes."[88] However, where EPA has made a finding that current levels of emissions endanger public health and welfare, preventing further increases of pollution does not satisfy the purposes of the CAA.[89] Moreover, because airplane travel is increasing, under this Proposal, $CO_2$ emissions would increase by 40 percent to 53 percent above 2015 levels in 2040.[90] Thus, the Proposal does not even function to prevent backsliding, as EPA asserts, but will instead contribute to further harms to public health and welfare.

EPA relies on *National Association of Clean Air Agencies (NACAA) v. EPA*, 489 F.3d 1221 (D.C. Cir. 2007), in defense of its do-nothing Proposal[91] but that case does not authorize EPA's action here. In *NACAA*, EPA had, in 2004, issued a proposal to adopt a 1999 ICAO NOx standard just "three months before the 1999 ICAO standards were set to take effect."[92] Because manufacturers were already designing new engines to meet the tougher ICAO standards at the

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[83] 42 U.S.C. 7571(b) (1990); 80 Fed. Reg. at 37,804.
[84] *Control of Pollution from Aircraft and Aircraft Engines*, 38 Fed. Reg. 19,087, 19,089 (July 17, 1973); *see also Control of Air Pollution From Aircraft and Aircraft Engines; Emission Standards and Test Procedures*, 70 Fed. Reg. 69,664, 69,676 (Nov. 17, 2005) ("forward-looking language" of section 231 does not preclude EPA from setting a technology-forcing standard).
[85] 70 Fed. Reg. at 69,676.
[86] National Air Quality Standards Act of 1970, Report of the Committee on Public Works United States Senate together with Individual Views to Accompany S. 4358 at 23-24, 91st Cong., 2nd Session, Report No. 91-1196.
[87] *Id.*
[88] 85 Fed. Reg. at 51,571.
[89] 42 U.S.C. § 7401(a), (c); *see also Coalition for Responsible Regulation v. EPA*, 684 F.3d 102, 122 (D.C. Cir. 2012, *aff'd in part Util. Air Regulatory Group v. EPA*, 134 S. Ct. 2427 (2014) (noting in connection with EPA's endangerment findings for vehicles under Clean Air Act section 202 that EPA is to "utiliz[e] emission standards to prevent reasonably anticipated endangerment from maturing into concrete harm," consistent with the Act's "'precautionary and preventive orientation'" (quoting *Lead Indus. Ass'n., Inc. v. EPA*, 647 F.2d 1130, 1155 D.C. Cir. 1980)).
[90] *See* Technical Support Document at 105.
[91] 85 Fed. Reg. at 51,562.
[92] 489 F.3d at 1225.

time of EPA's proposal, that unusually short lead time did not impede the implementation of the 1999 ICAO standards even though it increased the stringency of the NOx standard by 16 percent. But in 2005, after the comment period on EPA's proposal had already closed, ICAO overtook EPA again, lowering the international NOx emissions standard a second time.[93] Under these circumstances, EPA decided to finalize the less stringent 1999 standards as it had proposed. Acknowledging that, in light of ICAO's newer 2005 standards, "[m]ore stringent [EPA] standards . . . will likely be necessary and appropriate in the future," EPA nonetheless adopted the 1999 ICAO standards because "assess[ing] the costs (and emission benefits) of more stringent standards" would have required additional time that EPA did not then have "since [it had] already gone past the implementation date of the [1999 ICAO] standards."[94] In light of these unusual and exigent circumstances, the *NACAA* court upheld EPA's decision.[95]

EPA's instant Proposal, covering its first greenhouse gas standards for aircraft, is materially different from the standards at issue in *NACAA*. There, the deadline for implementation of the more stringent 1999 ICAO standards was just three months from the date of EPA's proposal, and EPA could not possibly have reconsidered that proposal to evaluate, propose and potentially implement the *second* new ICAO standards within the remaining three months without causing U.S. planes to fall out of compliance with the 1999 ICAO standards. Instead, EPA determined—and the court upheld EPA's decision—to increase its own NOx standards by 16 percent immediately, while preparing to undertake a second rulemaking to evaluate more stringent standards.

By contrast, EPA here is not purporting to act under any exigencies. In fact, EPA projects that no new airplanes will be built that would require certification under the ICAO $CO_2$ standards for at least ten years.[96] Moreover, EPA's actions in *NACAA* of increasing the NOx standard's stringency by 16 percent were in line with the Clean Air Act's and section 231's mandate to reduce harmful emissions. Here, EPA's Proposal would have no effect on emissions at all.

Whatever discretion is afforded to EPA in adopting aircraft emissions standards, it does not encompass a rule that fails to achieve any reduction in greenhouse gas emissions even though the agency has determined that existing emissions levels endanger public health and welfare. The Proposal is patently unreasonable and contrary to the requirements of section 231.

## IV. The Proposal is Arbitrary and Capricious.

An agency rule is arbitrary and capricious "if the agency has relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of

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[93] *Id.*
[94] *Id.* at 1225-26.
[95] *Id.* at 1229-30.
[96] 85 Fed. Reg. 51,566; *see also* Technical Support Document at 39 ("The EPA is currently not aware of a specific model of a new type design airplane that is expected to enter service after 2020 (no announcements have been made by airplane manufacturers).").

agency expertise."[97] EPA's reasoning to support its Proposal is deeply flawed and demonstrates its disregard of its statutory obligation. EPA does not consider any of the statutory factors that must guide its determination of how to reduce emissions: what technology will be available to do so, what lead time would be adequate, or what the cost of compliance might be. 42 U.S.C. § 7571(a), (b). EPA also does not accurately assess the climate or human health and welfare costs that failure to reduce emissions will cause and conducts a deficient alternatives analysis.

### *A. The Proposal is arbitrary and capricious because it fails to consider the agency's duty to reduce greenhouse gas emissions to protect public health and welfare.*

EPA has an obligation under the Clean Air Act to reduce or prevent pollution consistent with the goal of protecting public health and welfare. This Proposal fails to fulfill this duty.

Clean Air Act section 231 is intended to promote the "public health [and] welfare,"[98] and imposes on EPA both a duty to conduct endangerment findings and "a post-endangerment finding duty to regulate" to reduce these emissions.[99] Yet even while EPA's endangerment findings make clear that greenhouse gas emissions from aircraft endanger public health and welfare and that "without substantial and near-term efforts to significantly reduce emissions, it can be expected that atmospheric concentrations of . . . GHGs will continue to climb and thus lead to ever greater rates of climate change,"[100] the Proposal ignores EPA's public health and environmental protection duties. The Proposal states that the ICAO fuel-efficiency-based metric "reasonably serves as a surrogate" for controlling greenhouse gas emissions from aircraft.[101] Elsewhere, EPA states that "[a]s a result of the 2016 [Endangerment] Findings, CAA sections 231(a)(2)(A) and (3) obligate the EPA to propose and adopt, respectively, GHG standards for these covered aircraft engines."[102] But the Proposal fails to offer any explanation as to how the proposed standards actually reduce or prevent pollution consistent with the goal of protecting public health and welfare. Nor can it, since EPA is clear that the Proposal does not reduce emissions.

