



December 31, 2007

Hon. Stephen L. Johnson  
Administrator  
United States Environmental Protection Agency  
Ariel Rios Building  
1200 Pennsylvania Avenue, NW  
Mail Code 1101A  
Washington, DC 20460

**Re: Petition for Rulemaking Under the Clean Air Act to Reduce the Emission of Air Pollutants from Aircraft that Contribute to Global Climate Change**

Dear Administrator Johnson:

Global warming is one of the most pressing environmental challenges of our time. Concentrations of greenhouse gases,<sup>1</sup> primarily from society's burning of fossil fuels and the destruction of forests, are increasing in the Earth's atmosphere, trapping solar energy that would otherwise be radiated back into space. This phenomenon is having profound impacts on the Earth and its inhabitants, including a rise in global temperatures, more extreme weather events, severe flooding and droughts, the spread of infectious diseases, and the extinction of numerous species. As one of the world's largest emitters of greenhouse gases, the United States must act to address this urgent situation by reducing emissions from all sectors of its economy.

Aircraft engines represent an increasing and potent source of greenhouse gas emissions, due in part to the unprecedented growth in air travel in the United States and internationally. In 2005, aircraft accounted for three percent of the United States' total carbon dioxide emissions and 12 percent of such emissions from the U.S. transportation sector.<sup>2</sup> In fact, the United States

---

<sup>1</sup> "Greenhouse gases" are atmospheric gases responsible for causing global warming and climate change. The major greenhouse gases are carbon dioxide ("CO<sub>2</sub>"), methane ("CH<sub>4</sub>") and nitrous oxide ("N<sub>2</sub>O").

<sup>2</sup> EPA, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 – 2005* (Apr. 15, 2007) at 3-9, available at <http://www.epa.gov/climatechange/emissions/downloads06/07CR.pdf> [hereinafter EPA Inventory].

is responsible for almost *half* of worldwide carbon dioxide emissions from aircraft, nearly five times the amount of the next largest emitter.<sup>3</sup> Moreover, aircraft emissions are projected to substantially increase in the coming decades, and globally, are expected to more than triple by mid-century.<sup>4</sup> Recent reports show that at altitude, aircraft emissions have a greater impact on global warming than previously understood, and are more harmful than land-based fuel combustion.<sup>5</sup> While some countries have already begun taking steps in response to these challenges,<sup>6</sup> the United States has thus far ignored its responsibility to address this growing source of greenhouse gas emissions.

Therefore, pursuant to the Administrative Procedure Act, 5 U.S.C. § 553(e), and the Clean Air Act, 42 U.S.C. § 7571, Petitioners file this Petition for Rulemaking and respectfully request that you undertake the following mandatory duties:

- (1) Make a finding that greenhouse gas emissions from aircraft engines may reasonably be anticipated to endanger public health and welfare pursuant to Section 231(a)(2)(A) of the Clean Air Act, 42 U.S.C. § 7571(a)(2)(A);
- (2) Issue proposed standards for greenhouse gas emissions from aircraft engines pursuant to Section 231(a)(2)(A) of the Clean Air Act, 42 U.S.C. § 7571(a)(2)(A); and
- (3) Promulgate final regulations within 90 days of the issuance of such proposed standards pursuant to Section 231(a)(3) of the Clean Air Act, 42 U.S.C. § 7571(a)(3).

Given the urgent threats to public health and welfare posed by global climate change, prompt consideration must be given to this petition. Therefore, Petitioners hereby request a substantive response to this petition within one hundred eighty (180) calendar days. Petitioners will consider litigating to compel a response that is unreasonably delayed in order to achieve the requested agency action.<sup>7</sup>

---

<sup>3</sup> ROYAL AERONAUTICAL SOCIETY, AIR TRAVEL – GREENER BY DESIGN, Report of the Greener Design Science and Technology Sub-Group (July 2005) at 7 Fig. 7, *available at* [http://www.greenerbydesign.org.uk/\\_FILES/publications/GbD%20-%202005%20Science%20and%20Technology%20Report.pdf](http://www.greenerbydesign.org.uk/_FILES/publications/GbD%20-%202005%20Science%20and%20Technology%20Report.pdf) [hereinafter Greener by Design Report].

<sup>4</sup> Sir Nicholas Stern, STERN REVIEW ON THE ECONOMICS OF CLIMATE CHANGE, Cambridge University Press (Oct. 30, 2006) at 172, *available at* [www.sternreview.org.uk](http://www.sternreview.org.uk) [hereinafter Stern Report].

<sup>5</sup> Ian A. Waitz, *et al.*, AVIATION AND THE ENVIRONMENT: A NATIONAL VISION STATEMENT, FRAMEWORK FOR GOALS AND RECOMMENDED ACTIONS, Report to the United States Congress (Dec. 2004) at 18, *available at* [http://web.mit.edu/aeroastro/partner/reports/congrept\\_aviation\\_envirn.pdf](http://web.mit.edu/aeroastro/partner/reports/congrept_aviation_envirn.pdf) [hereinafter Aviation and the Environment].

<sup>6</sup> *Commission Proposal for a Directive of the European Parliament and of the Council amending Directive 2003/87/EC so as to include aviation activities in the scheme for greenhouse gas emission allowance trading within the Community*, 2006/0304 (COD), COM(2006) 818 final (Dec. 20, 2006), *available at* [http://eur-lex.europa.eu/smartapi/cgi/sga\\_doc?smartapi!celexplus!prod!DocNumber&lg=en&type\\_doc=COMfinal&an\\_doc=2006&nu\\_doc=818](http://eur-lex.europa.eu/smartapi/cgi/sga_doc?smartapi!celexplus!prod!DocNumber&lg=en&type_doc=COMfinal&an_doc=2006&nu_doc=818) [hereinafter European Parliament Commission Proposal].

<sup>7</sup> This petition follows the petition for rulemaking under Section 213(a)(4) of the Clean Air Act, 42 U.S.C. § 7547(a)(4), to regulate greenhouse gas emissions from marine vessels submitted by Petitioners on October 3, 2007.

## PETITIONERS

Friends of the Earth is a public interest, non-profit advocacy organization, whose mission is to defend the environment and champion a just and healthy world. The organization works to stop environmental damage from the current model of economic and corporate globalization, and to protect human health and the planet by reducing dependence on fossil fuels. Founded in San Francisco in 1969 by David Brower, Friends of the Earth now maintains its headquarters in Washington, D.C. and is the U.S. voice of the world's largest network of grassroots environmental groups, with affiliates in 70 countries.

Oceana is a non-profit international advocacy organization dedicated to protecting and restoring the world's oceans through policy, advocacy, science, law, and public education. Oceana has over 280,000 members and supporters around the world. Oceana is organized under the laws of the District of Columbia, and maintains its headquarters in Washington, D.C. It has offices or staff in five states (Alaska, California, Massachusetts, New York, and Oregon) and three foreign countries (Chile, Belgium, and Spain). Through its policy, scientific, litigation, and grass-roots activities, Oceana has been a prominent advocate for protecting threatened and endangered marine species and marine ecosystems. Many marine ecosystems and species, such as the loggerhead sea turtle and species of deep sea corals, are threatened by global warming and ocean acidification.

The Center for Biological Diversity ("the Center") is a non-profit organization with offices in San Francisco, Los Angeles, and Joshua Tree, California, Phoenix and Tucson, Arizona, Silver City, New Mexico, Portland, Oregon, and Washington, D.C. The Center is a national membership organization with over 35,000 members in the United States. The Center's mission is to ensure the preservation, protection, and restoration of biodiversity, native species, ecosystems, public lands and waters, and public health. Because climate change from society's production of greenhouse gases is one of the foremost threats to the Earth's biodiversity, the environment, and public health, the Center's Climate, Air, and Energy Program works to reduce United States greenhouse gas emissions in order to protect these resources. The Center has advocated in local, state, and federal forums for the reduction of greenhouse gas pollution. The Center has petitioned to have some of the first species to be threatened by global warming listed under the U.S. Endangered Species Act, including the polar bear, staghorn and elkhorn corals in the Caribbean, twelve of the world's penguin species, the American pika, and the Kittlitz's murrelet, a small seabird that feeds at the base of tidewater glaciers in Alaska. These species will not survive unless the United States substantially reduces its greenhouse gas emissions. The Center has previously requested that EPA regulate greenhouse gases from automobiles under Section 202 of the Clean Air Act, and was a party in the successful case overturning EPA's decision not to do so. The Center submits this petition on behalf of itself and its adversely affected members.

---

As described in that petition, marine engines contribute approximately five percent of total domestic carbon dioxide emissions from transportation-related fossil fuel combustion, and shipping worldwide is estimated to account for almost three percent of global greenhouse gas emissions. Moreover, global warming emissions from marine vessels are expected to triple by 2030.