For these reasons, the Proposal is a clear example of arbitrary agency decision-making:

> As the Supreme Court stated in *State Farm*, an agency's rule normally is arbitrary and capricious if it "entirely failed to consider an important aspect of the problem" before it. 436 U.S. at 43. A statutorily mandated factor, by definition, is an important aspect of any issue before an administrative agency, as it is for Congress in the first instance to define the appropriate scope of an agency's mission. When Congress says a factor is mandatory, that expresses its judgment that such a factor is important. In accordance with this principle, we have held that "the complete absence of any discussion" of a statutorily mandated factor "leaves us with no alternative but to conclude that [the agency]

[97] *Motor Vehicle Mfrs. Ass'n of U.S., Inc. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983).
[98] *See* 42 U.S.C. § 7571(a)(2)(A).
[99] *Center for Biological Diversity v. EPA*, 794 F. Supp. 2d 151, 159-62 (D.D.C. 2011).
[100] 81 Fed. Reg. at 54,444.
[101] 85 Fed. Reg. at 51,556.
[102] *Id.* at 51,557.

failed to take account of this statutory limit on [its] authority," making the agency's reasoning arbitrary and capricious.[103]

Because the Proposal does not address how the proposed standards will fulfill EPA's statutory duties, it is arbitrary and capricious.

### *B. The Proposal is arbitrary and capricious because EPA does not consider the costs and benefits of the reduction of other harmful aircraft emissions.*

As discussed, the combustion of aircraft fuel creates emissions of criteria and hazardous pollutants that cause well-recognized harm to human health and the environment.[104] NOx, in particular, is a precursor to ozone and particulate matter, pollutants with well-recognized, serious effects on human health and the environment.[105] Standards that increase aircraft fuel efficiency decrease fuel use, and thus the emissions of both greenhouse gases and these other pollutants. But EPA failed to consider these costs and benefits of its Proposal. It never assessed the amount of criteria and toxic pollutants emitted under the standard it proposed, nor under the two alternatives it did consider, nor under *any* alternative that would actually reduce greenhouse gases and thus these other pollutants. And it never estimated or compared the damage to human health done by criteria and toxic emissions resulting from the proposal or from any alternative course of action. EPA has consistently assessed, disclosed and compared the costs and benefits of increasing or reducing criteria and toxic pollutants in the greenhouse gas regulations it has issued for the nation's light duty vehicle fleet under section 202.[106] But in the Proposal, it did not consider this matter at all. EPA's failure to consider an important aspect of the problem before it is arbitrary and capricious.[107]

### *C. The Proposal is arbitrary and capricious because EPA does not adequately explain its reasoning and relies on factors Congress didn't intend to be considered.*

In articulating the purpose of the Proposal, EPA states that the rule was developed for the benefit of industry, to harmonize international aviation standards, and avoid imposing additional costs on manufacturers.[108] EPA does not discuss the purpose of section 231, nor the statutory

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[103] *Public Citizen v. Federal Motor Carrier Safety Admin.*, 374 F.3d 1209, 1216 (D.C. Cir. 2004) (quoting *United Mine Workers v. Dole*, 870 F.2d 662, 673 (D.C. Cir. 1989)).
[104] *See supra* n.23; Manisalidis 2020.
[105] ANPR, 80 Fed. Reg. at 37,784; *see also Cross-State Air Pollution Rule Update for the 2008 Ozone NAAQS*, 81 Fed. Reg. 74,504, 74,511 (Oct. 26, 2016) (noting that NOx is an "important precursor[] of regionally transported" $PM_{2.5}$ and ozone)
[106] *See, e.g., The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks,* 84 Fed. Reg. 24,174, 24,585 (April 20, 2020); *see also Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards; Final Rule*, 75 Fed. Reg. 25,324, 25,657 (May 7, 2010); *see also 2017 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards*, 77 Fed. Reg. 62,624, 63,119 (Oct. 15, 2012).
[107] *State Farm*, 463 U.S. at 43; *Michigan v. E.P.A.*, 576 U.S. 743, 753 (2015) (explaining that "reasonable regulation ordinarily requires paying attention to the advantages *and* the disadvantages of agency decisions").
[108] *See, e.g.*, 85 Fed. Reg. at 51,564 ("In order to promote international harmonization of aviation standards and to avoid placing U.S. manufacturers at a competitive disadvantage that likely would result if EPA were to adopt

factors that Congress directed EPA to consider in setting aircraft emission standards. International standard harmonization and beneficence to industry are not among the relevant factors Congress identified for setting emissions limits, yet these are the only factors EPA relies on to justify the Proposal. Therefore, EPA's reliance on them to justify the Proposal is improper.[109]

The Proposal correctly notes that, in addition to developing standards that meet the requirements of section 231, the U.S. must adopt standards that are at least as strict as those adopted by ICAO for planes that are certified in the U.S. to operate abroad without additional certification.[110] But EPA goes on to assert that standards that are in any way "different" from ICAO standards are not acceptable because they purportedly would disadvantage manufacturers and thwart international consistency.[111] EPA provides no legitimate basis for this assertion. Nothing prevents the U.S. from adopting standards that are more stringent than ICAO's (see Section IV.D., *infra*), and EPA has a responsibility to do so if that is what public health and environmental protection require.[112] At a minimum, under section 231, EPA must determine whether more stringent standards are necessary to protect public health and welfare, consider whether the requisite technology will be available to achieve those protections, and provide adequate lead time for its development. Instead, without considering these statutory requirements, EPA refuses to adopt stricter standards in the Proposal, because it "believes that meeting the United States' obligations under the Chicago Convention by aligning domestic standards with the ICAO standards, rather than adopting more stringent standards, will have substantial benefits for future international cooperation on airplane emission standards, and such cooperation is the key for achieving worldwide emission reductions."[113] EPA has provided no support in the record for this speculation. While concern for international emissions is laudatory,

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standards different from the standards adopted by ICAO, the EPA is proposing to adopt standards . . . [that match those] adopted by ICAO."); 51,556 (noting the proposed standards are "consistent with U.S. efforts to secure the highest practicable degree of uniformity").

[109] *State Farm*, 463 U.S. at 43 (An agency rule is arbitrary and capricious "if the agency has relied on factors which Congress has not intended it to consider.").

[110] 85 Fed. Reg. at 51,564, 51,557 ("The[] proposed standards would allow U.S. manufacturers of covered airplanes to remain competitive in the global marketplace. In the absence of U.S. standards for implementing the ICAO Airplane $CO_2$ Emission Standards, U.S. civil airplane manufacturers could be forced to seek $CO_2$ emissions certification from an aviation certification authority of another country . . . in order to market and operate their airplanes internationally").

[111] *Id.* at 51,564 ("We anticipate U.S. manufacturers would be at a significant competitive disadvantage if the U.S. fails to adopt standards that are aligned with the ICAO standards for $CO_2$ emissions."); *id.* at 51,584 ("By implementing the requirements that conform to ICAO requirements in the United States, we would remove any question regarding the compliance of airplanes certificated in the United States. The Proposal, if adopted, would facilitate the acceptance of U.S. airplanes and airplane engines by member States and airlines around the world. Conversely, U.S. manufacturers would be at a competitive disadvantage compared with their international competitors without this domestic action.").

[112] *Id.* at 51,564 (acknowledging that EPA can simply notify ICAO if it adopts more stringent standards). To the extent that EPA is basing its decision to align its standard with ICAO's on the false belief that it cannot adopt more stringent standards under its international treaty obligations, the Proposal is subject to vacatur for legal error if finalized. *See Prill v. NLRB*, 755 F.2d 941, 947-48 (D.C. Cir. 1985) ("An agency decision cannot be sustained, however, where it is based not on the agency's own judgment but on an erroneous view of the law. For it is a fundamental principle of law that 'an administrative order cannot be upheld unless the grounds upon which the agency acted in exercising its powers were those upon which its action can be sustained.'") (citing *SEC v. Chenery Corp.*, 318 U.S. 80, 95 (1943)).

[113] 85 Fed. Reg. at 51,564.

EPA's mandate is to set health-protective standards for U.S. airplanes. Even if international emissions reductions were EPA's central obligation, refusing to consider whether emissions from U.S. planes can be reduced is arbitrary and capricious in light of the fact that U.S.-departing flights alone contributed 24 percent of global aviation's passenger transport-related carbon dioxide emissions in 2018.[114] Furthermore, more stringent standards could actually support future international cooperation, as ICAO has adopted a goal of carbon neutral growth for international aviation from 2020 and is currently exploring the feasibility of a long-term aspirational climate goal.[115]

In addition, EPA states its belief that "requiring U.S. manufacturers to certify to a different standard than has been adopted internationally (even one more stringent) could have disruptive effects on manufacturers' ability to market planes for international operation."[116] EPA provides no support for this claim either. For example, EPA could adopt as part of its standards a more stringent fuel efficiency requirement that has an earlier implementation date but employs the same test and measurement procedures as the ICAO standards to avoid any difficulties in comparing standards for certification purposes. Further, EPA does not explain why more stringent standards would disadvantage manufacturers rather than advantage them by decreasing fuel costs and thus directly increasing profit margins, while ushering in the modernization and emissions reduction that will allow the industry to survive and evolve.

Lastly, EPA also fails to explain how its additional proposal to adopt a regulatory exemption procedure established by ICAO relates to the purpose of section 231 or the statutory factors that Congress directed EPA to consider. The ICAO exemption criteria allow in-production planes to be modified between 2023 and 2028 so long as modifications do not exceed a 1.5 percent degradation in the $CO_2$ metric value.[117] As currently written, this exemption procedure appears to allow manufacturers or airlines to propose a series of smaller changes that, even if cumulatively more than a 1.5 percent degradation in the $CO_2$ metric value, would still not trigger the standard. EPA failed to analyze the emissions consequences of this provision or justify it as in accordance with section 231, aside from stating that it was adopted by ICAO.

EPA has some discretion under section 231 to consider cost, safety, and noise when setting emission standards,[118] and must determine whether the effective date of a regulation "permit[s] the development and application of the requisite technology."[119] However, EPA has not tied the purpose of the Proposal to these factors. A decision to balance the cost of imposing requirements that more aggressively reduce emissions with the potential safety and environmental benefits is different from a decision to dismiss any standard that diverges from the international standard as categorically harmful to manufacturers and therefore unworthy of consideration. EPA is not permitted to prioritize factors that are irrelevant to its duties under section 231 of the Clean Air Act.

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[114] Graver 2019, *supra* n.21.
[115] ICAO, Resolution A40-18 of Resolutions Adopted by the Assembly in the 40th Session (October 2019), https://www.icao.int/environmental-protection/Documents/Assembly/Resolution_A40-18_Climate_Change.pdf.
[116] 85 Fed. Reg. at 51,564.
[117] *Id.* at 51,571, 51,592.
[118] *Nat'l Ass'n of Clean Air Agencies v. EPA*, 489 F.3d 1221, 1230 (2007).
[119] 42 U.S.C. § 7571(b).

### *D. The Chicago Convention is not a barrier to adoption of standards that protect public health and welfare.*

EPA's emphasis on "promot[ing] international harmonization"[120] seems to suggest that the U.S.'s treaty obligations are a barrier to setting the standards necessary to curb climate pollution. They are not. The United States has the sovereign power under international law to regulate activities within its jurisdiction that have an adverse effect on its citizens.[121]

Under the Chicago Convention, EPA has jurisdiction over both U.S. registered aircraft and foreign aircraft operating in U.S. airspace.[122] As EPA admits,[123] Article 38 of the Chicago Convention explicitly authorizes the U.S. to depart from international standards and procedures and adopt stricter ones for these aircraft if the U.S. "deems it necessary to adopt regulations or practices differing in any particular respect from those established by an international standard," requiring only notice to ICAO regarding the differences between the state and international standards.

Indeed, the U.S. has opted in the past to adopt standards that are stricter than ICAO's.[124] For example, the U.S. phased out noisy in-service aircraft on a quicker timeframe than ICAO

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[120] 85 Fed. Reg. at 51,564.

[121] Restatement (Third) of The Foreign Relations Law of the United States § 402 (1987) (stating that "[A] state has jurisdiction to prescribe law with respect to . . . conduct that, wholly or in substantial part, takes place within its territory." International law recognizes links of territoriality and nationality as justifying the exercise of State jurisdiction.); *see also* Am. Soc'y Int'l L., "Jurisdictional, Preliminary, and Procedural Concerns," in Benchbook on International Law § II.A (Diane Marie Amann ed., 2014), *available at* https://www.asil.org/sites/default/files/benchbook/ASIL_Benchbook_Complete.pdf; *see generally The Case of the S.S. Lotus (Fr. v. Turk.)*, 1927 P.C.I.J. (ser. A) No. 10, at 18 (1927) (discussion of territorial jurisdiction in international law including a statement that "jurisdiction is certainly territorial").