The Natural Resources Defense Council (“NRDC”) is a national, non-profit, environmental organization with a staff of scientists, lawyers, and policy analysts and more than 1.2 million members and activists nationwide. NRDC maintains headquarters in New York City and additional offices in Washington, D.C.; Chicago; Santa Monica; San Francisco; and Beijing. One of NRDC’s purposes is to safeguard the Earth by working to restore the integrity of the elements that sustain life and protecting nature in ways that advance the long-term welfare of present and future generations. As part of achieving its mission, NRDC has had a decades-long history of involvement in issues related to protecting air quality, challenging global warming, and promoting cleaner energy alternatives. NRDC is a founding member of the U.S. Climate Action Partnership, an alliance of businesses and environmental organizations seeking to reduce global warming emissions from transportation, large stationary sources, and commercial and residential energy use. NRDC and its members are harmed by the adverse environmental and public health impacts of climate change.

### STATEMENT OF LAW

The Clean Air Act, 42 U.S.C. §§ 7401 *et seq.* (the “Act”), provides the Administrator of the U.S. Environmental Protection Agency (“EPA”) with the exclusive authority to regulate air pollutants from aircraft engines. Pursuant to 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.

42 U.S.C. § 7571(a)(2)(A). In doing so, the Administrator is required to consult with the Administrator of the Federal Aviation Administration (“FAA”). *Id.* at § 7571(a)(2)(B). The Act further requires EPA to promulgate final regulations within 90 days of the issuance of its proposed emissions standards. *Id.* at § 7571(a)(3). In addition, Section 232 of the Act requires the Secretary of Transportation, acting through the FAA, to prescribe regulations that ensure compliance with the standards issued by EPA under section 231. *Id.* at § 7572(a); *see* 49 C.F.R. § 1.47(g). States and other political subdivisions are prohibited from adopting or attempting to enforce any emissions standards for aircraft engines unless they are identical to standards promulgated by EPA. 42 U.S.C. § 7573.

Although EPA has occasionally issued standards regulating air pollution from aircraft engines under Section 231,<sup>8</sup> it has not previously considered limiting emissions from aircraft based on the contribution of those emissions to global warming. However, it is clear that EPA’s authority under Section 231 extends to greenhouse gas emissions from aircraft engines. Section 302(g) of the Clean Air Act broadly defines the term “air pollutant” to include:

[A]ny air pollution agent or combination of such agents, including any physical, chemical, biological, radioactive (including source material, special nuclear

---

<sup>8</sup> *See, e.g.*, EPA Final Rule for Control of Air Pollution From Aircraft and Aircraft Engines; Emission Standards and Test Procedures, 70 Fed. Red. 69,664, 69,666 (Nov. 17, 2005) (establishing new emission standards for oxides of nitrogen (“NOx”) and discussing history of EPA’s regulation of aircraft engine emissions).

material, and byproduct material) substance or matter which is emitted into or otherwise enters the ambient air. Such term includes any precursors to the formation of any air pollutant, to the extent the Administrator has identified such precursor or precursors for the particular purpose for which the term ‘air pollutant’ is used.

*Id.* at § 7602(g). The U.S. Supreme Court has firmly established that greenhouse gases – including carbon dioxide – constitute air pollutants under Section 302(g) of the Act. *Massachusetts, et al. v. EPA, et al.*, 127 S. Ct. 1438, 1462 (2007) (“*Mass. v. EPA*”) (“Greenhouse gases fit well within the Clean Air Act’s capacious definition of ‘air pollutant’ in section 302(g)”)<sup>9</sup> Following that decision, the President confirmed the need for EPA to use its authority to protect the environment from greenhouse gas emissions from mobile engine sources. See Executive Order 13432: Cooperation Among Agencies in Protecting the Environment with Respect to Greenhouse Gas Emissions From Motor Vehicles, Nonroad Vehicles, and Nonroad Engines, 72 Fed. Reg. 27,717 (May 16, 2007).

Given these mandates, EPA has the authority to regulate greenhouse gas emissions from aircraft engines as “air pollutants” pursuant to Section 231(a)(2)(A) of the Act. Moreover, as demonstrated below, given the rapidly increasing contribution of greenhouse gas emissions from aircraft, combined with mounting evidence that these emissions, at altitude, have a significantly greater global warming impact than land-based fuel combustion, it is EPA’s clear statutory duty to do so.

## STATEMENT OF FACTS

### A. Global Climate Change Background.

There is no longer any scientific dispute that human production of greenhouse gases, including carbon dioxide, methane, and nitrous oxide, are responsible for the unprecedented rate of warming observed over the past century.<sup>10</sup> According to the Intergovernmental Panel on Climate Change (“IPCC”),<sup>11</sup> “[w]arming of the climate system is unequivocal, as is now evident from observations of increases in global air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level.”<sup>12</sup> Moreover, “[m]ost of the observed increase in

---

<sup>9</sup> While that decision dealt with the regulation of motor vehicles pursuant to Section 202(a)(1), 42 U.S.C. § 7521(a)(1), the definition of “air pollutant” in Section 302(g) applies throughout the Act.

<sup>10</sup> See EPA, Climate Change – Science, available at <http://www.epa.gov/climatechange/science/index.html>; GOVERNMENT ACCOUNTABILITY OFFICE, CLIMATE CHANGE: AGENCIES SHOULD DEVELOP GUIDANCE FOR ADDRESSING THE EFFECTS ON FEDERAL LAND AND WATER RESOURCES (Aug. 2007) at 10, available at <http://www.gao.gov/new.items/d07863.pdf> [hereinafter GAO Report].

<sup>11</sup> The IPCC was established in 1988 by the World Meteorological Organization and the United Nations Environment Programme to provide an authoritative international statement of scientific understanding of climate change. Its various Working Group and Assessment Reports on climate change are available at: <http://www.ipcc.ch/>.

<sup>12</sup> IPCC, SUMMARY FOR POLICYMAKERS: CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS; CONTRIBUTION OF WORKING GROUP I TO THE FOURTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (Feb. 2007) at 5 [hereinafter Working Group I Summary]. In particular, the IPCC found in its recent reports that total global surface temperature increased 0.76°C (1.37°F) between 1850-1899 and 2001-2005. *Id.* In

global average temperatures since the mid-20th century is *very likely* due to the observed increase in anthropogenic greenhouse gas concentrations.”<sup>13</sup> Thus, the world’s leading scientific body on the subject has now concluded, with greater than 90 percent certainty, that emissions of greenhouse gases are responsible for climate change.<sup>14</sup>

In the words of the IPCC, carbon dioxide is “the most important anthropogenic greenhouse gas.”<sup>15</sup> The primary source of carbon dioxide emissions since the pre-industrial period has been the combustion of fossil fuels, with land-use changes responsible for another significant but smaller contribution.<sup>16</sup> Not surprisingly, the global atmospheric concentration of carbon dioxide has increased from a pre-industrial value of about 280 parts per million (“ppm”) to 379 ppm in 2005, by far exceeding the natural range over the last 650,000 years (180 to 300 ppm), as estimated by ice core samples.<sup>17</sup>

The United States is responsible for over 20 percent of the world’s carbon dioxide emissions, and remains one of the largest emitters on a per capita basis.<sup>18</sup> As the largest source of domestic greenhouse gas emissions, carbon dioxide from fossil fuel combustion alone accounted for 79 percent of total warming emissions in 2005.<sup>19</sup> One of the primary sources of such emissions is from the transportation sector, which in 2005 accounted for 33 percent of carbon dioxide emissions in the United States and about 28 percent of all greenhouse gas emissions from anthropogenic activities.<sup>20</sup> According to the IPCC, greenhouse gas emissions from transport are expected to increase 80 percent between 2002 and 2030.<sup>21</sup>

## **B. Aircraft Engines Emit Greenhouse Gases and Have a Disproportionate Impact on Global Warming.**

Aircraft engine emissions are composed of approximately 70 percent carbon dioxide, 30 percent water vapor, and less than one percent each of oxides of nitrogen (“NO<sub>x</sub>”), carbon

---

the Arctic, temperatures at the top of the permafrost layer have increased since the 1980s by up to 3°C (5.4°F), while annual average arctic sea ice has shrunk by 2.7 percent per decade, with even larger decreases in summer of 7.4 percent per decade. *Id.* Global sea levels rose at an average rate of 1.8 millimeters per year between 1961 and 2003. *Id.*

<sup>13</sup> *Id.* at 10 (emphasis in original).

<sup>14</sup> *See id.* at 3 n.6 (explaining the use of the term “very likely”).

<sup>15</sup> *Id.* at 2; *see* EPA Inventory, *supra* note 2, at 2-1.

<sup>16</sup> Working Group I Summary, *supra* note 12, at 2.

<sup>17</sup> *Id.*

<sup>18</sup> Energy Information Administration, EMISSIONS OF GREENHOUSE GASES IN THE UNITED STATES 2006 (Nov. 2007), available at <ftp://ftp.eia.doe.gov/pub/oiaf/1605/cdrom/pdf/ggrpt/057306.pdf>. *See also* United Nations Environment Programme / GRID-Arendal, *National carbon dioxide (CO<sub>2</sub>) emissions per capita; CO<sub>2</sub> Emissions in 2002*, available at [http://maps.grida.no/go/graphic/national\\_carbon\\_dioxide\\_co2\\_emissions\\_per\\_capita](http://maps.grida.no/go/graphic/national_carbon_dioxide_co2_emissions_per_capita).