[122] Chicago Convention chs. 2-3 (establishing the rights and privileges afforded to contracting states in relation to aircraft operating within their borders). Article 17 of the Chicago Convention establishes that "[a]ircraft have the nationality of the State in which they are registered." Therefore, all U.S. registered aircraft have U.S. nationality. The Endangerment Findings explicitly considered the impact of emissions aircraft flying domestically in the United States and aircraft flying internationally that have a departure point in the U.S., on the basis that these are the emissions "assigned" to the United States under the IPCC Guidelines for National Greenhouse Gas Inventories. 81 Fed. Reg. at 54,465, 54,470 n.265. In 2008, EPA also indicated that a declining fleet average GHG emission standard "could cover all domestic operations and international departures of domestic airlines." *Regulating Greenhouse Gas Emissions Under the Clean Air Act*, 73 Fed. Reg. 44,354, 44,472-73 (July 30, 2008) (emphasis added). Article 11 of the Chicago Convention also establishes that "the laws and regulations of a contracting State relating to . . . the operation and navigation of such aircraft while within its territory, shall be applied to the aircraft of all contracting States without distinction as to nationality, and shall be complied with by such aircraft upon entering or departing from or while within the territory of that State." Foreign-flagged aircraft can be made subject to operational and economic controls to reduce greenhouse gas emissions so long as the controls are imposed in a non-discriminatory manner.

[123] 85 Fed. Reg. at 51,559-60.

[124] *See* Federal Aviation Administration, Interagency Comments on Proposed NPRM at 1 (May 15, 2020), available at https://downloads.regulations.gov/EPA-HQ-OAR-2018-0276-0038/attachment_1.pdf ("While we strive to make sure our aviation regulations are in line with ICAO standards per Article 37, we sometimes decide not to follow the ICAO standard and instead opt to file a difference per Article 38"); *id.* at 14 ("Our treaty obligations do allow for us to file a difference if we opt not to follow an ICAO standard, so there is no obligation to follow ICAO standards."); Paul Stephen Dempsey, *Compliance & Enforcement in International Law: Achieving Global Uniformity in Aviation Safety*, 30 N.C. J. Int'l L. & Com. Reg. 1, 17 n.65 (2004) ("[A]s of 2000, 55 states had notified ICAO of the

did.[125] In making the decision to embrace a more stringent standard, the United States noted that "aviation noise management is crucial to the continued increase in airport capacity" and "use of quieter aircraft" could alleviate "community noise concerns."[126] Notably, the U.S. chose to expedite the phase-out of noisier aircraft even though the Government Accountability Office estimated at the time that airlines' compliance costs ranged from $2.1 to $4.6 billion in 1990 dollars,[127] and airline industry groups estimated the cost to be much higher.[128]

EPA has also previously agreed that it can set more protective *emissions* standards under the Chicago Convention. In an aviation nitrogen oxides rulemaking in 2005, the Agency stated:

> The Chicago Convention does not require all Contracting States to adopt identical airworthiness standards. Although the Convention urges a high degree of uniformity, it is expected that States will adopt their own airworthiness standards, and it is anticipated that some states may adopt standards that are more stringent than those agreed upon by ICAO.[129]

EPA acknowledged in that rulemaking that "more stringent standards" than ICAO's would "likely be necessary and appropriate in the future,"[130] but argued that incorporation of ICAO standards into U.S. law was an appropriate first step because the agency was already several years behind in the regulatory process and failure to implement the 1999 NOx standards immediately would result in the decertification of U.S. aircraft.[131] In the 2016 Endangerment Findings, EPA announced that it expected to proceed with emission standards "of at least equivalent stringency to the international $CO_2$ standard," clearly indicating its view that the

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differences between their domestic laws and Annex 1."); Mark Edward Peterson, *The UAV and the Current and Future Regulatory Construct for Integration Into the National Airspace System*, 71 J. Air L. & Com. 521, 559 n.197 (2006) ("A review of the filed differences [pursuant to Article 38] reveals that most deal with differences in terminology or involve more stringent practices.").

[125] U.S. General Accounting Office, GAO-01-1053, Aviation and the Environment: Transition to Quieter Aircraft Occurred as Planned, but Concerns about Noise Persist (2001) ("USGAO 2001"), https://www.gao.gov/assets/240/232737.pdf; 49 U.S.C. § 47528(a); International Civil Aviation Organization, GIACC/3-IP/1, Agenda Item 2: Review of aviation emissions related activities within ICAO and internationally Parallels between Noise and $CO_2$ Environmental Goals (July 1, 2009), at ¶ 2.2 https://www.icao.int/environmental-protection/GIACC/Giacc-3/Giacc3_ip01_en.pdf (deadline that is 15 months after deadline set out in the United States' Aircraft Noise and Capacity Act of 1990).

[126] 49 U.S.C. § 47521; *see also* USGAO 2001 at 9.

[127] USGAO 2001 at 11.

[128] *Id*. (Air Transport Association of America, Inc. estimated airlines' transition costs at $175 billion).

[129] *Emission Standards and Test Procedures*, 70 Fed. Reg. at 69,667.

[130] *Nat'l Ass'n of Clean Air Agencies v. EPA*, 489 F.3d 1221, 1225 (D.C. Cir. 2007) (quoting 70 Fed. Reg. at 69,676-78).

[131] 489 F.3d at 1224-26 (EPA explained in its Final Rule that it adopted the ICAO standards because it needed more time to "fully analyze[] the emissions benefits . . . and the implementation costs of [wider applicability]").

ICAO standards did not prevent it from adopting a more stringent standards.[132] EPA has not acknowledged, let alone explained, its shift of position between 2016 and 2020.[133]

Given that the proposed ICAO standards will not reduce domestic emissions, EPA has the ability and responsibility to issue standards that will. Substantial emissions reductions are necessary to avoid the worst effects of climate change. Moreover, the U.S. is by far the greatest emitter of aircraft greenhouse gases and therefore has a unique obligation to reduce those emissions through technology-forcing regulations. EPA may not use ICAO's inaction to avoid its duty to reduce greenhouse gas pollution to protect public health and welfare.

*E. EPA's consideration of alternatives is arbitrary and capricious.*

EPA failed to analyze the costs and benefits of a meaningful range of possible emission standards. Though EPA acknowledges that it was obligated to propose standards as a result of its 2016 findings that the $CO_2$ and other gases emitted by aircraft "endanger the public health and welfare of current and future generations,"[134] the Proposal is, remarkably, devoid of any analysis of alternatives that would result in *any* greenhouse gas emissions reductions, let alone the significant reductions necessary to address the endangerment findings.

The Proposal itself contains only a passing reference to alternatives, stating that just one of the two alternatives EPA considered reduced emissions, "but the additional emission reductions are relatively small from this alternative and do not justify differentiating from the international standards and disrupting international harmonization."[135] As discussed below, a close look at the Technical Support Document reveals that the EPA has misstated the emissions reduction potential of the more-stringent alternative it considered and rejected, and its reasons for doing so are arbitrary and capricious. Neither alternative considered reduces greenhouse gas emissions.

In the Technical Support Document, two alternative scenarios were presented. Both were derived from the ten stringency options considered half a decade ago during the international negotiations to set the ICAO standards. EPA selected two scenarios (Scenarios 2 and 3 in the table below) and compared them to the Proposal (Scenario 1) "to consider whether moving the implementation date(s) forward (for in-production airplanes) and tightening the stringency (for both in-production and new type designs) would make a meaningful difference."[136]

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[132] 81 Fed. Reg. at 54,471; *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 Rulemakin*g, 80 Fed. Reg. at 37,766 (noting EPA would only adopt the "international aircraft $CO_2$ standard [if it was] consistent with CAA section 231 and . . . appropriate for domestic needs in the United States").

[133] *FCC v. Fox Television Stations, Inc.*, 556 U.S. 502, 515 (2009) (an agency must provide a reasoned explanation for changing a position and disregarding prior findings).

[134] 85 Fed. Reg. at 51,557.

[135] *Id.* at 51,564.

[136] Technical Support Document at 126.

Table 1 – Proposal and Alternative Scenarios[137]

| Scenario | Option | Description of Stringency and Effective Date |
|---|---|---|
| 1 | Proposal | New Type: 2020 (2023 for new type airplanes ≤ 60 tons & ≤ 19 seats)<br>In Production: 2028 (2023 for GHG adverse or significant in-production type changes) |
| 2 | Pull Ahead Some In-Production Dates | New Type: 2020 (2023 for new type airplanes ≤ 60 tons & ≤ 19 seats)<br>In Production: 2023 (2025 for in-production airplanes ≤ 60 tons, 2028 for in-production dedicated freighters) |
| 3 | Pull Ahead Some New Type and In-Production Dates and More Stringent Levels | New Type: 2020 and 2.5% more stringent than Scenario 1 (2% more stringent for new type airplanes ≤ 60 tons)<br>In Production: 2023 and 2% to 7% more stringent than Scenario 1 (2025 and 3% to 4% more stringent for in-production airplanes ≤ 60 tons, 2028 for in-production dedicated freighters) |

EPA looked at the existing airplane fleet and its projected evolution to determine which models would be impacted under Scenario 2 and 3 relative to the Proposal. Although the discussion of the alternative scenarios is opaque, outdated, and misleading, EPA ultimately admits that neither the Proposal nor either of the alternatives examined would reduce greenhouse gas emissions or increase costs for manufacturers.

Scenario 2 includes the "earliest implementation date that is practical" among the ten scenarios considered at the ICAO negotiations.[138] The Technical Support Document first states that all airplane models except one are "expected to be in production and compliant with" the accelerated 2023 in-production delivery date in Scenario 2.[139] EPA then notes that the outlier model—a Boeing 767-3ERF freighter airplane—is expected to be out of production by the earlier 2023 in-production airplane implementation date.[140] (Moreover, due to the delay of the in-production deadline to 2028 for dedicated freighters, as displayed in Table 1, and the plane's eligibility for an exemption for "airplanes at the end of their production life," the plane could escape the 2023 deadline in any case).[141] Scenario 2 itself therefore does nothing to affect the status quo, and EPA admits that it does "not . . . result in additional GHG reductions or costs relative to the proposed standards or Scenario 1."[142]

[137] *Id.* at 128 (adopted from Table 6-4).
[138] *Id.* at 126.
[139] *Id*. at 132.
[140] *Id.* at 133.
[141] *Id.* at 132-33.
[142] *Id.* at 132.

Scenario 3 "represents the most stringent option analyzed" during the international negotiations.[143] It accelerates the implementation date for in-production airplanes and increases the stringency of the standards for new type and in-production airplanes—it is the position the United States advocated for during ICAO negotiations.[144] Despite its support for Scenario 3 in 2015, EPA now claims that "there are limited [GHG] reductions and costs from Scenario 3."[145] However, EPA admits that any reductions are the result of the scenario's "impacts *on a single airplane model*, the Airbus A380."[146] EPA projected the emissions reductions associated with Scenario 3 to be "limited" because few A380s were expected to be built after the early implementation date for in-production airplanes of 2023.[147] In fact, EPA admits that even that conclusion about the limited emissions reductions associated with these aircraft was wrong because EPA ran its analysis before Airbus made a critical announcement about the plane in question: Airbus now plans to end production of A380s ahead of the early 2023 implementation date (and is eligible for an exemption even if it does continue production).[148] Considering the end of A380s production, Scenario 3 itself ultimately results in "no costs and no emission reductions."[149] Notably, the more accelerated and stringent standards would cost industry *nothing*, but EPA still refused to adopt them for reasons of "global consistency" and to ensure U.S. manufacturers are not "at a competitive disadvantage."[150]

There are several ways that EPA's selection of the Proposal instead of other alternatives is arbitrary and capricious. First, EPA's justification for eliminating alternative scenarios 2 and 3, which offer earlier implementation dates, is unsupported by the evidence before the agency. The reasons provided in the Technical Support Document for rejecting these scenarios are unsound. "Global consistency" is not required for the U.S. to meet its international treaty obligations (see Section IV.D., *supra*), and U.S. manufacturers cannot be at a "competitive disadvantage" if an earlier implementation date and more stringent standards would not cost them anything. EPA's statements in the Proposal are also unsupported. EPA states that Scenario 3 results in "some additional GHG emission reductions compared to the proposed standards,"[151] but this is flatly contradicted by the conclusion in the Technical Support document that Scenario 3 results in "no costs and no emission reductions." Elsewhere, EPA states that it must give manufacturers "knowledge of the level of future standards at least 8 years in advance of any new type design entering service."[152] While lead time may be a relevant consideration for standards that actually reduce emissions by requiring changes in type design, it is not relevant, let alone

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[143] *Id.* at 126.
[144] *Id.* at 129-30.
[145] *Id.* at 133.
[146] *Id.*
[147] *Id.* at 136.
[148] *Id.* at 133 ("The early exit of A380 would result in no costs and no emission reductions from Scenario 3. However, this EPA analysis of Scenario 3 was conducted prior to Airbus's announcement, so the analysis did not consider the effect of the A380 ending production in 2021. Thus, this analysis results in limited costs and emission reductions for Scenario 3"), 137 ("the A380 could apply to utilize the proposed exemption provisions (described in section V.E of the preamble), which are intended for airplanes at the end of their production life. If Airbus chose to apply for an exemption and it was granted, the A380 would not need to respond to Scenario 3, and thus, there would be no resultant emission reductions or costs for Scenario 3.").
[149] *Id.* at 133.
[150] *Id.* at 146.
[151] 85 Fed. Reg. at 51,564.
[152] 85 Fed. Reg. at 51,567.