<sup>19</sup> EPA Inventory, *supra* note 2, at 2-1.

<sup>20</sup> *Id.* at 2-10, 2-23.

<sup>21</sup> IPCC, CLIMATE CHANGE 2007: MITIGATION OF CLIMATE CHANGE; CONTRIBUTION OF WORKING GROUP III TO THE FOURTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (May 2007) at 357 [hereinafter Working Group III Report].

monoxide, oxides of sulfur, and other trace components including hydrocarbons such as methane and soot.<sup>22</sup> These emissions contribute to global warming in several ways. First, aircraft emit significant amounts of carbon dioxide, the primary greenhouse gas produced by anthropogenic activities in the United States and globally. In 2005, aircraft contributed three percent of the United States' total carbon dioxide emissions, and 12 percent of such emissions from the transportation end-use sector.<sup>23</sup> However aircraft carbon dioxide emissions, if measured at ground level, are only “a fraction” of aviation’s total contribution to climate change.<sup>24</sup>

NO<sub>x</sub> emissions from aircraft contribute to the formation of ozone, a greenhouse gas. Moreover, emissions of NO<sub>x</sub> in the upper troposphere and tropopause, where most aviation emissions occur, result in greater concentrations of ozone than ground-level emissions.<sup>25</sup> Aircraft also contribute to climate change by altering cloud cover patterns. Aircraft engines emit water vapor, a greenhouse gas that forms condensation trails, or “contrails,” when released at high altitude. Contrails are visible line clouds that form in cold, humid atmospheres and contribute to the global warming impact of aircraft.<sup>26</sup> In addition, the persistent formation of contrails is associated with the spread of cirrus clouds.<sup>27</sup> An increase in cirrus cloud cover tends to warm the surface of the Earth, further contributing to global warming.<sup>28</sup>

Therefore, greenhouse gas emissions from aircraft at altitude have a greater global warming impact than their carbon dioxide emissions alone, or than emissions of greenhouse gases at ground level. In fact, a recent report by the UK Royal Commission on Environmental Pollution stated that the net effect of ozone, contrail, and aviation-induced cirrus is expected to be three times the radiative forcing due to the CO<sub>2</sub> emitted from aircraft.<sup>29</sup> The report concludes that if these estimates are correct and the anticipated growth in aviation realized, aviation may be responsible for between six and ten percent of anthropogenic forcing of climate by 2050.<sup>30</sup>

---

<sup>22</sup> FAA, OFFICE OF ENVIRONMENT AND ENERGY, AVIATION AND EMISSION: A PRIMER (Jan. 2005) at 1, *available at* [http://www.faa.gov/regulations\\_policies/policy\\_guidance/envir\\_policy/media/aeprimer.pdf](http://www.faa.gov/regulations_policies/policy_guidance/envir_policy/media/aeprimer.pdf) [hereinafter FAA Report].

<sup>23</sup> EPA Inventory, *supra* note 2, at 3-8.e, Table 3-7.

<sup>24</sup> Bows, Alice, Kevin Anderson and Paul Upham, *Technical Report: Contraction and Convergence: UK carbon emissions and the implications for UK air traffic*, TYNDALL CENTRE FOR CLIMATE CHANGE RESEARCH (Feb. 2006) at 18, *available at* [http://www.tyndall.ac.uk/research/theme2/project\\_overviews/t3\\_23.shtml](http://www.tyndall.ac.uk/research/theme2/project_overviews/t3_23.shtml), (click link at “Technical Report”). *See also*, IPCC, TECHNICAL SUMMARY; CONTRIBUTION OF WORKING GROUP III TO THE FOURTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (May 2007) at 51 [hereinafter Working Group III Technical Summary].

<sup>25</sup> EPA Inventory, *supra* note 2, at 1-4. *See also* IPCC, AVIATION AND THE GLOBAL ATMOSPHERE (1999) at Chapter 1.3.3, *available at* <http://www.grida.no/climate/ipcc/aviation/index.htm> [hereinafter IPCC Aviation Report].

<sup>26</sup> IPCC, CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS; CONTRIBUTION OF WORKING GROUP I TO THE FOURTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (Feb. 2007) at 186 [hereinafter Working Group I Report].

<sup>27</sup> IPCC Aviation Report, *supra* note 25, at Summary for Policymakers, 4.5.

<sup>28</sup> *Id.*

<sup>29</sup> ROYAL COMMISSION ON ENVIRONMENTAL POLLUTION (RCEP), THE ENVIRONMENTAL EFFECTS OF CIVIL AIRCRAFT IN FLIGHT, London, UK (Nov. 29, 2002) at 18, *available at* <http://www.rcep.org.uk/avreport.htm>.

<sup>30</sup> *Id.* at 19.

### **C. Aviation's Impact on Global Warming Is Predicted to Increase Dramatically in the Next Few Decades.**

Greenhouse gas emissions from aircraft are anticipated to increase substantially in the coming decades because of a projected growth in air transport both in the United States and worldwide.<sup>31</sup> According to the FAA, greenhouse gas emissions from domestic aircraft are expected to increase 60 percent by 2025.<sup>32</sup> The IPCC estimates that increases in air transport over the next 50 years will result in a three-fold increase in aircraft CO<sub>2</sub> emissions, a 13 percent increase in ozone, a growth in contrail cover at a rate faster than that of the growth in aviation fuel consumption, and cirrus cloud increases by a factor of four.<sup>33</sup>

International air transport agreements (“ATAs”) negotiated by the United States facilitate these increases. For example, the United States recently signed an agreement with China to amend the countries’ existing ATA to *double* passenger flights by 2012, and give U.S. and Chinese cargo carriers unfettered access to markets.<sup>34</sup> Similarly, the United States recently amended its ATA with the European Union (the “Open Skies Agreement”) to authorize every U.S. and EU airline to fly between every city in the European Union and the United States, and to operate without restriction on the number of flights, aircraft, and routes.<sup>35</sup>

In short, there is an unrelenting global demand for increased air transport of both passengers and goods – a demand that appears undeterred by escalating flight delays and new terrorist threats, and one that is being facilitated by the policies of the United States government and its trading partners. It should therefore come as no surprise that globally, carbon dioxide emissions from aircraft could grow by more than three-fold by mid-century, making air travel one of the fastest-growing producers of greenhouse gases.<sup>36</sup>

### **D. Existing and Developing Aviation Procedures and Technologies Can Reduce Greenhouse Gas Emissions.**

Given that aircraft require a significant amount of fuel to operate, and that each gallon of jet fuel contributes 21 pounds of carbon dioxide when burned,<sup>37</sup> relatively minor improvements in fuel efficiency can result in significant reductions in greenhouse gases. As described below,

---

<sup>31</sup> Air transport in the United States is expected to increase by 3.5 percent annually over the next decade, and approximately five percent per year worldwide. Aviation and the Environment, *supra* note 5, at 21; ICAO Working Paper, *Towards a Carbon Neutral and Eventually Carbon Free Future*, INT’L AIR TRANSPORT ASS’N, A36-WP/85 EX/33 (Aug. 28, 2007) at ¶ 2.2.

<sup>32</sup> FAA Report, *supra* note 22, at 10.

<sup>33</sup> IPCC Aviation Report, *supra* note 25, at Summary for Policymakers 4.1, 4.2, 4.5, and 4.6.

<sup>34</sup> Fact Sheet, U.S. Department of Treasury, Second Meeting of the U.S.-China Strategic Economic Dialogue (May 23, 2007), *available at* <http://www.treas.gov/press/releases/hp417.htm>.

<sup>35</sup> Statement by U.S. Department of Transportation Secretary Peters on the U.S. – EU Open Skies Agreement (Mar. 22, 2007), *available at* <http://www.dot.gov/affairs/peters032207.htm>.

<sup>36</sup> Stern Report, *supra* note 4, at 172.

<sup>37</sup> Energy Information Association, Voluntary Reporting of Greenhouse Gases Program, *available at* <http://www.eia.doe.gov/oiaf/1605/factors.html>.



aviation procedures and aircraft designs are available today that can significantly increase fuel efficiency and decrease greenhouse gas emissions. Technologies currently being developed are expected to result in even further improvements within the next few years. Taken together, these hold out the prospect that, in the long run, technological, design and operational progress will enable environmental impact per passenger-mile to be reduced faster than air traffic increases.

Voluntary measures alone will not be sufficient to bring about the changes that are needed to address the significant and growing climate impacts of aviation.<sup>38</sup> Regulations that set mandatory and increasingly stringent standards are needed not only to ensure that existing technologies and operations are implemented in the near-term, but also to increase incentives for the development of new technologies and procedures in the future.<sup>39</sup> EPA itself has acknowledged that Section 231 of the Clean Air Act authorizes it to set “technology-forcing” standards for aircraft engines as long as the standards give manufacturers sufficient lead time. Final Rule for Control of Air Pollution From Aircraft and Aircraft Engines; Emission Standards and Test Procedures, 70 Fed. Red. 69,664, 69,676 (Nov. 17, 2005). Thus, it is imperative that the agency set standards to force the adoption and use of these existing measures, and to encourage development of improved technologies and procedures that will further reduce emissions.