necessary, for a Proposal that EPA acknowledges manufacturers would already meet should it be implemented earlier. At a minimum, EPA should have explained its reasoning for not adopting Scenarios 2 and 3. In 2015 and 2016, EPA spent months developing unique data and analysis to inform its position to support Scenario 3 at the ICAO negotiations.[153] "[F]or the first time in the 30+ year history" of the negotiations, EPA provided objective information that came from a non-industry source.[154] EPA now arbitrarily eschews that option based on an "explanation . . . that runs counter to the evidence before" it.[155]

Second and more importantly, EPA's failure to consider any alternatives that actually fulfill the emissions-reduction purpose of the Proposal puts on full display EPA's refusal to consider the most important aspect of the problem before the agency: the need to protect public health and welfare from the overwhelming damage done by greenhouse gas-induced climate change. Instead, EPA, relying on its commitment to a fabricated "international harmonization" polestar, arbitrarily and without explanation limits its alternative considerations to only those considered by ICAO and, even among those, considers just a select three. That decision unlawfully precludes consideration of alternatives consonant with the forward-looking, preventative approach demanded by section 231 and the Clean Air Act. There are many obvious alternative standards to those considered at ICAO, including those cited in Section V, *infra*.[156] EPA has previously proposed some alternative options for regulation in its endangerment findings and advanced notice of proposed rulemaking, though those are now more than five years out of date. Today, EPA must rely on the best science and what is currently possible and necessary to address the climate emergency, addressing five additional years of information since the ICAO negotiations.

Finally, even if EPA had properly considered an adequate array of alternatives, the way it conducted its alternative analysis itself was flawed. In analyzing alternatives, agencies must refrain from "put[ting] a thumb on the scale by undervaluing the benefits and overvaluing the costs of more stringent standards."[157] But that is exactly what EPA did. As the Institute for Policy Integrity explains in its concurrently submitted comment letter, EPA improperly focused only on domestic climate damages and applied an inappropriate seven percent discount rate to those damages. The undersigned incorporate these criticisms by reference. EPA's use of the social domestic cost of carbon tool to determine that the benefits of Scenario 3 were outweighed by its costs is particularly egregious.[158] The Trump administration replaced long-standing social cost of greenhouse gas emission tools with "interim" tools to artificially drive down the benefits of environmental rules. A district court recently found that use of the interim social cost of

[153] Charmley email 2/16/2016.
[154] *Id*.
[155] *State Farm*, 463 U.S. at 43.
[156] *See Int'l Ladies' Garment Workers' Union v. Donovan*, 722 F.2d 795, 816 n.41, 817-18 (D.C. Cir. 1983) (agencies must consider "obvious" alternatives and provide an adequate explanation when alternatives are rejected: "the agency's consideration of some alternatives does not free it from considering other obvious alternatives. A contrary holding would provide agencies an easy means to circumvent this aspect of reasoned decisionmaking, since they could, according to the Government, avoid considering obvious and potentially viable alternatives simply by showing that they considered any alternatives at all.").
[157] *Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin.*, 538 F.3d 1172, 1198 (9th Cir. 2008).
[158] Technical Support Document at 144-146. As explained above, Scenario 3 does not actually reduce emissions nor impose any costs because the type of plane affected by this scenario is going out of production ahead of the compliance deadline.

methane tool was arbitrary and capricious: "an agency simply cannot construct a model that confirms a preordained outcome while ignoring a model that reflects the best science available."[159] In particular, the court determined that the interim tool was unlawful because it replaces peer-reviewed models that use the best available data;[160] ignores the impacts of climate change on millions of Americans living abroad and on U.S. interests due to worldwide climate disruption;[161] underestimates the U.S.' share of global damages from emissions;[162] and overstates the significance of the regulatory rules and orders cited to justify the new rule, as those rules and orders do not require exclusion of global impacts.[163] The same principles and logic that the district court found so flawed when it examined the interim tool to assess the domestic cost of methane underpin the interim tool to assess the domestic cost of carbon. Reliance on that tool is arbitrary and capricious.

EPA must also account for the staggering costs associated with further delay in reducing greenhouse gas emissions. The cost of delaying the necessary cuts to the nation's greenhouse gas emissions is extremely steep and irreversible, rising exponentially as delay continues.[164] Based even on highly conservative assumptions (which omit, for example, the effects of crucial tipping points such as methane releases from melting permafrost), the cost of *delay alone* was found in the Obama administration's now-outdated Cost of Delay Report to be at least $150 billion for *every year* of delayed action if the delay results in overshooting the increase of temperatures over pre-industrial levels by just one degree Celsius, and sharply higher annually for every degree of warming thereafter.[165] Every year of unnecessary delay in reducing greenhouse gas emissions from aircraft in the face of steeply rising, persistent, and irreversible costs, including the acknowledged possibility that mitigation will be too late altogether, is unreasonable and unjustifiable.

## V. Proper Consideration of the Endangerment Findings, Purpose of the Clean Air Act, and Other Factors Demands the Promulgation of Ambitious, Technology-Forcing Standards.

EPA has both the authority and the obligation to immediately implement strong, technology forcing standards to reduce U.S. aviation emissions to address the climate crisis. To effectively reduce greenhouse gas emissions from the aviation sector, emission standards should: (1) apply to in-service aircraft, which have a lifespan of 25-30 years, not just to new aircraft and new aircraft designs; (2) include the emissions reductions achievable through both airframe design and operational improvements;[166] and (3) include a ratchet mechanism to decrease

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[159] *California v. Bernhardt*, No. 4:18-cv-05712-YGR, 2020 U.S. Dist. LEXIS 128961, at *84 (N.D. Cal. July 15, 2020).
[160] *Id.* at *77-*78.
[161] *Id.* at *81.
[162] *Id.*
[163] *Id.* at *78-*79.
[164] The White House, Cost of Delaying Action to Stem Climate Change (Jul. 29, 2014) at 2, *available at* https://obamawhitehouse.archives.gov/sites/default/files/docs/the_cost_of_delaying_action_to_stem_climate_change.pdf.
[165] *Id.*
[166] EPA has explicitly and extensively considered setting aviation emission standards that take into account reductions achievable through both aircraft design modifications and operational improvements. *Regulating Greenhouse Gas Emissions Under the Clean Air Act*, 73 Fed. Reg. at 44,470-473.

emissions over time and work to decarbonize the industry. Studies suggest that the most effective way of incorporating these three features would be to set a declining fleetwide average standard, which would allow airlines to reduce their emissions through operational changes and design improvements, decreasing demand growth, electrifying aircraft, or some combination of these options.[167]

### *A. Standards should apply to new and existing aircraft.*

EPA has the authority to regulate in-use aircraft and must use it to work toward decarbonization of the sector in line with what climate science and equity demand. Even if the Proposal were to set more stringent engine emission standards, they would be insufficient to curb aviation-related emissions without applying to in-service aircraft because planes have decades-long lifespans.[168]

In contrast to other mobile source provisions that limit standard-setting authority to "new" engines and vehicles, section 231 does not distinguish between new and existing sources. Section 231 instead authorizes EPA to establish emission standards for "any class or classes of aircraft engines."[169] Thus, EPA is empowered to regulate emissions from both new and existing aircraft. In fact, EPA has always interpreted section 231 in this way. The emissions controls EPA first adopted in 1973 included retrofit standards for in-use aircraft engines.[170] In 2008, EPA referred to its ability to regulate "previously certified engines" and to setting standards based on fleet average performance.[171] In 2015, EPA again reiterated its understanding that section 231 authorizes regulation of existing aircraft.[172]

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[167] Rutherford, Dan, Standards to promote airline fuel efficiency, International Council on Clean Transportation (2020), https://theicct.org/sites/default/files/publications/Airline-fuel-efficiency-standard-2020.pdf. According to the International Council on Clean Transportation, a declining fleet average standard, requiring airlines to reduce their emissions, could yield 2.5 percent annual fuel efficiency improvements. In this scenario, fuel efficiency improvements occur via three main pathways: (1) replacing older aircraft with newer, more fuel-efficient aircraft; (2) improving operations to carry more passengers and freight per flight and to fly more directly to destinations; and (3) finding optimal flight paths and avoiding congestion near airports using advanced air traffic management. Historically, replacing older aircraft has led to fuel burn reductions of 1.3 percent per year (since the late 1960s), operational improvements have led to reductions of 0.5 percent, and advanced air-traffic management has led to reductions of 0.2 percent, producing total reductions of two percent. These historic trends can be improved upon.

[168] Aircraft are generally assumed to have about a 25-30 year lifespan. 73 Fed. Reg. at 44,471.

[169] 42 U.S.C. § 7571(a)(2)(A) (1990); *compare* section 7571(a)(2)(A), *with* section 7521(a)(1) (authorizing emission standards for "any class or classes of new motor vehicles or new motor vehicle engines"). "Where Congress includes particular language in one section of a statute but omits it in another section of the same Act, it is generally presumed that Congress acts intentionally and purposely in the disparate inclusion or exclusion." *Bates v. United States*, 522 U.S. 23, 29-30 (1997) (internal quotations and citations omitted).

[170] *Control of Air Pollution from Aircraft and Aircraft Engines*, 38 Fed. Reg. at 19,089.

[171] *Regulating Greenhouse Gas Emissions Under the Clean Air Act*, 73 Fed. Reg. at 44,472.

[172] *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. at 37,791 n.203 (citing fuel venting and smoke number standards that applied to in-use aircraft and noting that "unlike the EPA's authority to promulgate emission standards for motor vehicles under CAA section 202(a) or for nonroad engines and vehicles under section 213(a), section 231 of the CAA does not restrict the EPA's authority to set standards for only new aircraft.").

EPA has not explained why it has abandoned these approaches. EPA should consider implementing regulations that apply to the most polluting aircraft, regardless of their status as existing or new.[173] At a minimum, EPA must consider applying its standards to *all* classes of aircraft, including in-service aircraft in addition to all new-in production aircraft and new designs, and provide a reasonable explanation for any decision not to regulate them.[174]

### *B. Standards should include emissions reductions achievable through design and operational improvements.*

A wide range of regulatory options are available to curb aircraft greenhouse gas emissions. EPA has long assumed that emission standards may be met through operational efficiencies where those would be more cost-effective than applying certain technologies to the engine itself,[175] and has generally set performance standards that offer flexibility as to the technologies used to achieve the standards. In the 2008 ANPR, EPA specifically discussed "a declining fleet average emissions program" which would involve consideration of efficiency gains from improved "engine, aircraft and operational greenhouse gas control[s]."[176] EPA also reiterated in the 2015 ANPR that the "broad degree of discretion" afforded the agency under section 231 enables reconciliation of ICAO's holistic "aircraft standards" with domestic standards "*even if* the GHG standards take a different form than the traditional thrust-based NOx aircraft engine standards."[177] EPA listed a wide range of technologies that can cost-effectively reduce emissions and that "illustrate that it is best to consider the aircraft as a whole in addressing $CO_2$ emissions."[178]

Operational improvements that ultimately reduce fuel consumption must also be considered, including:

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[173] Such phase-out regulations could be modeled on FAA's regulations to phase out the loudest civil turbojet aircraft. *See Adoption of Statutory Prohibition on the Operation of Jets Weighing 75,000 Pounds or Less That Are Not Stage 3 Noise Compliant*, 78 Fed. Reg. 39,576 (July 2, 2013) (prohibiting the operation of jet airplanes with a maximum weight of 75,000 pounds or less in the contiguous United States after December 31, 2015, unless they meet Stage 3 noise levels).

[174] *See, e.g.*, *State* Farm, 463 U.S. at 47-49 (reaffirming that "an agency must cogently explain why it has exercised its discretion in a given manner").

[175] *Control of Air Pollution from Aircraft and Aircraft Engines*, 38 Fed. Reg. at 19,089 ("Commenters representing general aviation interests opposed the introduction of emission standards applicable to piston engine aircraft, on the arounds that compliance would require introductions of exhaust system reactors which would have drastic and costly effects on the configuration of the entire aircraft. The Agency has concluded that sufficient evidence is already available in the form of measured emissions data on current aircraft to indicate that the *proposed standards can be met by improved fuel management and will not require exhaust system reactors*.")

[176] *Regulating Greenhouse Gas Emissions Under the Clean Air Act*, 73 Fed. Reg. at 44,473. Section 231's language is similar to that in Section 202, under which EPA has historically employed a fleet-wide averaging approach to regulate of emissions from new motor vehicles. The D.C. Circuit has upheld this approach as lawful, emphasizing the "absence of any clear evidence that Congress intended to prohibit averaging" under section 202 and the strong policy arguments for adopting this approach. *See NRDC v. Thomas*, 805 F.2d 410, 425 (D.C. Cir. 1986).

[177] *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. at 37,794, n.227 (emphasis added).