### **1. Improved Aviation Operations and Procedures Can Reduce Greenhouse Gas Emissions Significantly.**

There are numerous existing operational measures that can reduce greenhouse gas emissions from aircraft. Mandating the use of these procedures will result in immediate, near-term, and meaningful improvements in aviation’s climate impact.<sup>40</sup> The IPCC estimates that improved aircraft operational practices can reduce greenhouse gas emissions by six to twelve percent.<sup>41</sup> For example, some operational measures for reducing fuel use, and consequently, carbon dioxide, emissions include:

- minimizing engine idling time on runways<sup>42</sup> and employing single engine taxiing;<sup>43</sup>

---

<sup>38</sup> According to the IPCC, given the anticipated five percent annual growth in aviation, increases in greenhouse gas emissions from aircraft will outpace improvements that can be expected through evolutionary changes in engine and aircraft design. Working Group III Report, *supra* note 21, at 326.

<sup>39</sup> The European Commission’s proposal to include aviation emissions in the European carbon trading system illustrates how such regulatory standards can spur industry to more rapidly develop and deploy cleaner aircraft. Under the proposal, greenhouse gas emissions from aviation would be capped and airlines that are unable to meet emission standards would be required to purchase carbon dioxide allowances or offsets. European Parliament Commission Proposal, *supra* note 6. Many European airlines are taking steps to modernize their fleets and to purchase more fuel efficient aircraft, but the U.S. airline industry’s fleets remain outdated and domestic airline companies have been slow to order newer, more fuel efficient aircraft. Kyle Peterson, *U.S. airlines bide their time as fleet needs grow*, REUTERS (June 12, 2007), available at <http://uk.reuters.com/article/basicIndustries/idUKN1226568120070612>.

<sup>40</sup> Aviation and the Environment, *supra* note 5, at 33-34.

<sup>41</sup> Working Group III Technical Summary, *supra* note 24, at 51.

<sup>42</sup> CONTROLLING AIRPORT RELATED POLLUTION, CCAP & NESCAUM (June 2003) at III-8, available at [http://bronze.nescaum.org/workgroup/aircraftport/Aviation\\_Final\\_Report.pdf](http://bronze.nescaum.org/workgroup/aircraftport/Aviation_Final_Report.pdf) [hereinafter CCAP Report].

- reducing engine thrust and reverse during high-intensity periods such as take-off and landing;<sup>44</sup>
- optimizing timetables, route networks, and flight frequencies to reduce stopovers, especially for short- and medium-haul flights,<sup>45</sup> and to make possible the selection of more fuel-efficient routes;<sup>46</sup>
- reducing the use of auxiliary power units;<sup>47</sup>
- reducing the amount of excess fuel carried;<sup>48</sup> and
- more regular maintenance and cleaning of engines and airframes to correct minor deterioration.<sup>49</sup>

Additionally, designing aircraft to operate at lower altitudes and reduced speeds could help avoid contrails and cirrus cloud formation, thereby further reducing environmental impacts.<sup>50</sup>

A 2004 Report to Congress, prepared on behalf of the FAA and the National Aeronautics and Space Administration (“NASA”), outlined numerous available operational changes that could be implemented to reduce the global warming impacts of aircraft.<sup>51</sup> In addition to those mentioned above, these measures include continuous descent approach procedures which have been shown not only to reduce noise impacts by keeping aircraft higher for longer, but also to reduce fuel burn and emissions of pollutants.<sup>52</sup> Another example successfully piloted at San Francisco International Airport combined existing technologies to increase the number of landings per hour, with the aim of reducing delays by 25 percent and decreasing the need for aircraft to circle while awaiting clearance for landing.<sup>53</sup>

Measures to reduce the global warming impact of aviation should be a central consideration in the development of new air traffic management systems.<sup>54</sup> Improvements in air traffic management procedures alone could reduce aviation fuel use by between six and eighteen percent, while other operational measures could result in a further two to six percent

---

<sup>43</sup> Aviation and the Environment, *supra* note 5, at 34.

<sup>44</sup> CCAP Report, *supra* note 42, at III-9-11.

<sup>45</sup> For the purposes of this petition, short-haul flights refer to flights between 300 and 600 miles. Medium-haul flights refer to flights between 600 and 1,000 miles. Long-haul flights refer to flights greater than 1,000 miles.

<sup>46</sup> CCAP Report, *supra* note 42, at III-9-11; *see also* Aviation and the Environment, *supra* note 5, at 34.

<sup>47</sup> Aviation and the Environment, *supra* note 5, at 34.

<sup>48</sup> *Id.*

<sup>49</sup> *Id.*

<sup>50</sup> Nicolas Antoine & Ilan Kroo, *Framework for Aircraft Conceptual Design and Environment Performance Studies*, AIAA JOURNAL, Vol. 43, No. 10, 2102, 2109 (Oct. 2005).

<sup>51</sup> Aviation and the Environment, *supra* note 5, at 34.

<sup>52</sup> *Id.*

<sup>53</sup> *Id.*

<sup>54</sup> Thea Sebastian & Rick Pitz, *NextGen Air Transportation System Progress Reports Ignore Climate Change*, CLIMATE SCIENCE WATCH (July 2007), available at [http://www.climate-science-watch.org/file-uploads/NextGen\\_final\\_18jul07.pdf](http://www.climate-science-watch.org/file-uploads/NextGen_final_18jul07.pdf).

improvement in efficiency.<sup>55</sup> Unfortunately, the Next Generation Air Transportation System (“NextGen”), the U.S. government’s most recent initiative to update and improve America’s air traffic system,<sup>56</sup> currently does not include any measures to address the climate change impacts of aviation. In fact, neither the 2005 nor the 2006 NextGen progress report contains a single reference to climate change.<sup>57</sup>

## **2. Existing, More Efficient Aircraft Designs Can Reduce Greenhouse Gas Emissions.**

The airline industry could also meet requirements to reduce greenhouse gas emissions by adopting more efficient aircraft designs and technologies. In fact, designs and technologies are available today that can increase the fuel efficiency of aircraft and minimize such emissions.

One way to reduce the fuel consumption of aircraft is to reduce their weight.<sup>58</sup> Weight reduction can be achieved through the use of lighter composite materials for airframes.<sup>59</sup> For example, the frame of the Boeing 787 Dreamliner, which is scheduled to enter service in 2008, is made primarily from carbon composite, making the aircraft much lighter and 20 percent more fuel efficient than any metal aircraft of similar size.<sup>60</sup>

Weight could also be removed from the nacelle of the aircraft, which holds the engine, fan, thruster and exhaust of a jet engine. The use of lighter materials for the nacelle, and the application of design techniques which can help offset the weight of the engine and fan, can reduce drag and fuel burn, thus improving aircraft efficiency.<sup>61</sup> The weight penalty of the nacelle can be avoided altogether by the adoption of advanced contra-rotating propellers, which offer a significant reduction in fuel burn through increased propulsive efficiency; advanced propellers are particularly suitable for the short and medium haul market, where the increase in flight time due to the slight reduction in cruise Mach number is relatively small.<sup>62</sup>

Other technological adjustments also show promise for marked improvements. The 787, for example, uses advances in engine technology, including the lightest fan system currently

---

<sup>55</sup> International Civil Aviation Organization, ENVIRONMENTAL REPORT 2007 (2007) at 108, *available at* [http://www.icao.int/icao/en/env/pubs/Env\\_Report\\_07.pdf](http://www.icao.int/icao/en/env/pubs/Env_Report_07.pdf) [hereinafter ICAO Environmental Report].

<sup>56</sup> NextGen is comprised of representatives of the Department of Transportation (with FAA as the lead planning agency), Homeland Security, the Departments of Defense and Commerce, NASA, and the White House Office of Science and Technology Policy, with the oversight of the Joint Planning and Development Office (“JPDO”).

<sup>57</sup> Sebastian & Pitz, *supra* note 54, at 7.

<sup>58</sup> Greener by Design Report, *supra* note 3, at 15.

<sup>59</sup> Antoine & Kroo, *supra* note 50, at 2107.

<sup>60</sup> Boeing, Boeing 787 Dreamliner Will Provide New Solutions for Airlines, Passengers, *available at* <http://www.boeing.com/commercial/787family/background.html> [hereinafter Boeing 787 Dreamliner Background].

<sup>61</sup> Greener by Design Report, *supra* note 3, at 10.