[178] *Id*. at 37,797 (discussing use of advanced materials, new manufacturing processes, aircraft changes to improve propulsion and aerodynamics, and means to reduce drag and improve combustion and engine cycle refinements*).*

- Minimizing engine idling time on runways and employing single engine taxiing;[179]
- Reducing engine thrust and reverse during high-intensity periods such as take-off and landing;[180]
- Optimizing timetables, route networks, and flight frequencies to reduce stopovers and select fuel-efficient routes;[181]
- Reducing the use of auxiliary power units;[182]
- Reducing the amount of excess fuel carried;[183]
- More regular maintenance and cleaning of engines and airframes to correct minor deterioration;[184] and
- Retiring older, more polluting aircraft in favor of newer, more efficient aircraft.

Because the electrification and decarbonization of air travel lags behind the decarbonization of other transportation modes, it is essential that all possible opportunities for emission reduction are considered in setting aircraft engine greenhouse gas emission standards. Any standards should be based not just on the reductions that can be gained through technological innovation at the engine, but also through airframe design and operational improvements.

### *C. Standards should be technology forcing.*

Congress intended the Clean Air Act to be a technology-forcing statute, and section 231 in particular gives EPA the ability to establish standards based on "the degree of control required" to address the "contribution of moving sources to deterioration of air quality."[185] In describing EPA's responsibilities with respect to aircraft emissions in 1970, the Senate noted that EPA is "expected to press for the development and application of improved technology rather than be limited by that which exists."[186]

The statute itself provides that standards should take effect "after such period as [EPA] finds necessary . . . to permit *the development* . . . of the requisite technology."[187] Thus, as EPA explained in its first rulemaking under section 231, "the standards set by EPA may reflect technology which may reasonably be obtained within a given time frame but which is not yet

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[179] Waitz, Ian A. et al., Aviation and the Environment: A National Vision Statement, Framework for Goals and Recommended Actions, Report to the United States Congress (Dec. 2004) ("Aviation & the Environment") at 34, *available at*: http://web.mit.edu/aeroastro/partner/reports/congrept_aviation_envirn.pdf; Center for Clean Air Policy and Northeast States for Coordinated Air use Management, Controlling Airport Related Pollution, (June 2003) ("CCAP Report") at III-7-8, *available at*: https://crp.trb.org/acrp0267/controlling-airport-related-air-pollution/.
[180] CCAP Report at III-9.
[181] CCAP Report at III-7-11; *see also* Aviation & the Environment at 34.
[182] Aviation & the Environment at 34.
[183] *Id.*
[184] *Id.*
[185] National Air Quality Standards Act of 1970, Report of the Committee on Public Works United States Senate together with Individual Views to Accompany S. 4358 at 24, 91st Cong., 2nd Session, Report No. 91-1196.
[186] *Id.*
[187] 42 U.S.C. 7571(b) (1990).

available."[188] EPA in 2005 again confirmed its authority to implement a "technology-forcing standard," and the agency need not "demonstrate that a [necessary] technology is currently available universally or over a broad range of aircraft" to require implementation of its standards, so long as "sufficient lead time" is provided.[189]

### *D. Greenhouse Gas reductions from aircraft are readily achievable and EPA must set standards that avert climate catastrophe.*

There is no doubt that airplane pollution can be dramatically reduced. For example, recent reports have documented the 51% fuel efficiency performance gap between the worst- and best-performing transatlantic air carriers,[190] have noted that the rate of fuel burn reduction for new aircraft could be accelerated up to 2.2% per year through 2034, surpassing the 1.3% per year achieved historically,[191] and have described the increasing availability of hybrid and all-electric technology.[192]

In the case of $CO_2$, the "degree of control required" to address the "contribution of [aircraft] to deterioration of air quality" [193] is high. EPA has the ability to be much more aggressive in pressing for the development of improved technology by, for example, implementing a declining fleetwide average standard that allows airlines to reduce their emissions by increasing fuel efficiency through operational changes and design improvements, decreasing demand growth, electrifying aircraft, or some combination of these options. To avoid catastrophic climate change, EPA must implement standards that far exceeds ICAO's standards in both stringency and scope.

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[188] *Control of Pollution from Aircraft and Aircraft Engines*, 38 Fed. Reg. at 19,089.

[189] *Control of Air Pollution From Aircraft and Aircraft Engines; Emission Standards and Test Procedures*, 70 Fed. Reg. at 69,676 ("forward-looking language" of section 231 does not preclude EPA from setting a technology-forcing standard, and "the Agency is not limited in identifying what is 'technologically feasible' as what is already technologically achieved").

[190] Kwan, Irene & Dan Rutherford, Transatlantic Airline Fuel Efficiency Ranking, 2014, International Council on Clean Transportation (Nov 2015), http://www.theicct.org/sites/default/files/publications/ICCT_transatlantic-airline-ranking-2014.pdf at 9.

[191] Kharina, Anastasia et al., Cost assessment of near and mid-term technologies to improve new aircraft fuel efficiency, International Council on Clean Transportation (2016), https://theicct.org/sites/default/files/publications/ICCT%20aircraft%20fuel%20efficiency%20cost%20assessment_final_09272016.pdf. Although average fuel burn reductions have been 1.3% per year since the late1960s, there have been decades where fuel burn reduction has been as high as 2.8% annually. Fuel burn efficiency can be improved through cost-effective technologies as well as operational and air-traffic management improvements. Zheng 2020, *supra* n.25 at 9-10.

[192] Roland Berger, Electrically Propelled Aircraft Developments Exceed 200 for the First Time, https://www.rolandberger.com/en/Point-of-View/Electric-propulsion-is-finally-on-the-map.html (2020); *see also* Fleming, John, Flight Path: A Trajectory for U.S. Aviation to Meet Global Climate Goals, Center for Biological Diversity (Oct. 2020) (outlining a multi-prong strategy for addressing aviation emissions with the stringency and scope warranted by the climate crisis).

[193] National Air Quality Standards Act of 1970, Report of the Committee on Public Works United States Senate together with Individual Views to Accompany S. 4358 at 23-24, 91st Cong., 2nd Session, Report No. 91-1196.

## VI. EPA Should Replace the Proposal With a Rule that Complies with Section 231 and Basic Requirements of the Administrative Procedure Act.

The Proposal violates section 231 of the Clean Air Act because it fails to reduce greenhouse gas emissions from aircraft despite EPA's findings that such emissions endanger public health and welfare. Moreover, the Proposal's failure to consider the statutory factors laid out in section 231, over-reliance on factors outside the statute, failure to analyze the costs and benefits of a sufficient range of possible emission standards, and refusal to select an alternative based on the evidence before the agency are arbitrary and capricious. These flaws cannot be remedied in a final rule. Instead, EPA must replace the Proposal with one that meets its duties under the Clean Air Act. The final regulations must employ strong mechanisms to reduce emissions from aircraft and protect the public health and welfare, and in doing so, EPA must consider the full panoply of available measures, including declining fleetwide emissions averages and operational and design improvements.

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