<sup>62</sup> Greener by Design Report, *supra* note 3, at 13.

certified in the industry, a more fuel-efficient compressor, and a contra-rotating system,<sup>63</sup> that Boeing claims will contribute as much as eight percent of the new airplane's increased efficiency.<sup>64</sup> Small changes to the bodies of aircraft, such as winglets on the tips of aircraft wings that improve aerodynamics,<sup>65</sup> the use of electric fuel and air pumps inside planes, disk and airfoil blade materials that can withstand higher operating pressures and temperatures,<sup>66</sup> and the employment of unducted-fan engines,<sup>67</sup> are all available technologies that can achieve significant fuel savings and lower emissions. Given the fact that aircraft use large amounts of fuel, even incremental improvements in fuel efficiency can result in significant carbon dioxide emissions reductions.

While these technologies are currently available, there are many more advances in aircraft design in the works. Boeing and NASA, for example, are working on the development of a "blended wing" aircraft.<sup>68</sup> Blended wing designs incorporate the engine, wings, and body of an aircraft into a single lifting surface and result in increased fuel efficiency and fewer emissions.<sup>69</sup> This type of aircraft could reduce fuel burn by 20 to 30 percent over an equivalent sized conventional aircraft carrying the same load.<sup>70</sup> In July 2007, the NASA development group successfully tested a blended wing aircraft.<sup>71</sup> Although current blended wing designs are not as comfortable as existing passenger aircraft, the use of a blended wing design for freighter or tanker aircraft transport could reduce emissions in the near term.<sup>72</sup> Another promising technology is a "silent aircraft" being developed by the Massachusetts Institute of Technology and Cambridge University that would burn 25 percent less fuel than current planes, simultaneously achieving the environmental goals of reducing greenhouse gas emissions and reducing noise.<sup>73</sup>

Advances in fuel efficiency can be undermined by operational practices, for example, by the inclusion of stopovers, with their additional fuel burn penalty, in short- and medium-haul flights. On the other hand, the inclusion of stopovers in long-haul flights can provide significant

---

<sup>63</sup> Rolls Royce, Trent 1000, Leading Technology, *available at* [http://www.rolls-royce.com/civil\\_aerospace/products/airlines/trent1000/technology\\_flash.jsp](http://www.rolls-royce.com/civil_aerospace/products/airlines/trent1000/technology_flash.jsp).

<sup>64</sup> Boeing 787 Dreamliner Background, *supra* note 60.

<sup>65</sup> FAA Report, *supra* note 22, at 19. The IPCC has recently estimated that winglets can reduce fuel consumption by around seven percent. Working Group III Report, *supra* note 21, at 354.

<sup>66</sup> NASA Fact Sheet, Safeguarding Our Atmosphere; Glenn Research Reduces Harmful Aircraft Emissions, *available at* <http://www.nasa.gov/centers/glenn/about/fs10grc.html>.

<sup>67</sup> *Green Fingers; Rolls-Royce pitches open-rotor concept for Europe's Nacre*, AVIATION WEEK & SPACE TECHNOLOGY; AIR TRANSPORT, at 49, Vol. 165, No. 14.

<sup>68</sup> NASA, X-48 Blended Wing Body, *available at* <http://www.nasa.gov/centers/dryden/research/X-48B/index.html>.

<sup>69</sup> Greener by Design Report, *supra* note 3, at 22.

<sup>70</sup> Working Group III Report, *supra* note 21, at 354.

<sup>71</sup> *X-48B Blended Wing Body Aircraft makes first flight*, ASSOC. PRESS (July 27, 2007), *available at* <http://www.komotv.com/news/boeing/8763787.html>.

<sup>72</sup> Greener by Design Report, *supra* note 3, at 20.

<sup>73</sup> The Silent Aircraft Initiative, MIT-Cambridge Institute, *available at* <http://silentaircraft.org/efficiency/>.

fuel savings, particularly if a medium-range rather than a long-range aircraft is used for the journey.<sup>74</sup>

These technology improvements, combined with aircraft design improvements and operational changes, have the potential to achieve significant reductions in greenhouse gas emissions. The 2004 Report to Congress concluded, however, that without more funding and the development of goals to specifically address the global warming impacts of aircraft, future emissions reductions goals – while technologically feasible – may not be met because an insufficient number of technology options will be brought to a readiness level that would allow them to be transitioned into the industry.<sup>75</sup> Thus, the report recommends that “[f]or the long term, but commencing immediately, integrated programs should be strengthened to bring economically reasonable advanced technologies to levels of development that allow more rapid insertion into aircraft and engines.”<sup>76</sup>

### **3. The Use of Alternative Fuels Could Further Reduce Greenhouse Gas Emissions from Aviation.**

Efforts are currently underway to develop and certify alternative fuels that could reduce the global warming impact of aircraft. In April of 2007, Boeing, Virgin Atlantic, and GE Aviation announced an environmental partnership to develop alternative aviation fuels.<sup>77</sup> The consortium is planning to test an alternative-fueled flight in 2008.<sup>78</sup> Boeing also recently entered into an agreement with Air New Zealand and Rolls-Royce to conduct a biofuel demonstration flight in the second half of 2008 using an Air New Zealand Boeing 747-400 equipped with Rolls-Royce engines.<sup>79</sup> According to Air New Zealand’s Chief Executive, advances in technology have made biofuels a viable possibility for use in aviation far sooner than anticipated.<sup>80</sup> Academic and private institutes in the United States and around the world are also working to find sustainable ways to produce biofuels suitable for use in aviation.<sup>81</sup>

---

<sup>74</sup> Greener by Design Report, *supra* note 3, at 25.

<sup>75</sup> Aviation and the Environment, *supra* note 5, at 36.

<sup>76</sup> *Id.*

<sup>77</sup> *Boeing and Virgin Atlantic Announce Environmental Partnership*, NAFTC ENEWS (May 2007), available at <http://www.naftc.wvu.edu/eNews/May07/virgin.html>.

<sup>78</sup> Anita LaFond, *Boeing, Virgin Atlantic Join For Biofuel Development; Virgin Atlantic Puts In Big Order For Boeing's Dreamliners*, MANUFACTURING.NET; MANAGEMENT NEWS NOW (Apr. 24, 2007), available at <http://www.manufacturing.net/article.aspx?id=140037&menuid=272>.

<sup>79</sup> Richard Black, *Biofuel Trial Flight Set for 747*, BBC NEWS ONLINE (Sept. 28, 2007), available at <http://news.bbc.co.uk/2/hi/science/nature/7017694.stm>.

<sup>80</sup> *Id.*

<sup>81</sup> See, e.g., Baylor Institute for Air Sciences, available at <http://www.baylor.edu/bias/>; see also *Boeing and Virgin launch biofuel efforts*, MACHINE DESIGN (June 21, 2007), available at <http://machinedesign.com/ContentItem/67970/BoeingandVirginlaunchbiofueleffort.aspx>.

Although the benefits of requiring the use of biofuels for any transportation sector remain uncertain,<sup>82</sup> to the extent that concerns are sufficiently addressed, the development of alternative fuels for use in aircraft is promising. Regulatory measures limiting greenhouse gas emissions from aircraft would increase the incentives to develop and use alternative fuels that could significantly reduce the global warming impacts of aviation.

## **ARGUMENT**

Pursuant to the Clean Air Act, EPA is required to prescribe emission standards for air pollutants from aircraft engines when such emissions cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare. 42 U.S.C. § 7571(a)(2)(A). As discussed herein, it is indisputable that greenhouse gas emissions, including those from aircraft engines, are air pollutants that are causing and contributing to global climate change with severe environmental consequences for the planet and all of its inhabitants. EPA has broad discretion in promulgating regulations to limit greenhouse gases from aviation. Moreover, numerous measures are currently available that can reduce the global warming impacts of aircraft emissions, and new technologies and other procedures under development can be brought online to further reduce emissions within reasonable timeframes. Consequently, Petitioners request that EPA undertake its mandatory duty to regulate greenhouse gas emissions from aircraft engines.

### **A. Greenhouse Gas Emissions from Aircraft Engines Are Air Pollutants Under the Clean Air Act.**

Under Section 302(g) of the Clean Air Act, an “air pollutant” is defined as “any air pollution agent or combination of such agents, including any physical, [or] chemical...substance or matter which is emitted into or otherwise enters the ambient air.” 42 U.S.C. § 7602(g). This definition has long been interpreted by courts in an extremely broad manner. *See, e.g., Alabama Power Co. v. Costle*, 636 F.2d 323, 353 n. 60 (D.C. Cir. 1979). Furthermore, the Supreme Court recently held that carbon dioxide and other greenhouse gases “are without a doubt ‘physical [and] chemical...substance[s] which [are] emitted into...the ambient air.’” *Mass. v. EPA*, 127 S. Ct. at 1460. As a result, the greenhouse gases that Petitioners here request EPA to regulate under Section 231 of the Clean Air Act fall within the definition of “air pollutant” under Section 302(g).

### **B. Emissions of Greenhouse Gases from Aircraft Engines Endanger Public Health and Welfare.**

Pursuant to the requirements of Section 231, greenhouse gas emissions from aircraft engines must be regulated under the Clean Air Act because they cause or contribute to the endangerment of public health and welfare. As discussed above, there is now substantial evidence that greenhouse gas emissions from anthropogenic sources are resulting in changes to

---

<sup>82</sup> Many issues, primarily those of land available for growing biostocks, the costs of processing and refining them, as well as lifecycle greenhouse gas emissions from biofuels, remain to be resolved before the widespread introduction of biofuels to transportation industries could be sustainable or result in life-cycle net reductions in greenhouse gas emissions.

the global climate, with profound implications for all life on the planet. These impacts include increased global air and water temperatures, rising sea levels, the spread of infectious diseases, an increased number of extreme weather events, impacts on air quality and the availability of drinking water, changes in ecosystems and wildlife habitat, and the potential extinction of countless species.

The Clean Air Act does not require proof of actual harm when determining what constitutes an endangerment to public health and welfare. Rather, EPA is required to take a precautionary approach in regulating pollution that “may reasonably be anticipated to endanger public health or welfare.” 42 U.S.C. § 7571(a)(2)(A); *see Mass. v. EPA*, 127 S. Ct. at 1463 (“Nor can EPA avoid its statutory obligation by noting the uncertainty surrounding various features of climate change and concluding that it would therefore be better not to regulate at this time”); *Lead Industries Ass’n v. EPA*, 647 F.2d 1130, 1155 (D.C. Cir. 1980) (“requiring EPA to wait until it can conclusively demonstrate that a particular effect is adverse to health before it acts is inconsistent with both the Act’s precautionary and preventive orientation and the nature of the Administrator’s statutory responsibilities”). Regardless, there is now substantial evidence that greenhouse gas emissions, including those contributed by aircraft engines, may reasonably be anticipated to endanger public health and welfare.<sup>83</sup>

### **1. Aircraft Greenhouse Gas Emissions Cause and Contribute to the Endangerment of Public Health.**

Global climate change is expected to have significant impacts on human health in numerous ways, including increased heat-related mortalities, the spread of infectious disease vectors, greater air and water pollution, an increase in malnutrition, and greater casualties from fires, storms, and floods.<sup>84</sup> As EPA itself has stated:

Throughout the world, the prevalence of some diseases and other threats to human health depend largely on local climate. Extreme temperatures can directly lead to loss of life, while climate-related disturbances in ecological systems, such as changes in the range of infective parasites, can indirectly impact the incidence of serious infectious diseases. In addition, warm temperatures can increase air and water pollution, which in turn harm human health.<sup>85</sup>

Negative health effects from rising temperatures and sea levels worldwide, especially in developing countries, are expected to outweigh any anticipated benefits of climate change on

---

<sup>83</sup> In fact, EPA found more than a decade ago that aircraft NO<sub>x</sub> emissions at cruise altitudes are “directly harmful to human health and the environment” since they are “considered to be a precursor of tropospheric ozone and a contributor to greenhouse gas.” 62 Fed. Reg. 25,356, 25,358 (May 8, 1997).

<sup>84</sup> IPCC, SUMMARY FOR POLICYMAKERS: CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY, WORKING GROUP II CONTRIBUTION TO THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE FOURTH ASSESSMENT REPORT (Apr. 2007) at 3 [hereinafter Working Group II Report]; *see generally* Paul R. Epstein & Evan Mills, CLIMATE CHANGE FUTURES: HEALTH, ECOLOGICAL AND ECONOMIC DIMENSIONS (Nov. 2005), *available at* <http://www.climatechange-futures.org/report/index.html> [hereinafter Epstein & Mills].

<sup>85</sup> EPA, Climate Change – Health and Environmental Effects, Health, *available at* <http://www.epa.gov/climatechange/effects/health.html> [hereinafter EPA Climate Change Effects].

human health in temperate areas.<sup>86</sup> Even though such impacts may be mediated through complex interactions of physical, ecological, and social factors, the World Health Organization (“WHO”) has previously estimated that climate change was responsible for at least 154,000 deaths worldwide in 2000.<sup>87</sup>

Climate change is expected to increase the risk from certain infectious diseases, especially vector-borne diseases spread by mosquitoes such as malaria, dengue fever, yellow fever, and encephalitis in warm areas.<sup>88</sup> In the northeastern United States, hotter, longer, and drier summers punctuated by heavy rainstorms may also create more favorable conditions for outbreaks of West Nile Virus.<sup>89</sup> Furthermore, the spread of warmer winters is expected to create ideal conditions for the northward expansion of Lyme disease from the United States into southern Canada.<sup>90</sup>

An increase in the frequency and severity of extreme weather events, such as hurricanes, heat waves, and floods, resulting from climate change may result in more deaths, injuries, and stress-related disorders.<sup>91</sup> For example, in heavily populated delta regions, coastal areas, and small islands, sea level rise is anticipated to exacerbate flooding, storm surges, beach erosion, and other hazards, thus threatening vital infrastructure and settlements.<sup>92</sup> In the United States, sea levels have already risen five to six inches more than the global average along the Mid-Atlantic and Gulf Coast during the last century due to coastal lands that are subsiding.<sup>93</sup> By the end of this century, coastal flooding in New York City that now occurs once every 100 years could strike once each decade, while Atlantic City and Boston could experience such flooding every other year.<sup>94</sup>

Moreover, cities that already experience hot summers are expected to be further challenged by an increasing number, intensity, and duration of heat waves during the 21st century and a resulting increase in heat-related illnesses and deaths.<sup>95</sup> Temperatures in the northeastern United States are expected to increase between 2.5°F to 4.5°F in the winter months and 1.5°F to 3.5°F in the summer by the end of the century, with cities such as Hartford and Philadelphia averaging more than 30 days with high temperatures above 100°F each year.<sup>96</sup>

---

<sup>86</sup> Working Group II Report, *supra* note 84, at 7.

<sup>87</sup> WHO, THE WORLD HEALTH REPORT 2002: REDUCING RISKS, PROMOTING HEALTHY LIFE (Oct. 2002) at 72, available at <http://www.who.int/whr/2002/en/>.

<sup>88</sup> Epstein & Mills, *supra* note 84, at 32-47; EPA Climate Change Effects, *supra* note 85.

<sup>89</sup> PETER C. FRUMHOFF, ET AL., CONFRONTING CLIMATE CHANGE IN THE U.S. NORTHEAST: SCIENCE, IMPACTS, AND SOLUTIONS (July 2007) at xi, available at [http://www.climatechoices.org/ne/resources\\_ne/nereport.html](http://www.climatechoices.org/ne/resources_ne/nereport.html) [hereinafter Northeast Report].

<sup>90</sup> Epstein & Mills, *supra* note 84, at 46.

<sup>91</sup> *Id.* at 53-64.

<sup>92</sup> Working Group II Report, *supra* note 84, at 8-11.

<sup>93</sup> EPA Climate Change Effects, *supra* note 85.

<sup>94</sup> Northeast Report, *supra* note 89, at x-xi.

<sup>95</sup> Working Group II Report, *supra* note 84, at 10.

<sup>96</sup> Northeast Report, *supra* note 89, at ix-x.



Segments of the population that are particularly vulnerable, such as those with heart problems, asthma, the elderly, infants, and the homeless, can be especially at risk to extreme heat.<sup>97</sup>

In addition to an increase in the frequency and severity of heat waves, higher temperatures and sunlight, combined with other pollutants such as NO<sub>x</sub> and volatile organic compounds, may increase concentrations of ground-level ozone.<sup>98</sup> In Philadelphia, for instance, the number of days failing to meet federal air quality standards for ozone is expected to quadruple by the end of the century.<sup>99</sup> Breathing ozone can trigger a variety of health problems, including chest pain, coughing, throat irritation, and congestion, and repeated exposure can lead to bronchitis, emphysema, asthma, and permanent scarring of lung tissue.<sup>100</sup>

Climate change may also indirectly affect the concentration of particulate matter in the air by increasing sources such as wildfires and dust from dry soils.<sup>101</sup> Exposure to such particles can affect both the lungs and heart and has been linked to a variety of problems, including increased respiratory symptoms such as irritation of the airways, coughing or difficulty breathing, decreased lung function, aggravated asthma, development of chronic bronchitis, irregular heartbeat, nonfatal heart attacks, and premature death in people with heart or lung disease.<sup>102</sup> As with other forms of air pollution, certain vulnerable segments of the population, such as children with asthma and the elderly, are the most likely to be affected.<sup>103</sup>

Warming in the western United States is projected to decrease snowpack, cause more winter flooding and reduced summer flows, and exacerbate competition for already over-allocated freshwater resources.<sup>104</sup> Moreover, rising sea levels are expected to increase the salinity of surface and ground water through salt water intrusion, threatening drinking water supplies in places like New York City, southern Florida, and California's Central Valley.<sup>105</sup>

Together, these findings amply demonstrate that global warming presents an unprecedented, long-term, and wide-ranging threat to public health. Reducing greenhouse gas emissions from aircraft is a necessary step towards addressing these impacts.

---

<sup>97</sup> EPA Climate Change Effects, *supra* note 85.

<sup>98</sup> *Id.*

<sup>99</sup> Northeast Report, *supra* note 89, at x.

<sup>100</sup> EPA, Ground Level Ozone, Health and Environment, *available at* <http://www.epa.gov/air/ozonepollution/health.html>.

<sup>101</sup> EPA Climate Change Effects, *supra* note 85.

<sup>102</sup> EPA, Particulate Matter, Health and Environment, *available at* <http://www.epa.gov/air/particlepollution/health.html>.

<sup>103</sup> *Id.*

<sup>104</sup> Working Group II Report, *supra* note 84, at 10.

<sup>105</sup> EPA Climate Change Effects, *supra* note 85.

## 2. Aircraft Greenhouse Gas Emissions Cause and Contribute to the Endangerment of Public Welfare.

Emissions of greenhouse gases from aircraft engines are also endangering public welfare,<sup>106</sup> and many of these effects are directly related to the public health impacts discussed above. For example, global climate change is already resulting in well-documented impacts on climate and weather, including air and ocean temperature increases, widespread melting of snow and ice, changes in precipitation amounts and wind patterns, and more frequent extreme weather events such as hurricanes, heat waves, floods, and droughts.<sup>107</sup> Coastal areas are projected to be exposed to increased risk, such as erosion and flooding, due to climate change and sea level rise.<sup>108</sup> As the IPCC has stated, “[m]any millions more people are projected to be flooded every year due to sea-level rise by the 2080s.”<sup>109</sup>

In its recent assessment, the IPCC concluded that “[o]bservational evidence from all continents and most oceans shows that many natural systems are being affected by regional climate changes, particularly temperature increases.”<sup>110</sup> With regard to natural systems involving snow, ice, and frozen ground such as permafrost, the evidence shows an enlargement and increased number of glacial lakes, increasing ground instability in permafrost regions, and rock avalanches in mountain regions.<sup>111</sup> In Glacier National Park, the estimated number of glaciers has dropped from 150 to 26 since 1850, and the remaining glaciers will be gone in the next 25 to 30 years if the current rate of melting continues.<sup>112</sup> It is also likely that temperature increases associated with global climate change will alter the disturbance regimes of northern hemisphere forests, resulting in earlier and longer fire seasons, an increase in disease and pests, and a greater amount of areas burned and experiencing high to extreme fire danger.<sup>113</sup> Climate change is expected to alter the geographic distribution of these forests, including New England sugar maples and boreal forests in Alaska, which may shift northward or to higher elevations.<sup>114</sup>

Sea level rise is also resulting in the loss of wetlands and increasing damage from coastal flooding in many areas.<sup>115</sup> Coastal wetlands, including salt marshes and mangroves, are projected to be negatively affected by sea level rise, especially where they are constrained on their landward side or starved of sediment.<sup>116</sup> Wetlands can provide habitat for numerous

---

<sup>106</sup> “Welfare” is defined under the Clean Air Act to include “effects on soil, water, crops, vegetation, manmade materials, animals, wildlife, weather, visibility and climate.” 42 U.S.C. § 7602(h).

<sup>107</sup> Working Group I Summary, *supra* note 12, at 5-9; *see* GAO Report, *supra* note 10, at 5-6.

<sup>108</sup> Working Group II Report, *supra* note 84, at 6.

<sup>109</sup> *Id.* at 7.

<sup>110</sup> *Id.* at 1.

<sup>111</sup> *Id.*

<sup>112</sup> GAO Report, *supra* note 10, at 18.

<sup>113</sup> Working Group II Report, *supra* note 84, at 3.

<sup>114</sup> EPA Climate Change Effects, *supra* note 85.

<sup>115</sup> Working Group II Report, *supra* note 84, at 3.

<sup>116</sup> *Id.* at 6-7.

species and nursery areas for fish, serve as a basis for many communities' economic livelihoods, provide recreational opportunities, and protect local areas from flooding.<sup>117</sup> During the 21st century, sea level rise could convert as much as 22 percent of the world's coastal wetlands into open water.<sup>118</sup> EPA has estimated that a two foot rise in sea level could eliminate 17-43 percent of wetlands in the United States, with more than half of the loss occurring in Louisiana.<sup>119</sup>

Global climate change directly affects terrestrial biological systems, as evidenced by the poleward and upward shifts in the ranges of numerous plant and animal species, as well as the earlier timing of spring events such as bird migration and egg-laying.<sup>120</sup> As the IPCC has found, “[t]he resilience of many ecosystems is likely to be exceeded in this century by an unprecedented combination of climate change, associated disturbances (e.g., flooding, drought, wildfire, insects, ocean acidification),” and other global change drivers such as pollution and over exploitation of resources.<sup>121</sup> In the Arctic, detrimental effects are expected to mammals, migratory birds, and other organisms from reductions in sea ice,<sup>122</sup> increased coastal erosion, and an increase in the depth of seasonal thawing of permafrost.<sup>123</sup> Not surprisingly, approximately 20-30 percent of plant and animal species assessed so far will be at an increased risk of extinction if global average temperatures exceed 1.5-2.5°C (2.7-4.5°F).<sup>124</sup> According to one estimate, up to 35 percent of species in the regions sampled will be committed to extinction by 2050 under a high climate-warming scenario.<sup>125</sup>

Changes in global climate are also expected to have numerous impacts on marine and freshwater biological systems, such as shifts in ranges and changes in algal, plankton, and fish abundance in high latitude oceans, increases in algal and zooplankton abundance in high-latitude and high-altitude lakes, and range changes and earlier migrations of fish in rivers.<sup>126</sup> In addition, the acidification of the oceans, which has already decreased in pH by 0.1 units on average due to the absorption of increasing atmospheric levels of carbon dioxide, is expected to harm marine shell forming organisms and species dependant on them.<sup>127</sup>

Corals are particularly vulnerable to thermal stress and already have low adaptive capacity to changes in their ecosystem.<sup>128</sup> For example, an increase in sea surface temperature

---

<sup>117</sup> EPA Climate Change Effects, *supra* note 85.

<sup>118</sup> *Id.*

<sup>119</sup> *Id.*

<sup>120</sup> Working Group II Report, *supra* note 84, at 2.

<sup>121</sup> *Id.* at 5.

<sup>122</sup> This is especially true for species like the polar bear, which is evolutionarily adapted to life on the sea ice and spends only short periods on land. See 72 Fed. Reg. 1,064 (Jan. 9, 2007) (Proposed Rule to List the Polar Bear as Threatened Under the Endangered Species Act).

<sup>123</sup> Working Group II Report, *supra* note 84, at 11.

<sup>124</sup> *Id.* at 6.

<sup>125</sup> Chris D. Thomas, *et al.*, *Extinction Risk From Climate Change*, NATURE 427 (Jan. 8, 2004) at 145-48.

<sup>126</sup> Working Group II Report, *supra* note 84, at 2.

<sup>127</sup> *Id.* at 6; see GAO Report, *supra* note 10, at 22.

<sup>128</sup> Working Group II Report, *supra* note 84, at 6.

of approximately 1-3°C (1.8-5.4°F) is projected to result in more frequent coral bleaching events and widespread mortality.<sup>129</sup> This is because even slightly elevated ocean temperatures can destroy the symbiotic relationship in corals between algae and animal polyps, leading to the collapse of entire reefs.<sup>130</sup> As the GAO has reported, continued increases in water temperatures in the Florida Keys may result in more coral bleaching events and will adversely affect the area's tourism and fishing industries.<sup>131</sup> In addition, the lobster fisheries in Long Island Sound and the coastal waters off Rhode Island and South Cape Cod are likely to decline significantly by 2050, while cod is expected to disappear by the end of the century.<sup>132</sup>

Agriculture is highly sensitive to changes in climate, including increased temperatures and shifting rainfall patterns, as well as weather extremes, such as droughts, floods, and severe storms. The IPCC reports that temperature increases resulting from greenhouse gas emissions are likely to impact agricultural practices in the northern hemisphere, such as an earlier spring planting of crops.<sup>133</sup> Parts of Massachusetts, New Jersey, and Pennsylvania are likely to become unsuitable for growing popular varieties of apples, blueberries, and cranberries, while milk production across the northeastern United States is projected to decline between five and 20 percent during certain months.<sup>134</sup> In addition, an increase in the frequency of droughts and floods is also expected to negatively affect crop production, especially at low latitudes.<sup>135</sup> Crop losses attributed to pests, pathogens, and weeds could also increase from the current 42 percent to over 50 percent of potential yields within the coming decade.<sup>136</sup>

In sum, there is no dispute that global warming presents an unprecedented and wide-ranging threat to public welfare. As a result, EPA must take the necessary steps toward regulating greenhouse gas emissions from aircraft engines pursuant to Section 231 of the Clean Air Act.

---

<sup>129</sup> *Id.* The National Marine Fisheries Service has found that shallow reef habitats are especially vulnerable to increases in global air and sea temperatures due to coral bleaching. 76 Fed. Reg. 26,852, 26,858 (May 9, 2006) (Final Rule to List Elkhorn (*Acropora palmata*) and Staghorn (*A. cervicornis*) Corals as Threatened Under the Endangered Species Act). See also International Coral Reef Initiative, Okinawa Declaration on Conservation and Restoration of Endangered Coral Reefs of the World (July 2, 2004) (finding that “the increase in sea surface temperatures, the decrease in carbonate levels as well as sea-level rise, caused by increasing anthropogenic CO<sub>2</sub> in the atmosphere, all act synergistically to stress coral reefs, which lead to severe bleaching and extensive coral mortality”), available at [http://www.icriforum.org/secretariat/oki\\_declaration.html](http://www.icriforum.org/secretariat/oki_declaration.html).

<sup>130</sup> Epstein & Mills, *supra* note 84, at 10, 77-79.

<sup>131</sup> GAO Report, *supra* note 10, at 30-31.

<sup>132</sup> Northeast Report, *supra* note 89, at xi.

<sup>133</sup> Working Group II Report, *supra* note 84, at 3.

<sup>134</sup> Northeast Report, *supra* note 89, at xi.

<sup>135</sup> Working Group II Report, *supra* note 84, at 6.

<sup>136</sup> Epstein & Mills, *supra* note 84, at 29.

### **C. EPA Has Broad Discretion in Promulgating Regulations to Limit Greenhouse Gas Emissions from Aircraft Engines.**

While EPA's determination of whether greenhouse gas emissions from aircraft endanger public health or welfare presents a straightforward "yes or no" question, the realm of potential regulatory responses to an affirmative finding is quite broad. This flexibility stems from Congress' recognition, in drafting the Clean Air Act, that not all pollutants could be controlled in the same manner. *See, e.g.*, 42 U.S.C. § 7408(b) (requiring EPA to provide information regarding air pollution control techniques for criteria pollutants, including "available technology and alternative methods of prevention and control of air pollution," as well as "data on alternative fuels, processes, and operating methods which will result in elimination or significant reduction of emissions"). Accordingly, Congress provided EPA with broad authority to craft emissions standards that utilize multiple approaches in achieving pollution reductions. *See Mass. v. EPA*, 127 S. Ct. at 1462 (once EPA makes a finding of endangerment regarding greenhouse gas emissions from motor vehicles, it "no doubt has significant latitude as to the manner, timing, content, and coordination of its regulations with those of other agencies").

Specifically, Section 231 of the Act requires EPA to "issue proposed emission standards" applicable to any air pollutants from aircraft engines that contribute to air pollution that may reasonably be anticipated to endanger public health or welfare. 42 U.S.C. § 7571(a)(2)(A). The Act broadly defines "emission standard" as:

a requirement established by the State or the Administrator which limits the quantity, rate, or concentration of emissions of air pollutants on a continuous basis, including any requirement relating to the operation or maintenance of a source to assure continuous emission reduction, and any design, equipment, work practice or operational standard promulgated under this chapter.

*Id.* at § 7602(k).

As this definition demonstrates, EPA has the authority to regulate greenhouse gas emissions from aircraft through the use of operational or maintenance requirements, and any design, equipment, work practice or operational standards. *See, e.g., Engine Mfrs. Ass'n v. South Coast Air Quality Mgmt. Dist.*, 541 U.S. 246, 252-53 (2004) (state rule prohibiting the purchase or lease of vehicles that fail to meet stringent emission requirements constituted a "standard relating to the control of emissions" under Section 209(a); such a broad interpretation was "consistent with the use of 'standard' throughout Title II of the CAA"). In fact, the only limitation on EPA's discretion to set "emission standards" for aircraft engines is the Act's restriction on changes that "would significantly increase noise or adversely affect safety." *Id.* at § 7571(a)(2)(B)(ii).

Moreover, Section 231 allows EPA to limit emissions by establishing technology-forcing standards for aircraft engines. Congress deliberately chose such an approach in the Clean Air Act to require EPA to "'press for the development and application of improved technology rather than be limited by that which exists today,'" *Natural Resources Defense Council v. U.S. EPA*, 655 F.2d 318, 328 (D.C. Cir. 1981) (quoting S. Rep. No. 91-1196, 91st Cong., 2d Sess. 24

(1970)), and to force the industry “to develop pollution control devices that might at the time appear to be economically or technologically infeasible.” *Union Elec. Co. v. EPA*, 427 U.S. 246, 257 (1976). Although Section 231 does place a greater emphasis on safety considerations than other provisions in the Act, EPA has agreed that “section 231(b)’s forward-looking language” does not preclude the agency from setting technology-forcing standards. *See* 70 Fed. Reg. at 69,676 (“EPA does not agree that a technology-forcing standard would be precluded by section 231, in light of section 231(b)’s forward-looking language. Nor would EPA have to demonstrate that a technology is currently available universally or over a broad range of aircraft in order to base a standard on the emissions performance of such technology – the Agency is not limited in identifying what is ‘technologically feasible’ as what is already technologically achieved.”).

EPA also has broad authority to regulate emissions from all classes of aircraft, including both new and in-use aircraft and aircraft engines. 42 U.S.C. § 7571(a)(2)(A) (authorizing EPA to issue proposed emission standards for air pollutants from “any class or classes of aircraft engines”); *see, e.g.*, 40 C.F.R. § 87.10 (prescribing fuel venting emissions standards for new and in-use aircraft). While Congress limited EPA’s authority to regulate only “new” motor vehicles and engines under Sections 202 and 213 of the Clean Air Act, 42 U.S.C. §§ 7521 & 7547, Section 231 contains no such restriction. “[W]here 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) (quotations omitted); *see Reiter v. Sonotone Corp.*, 442 U.S. 330, 339 (1979) (“In construing a statute we are obliged to give effect, if possible, to every word Congress used.”).

The duty to regulate air pollution from aviation has not been left to EPA alone. Instead, Section 231 of the Act requires EPA to consult with the FAA in developing emissions standards for aircraft engines. 42 U.S.C. § 7571(a)(2)(B)(i). The FAA is also required by Section 232 to promulgate its own regulations “to insure compliance with all standards prescribed under section 7571” by EPA. *Id.* at § 7572(a). In issuing such regulations, the FAA “may execute any power or duty vested in [the FAA Administrator] by any other provision of law.” *Id.* *See, e.g.*, 49 U.S.C. §§ 40103(b) (authorizing FAA to prescribe air traffic regulations for using navigable airspace efficiently); 44505(a) (FAA shall develop and evaluate systems, procedures, facilities, and devices to provide for safe and efficient navigation and air traffic control); 44714 (requiring FAA to control or eliminate emissions from aircraft fuels that EPA finds endanger public health or welfare); 47107(a)(16) (authorizing FAA to condition approval of airport development projects or alterations based on operational efficiency).

#### **D. EPA’s Authority to Address the Global Warming Impacts of Aircraft is Consistent with International Law.**

The Convention on International Civil Aviation (the “Chicago Convention”),<sup>137</sup> to which the United States is a Party, supports EPA’s discretion to regulate greenhouse gas emissions from aircraft. While the convention encourages parties to cooperate in securing the highest

---

<sup>137</sup> Convention on International Civil Aviation, Dec. 7, 1944, T.I.A.S. 1591, 61 Stat. 1180.

practicable degree of uniformity,<sup>138</sup> Article 38 recognizes the right of States to depart from international airworthiness standards and procedures where they deem necessary by giving notice to the International Civil Aviation Organization (“ICAO”)<sup>139</sup>: “Any State ... which deems it necessary to adopt regulations or practices differing in any particular respect from those established by an international standard, shall give immediate notification to the [ICAO] of the differences between its own practice and that established by the international standard.” As EPA itself has recognized:

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.

70 Fed. Reg. at 69,667. Thus, the convention permits countries to adopt aircraft emissions standards that are more stringent than the ICAO standards, and EPA, in consultation with the FAA, “retains the discretion to adopt more stringent emissions standards if the international consensus standards ultimately prove insufficient to protect U.S. air quality.” *Id.* at 69,664.

In fact, the ICAO is strongly encouraging States to adopt programs to address the significant and increasing climate impacts from aircraft. During the most recent meeting of the ICAO Assembly in September 2007, the Assembly amended its policies and practices related to environmental protection to encourage States to proactively address aviation’s contribution to global warming.<sup>140</sup> Pursuant to a new Appendix K – “*ICAO Programme of Action on international aviation and climate change*,” the ICAO Assembly is urging States to undertake an array of measures to address the climate impacts of aircraft including by: (1) encouraging development of “more environmentally friendly efficient engine and aircraft designs”; (2) accelerating “the development and implementation of fuel efficient routings and procedures to reduce aviation emissions”; (3) accelerating efforts “to achieve environmental benefits through the application of satellite-based technologies that improve the efficiency of air navigation”;<sup>141</sup> and (4) reducing barriers “to enable implementation of new ATM [air traffic management] operating (ATM) concepts for environmentally efficient use of airspace.”<sup>142</sup> A comprehensive

---

<sup>138</sup> Article 37 provides: “Each contracting State undertakes to collaborate in securing the highest practicable degree of uniformity in regulations, standards, procedures, and organization in relation to aircraft, personnel, airways and auxiliary services in all matters in which such uniformity will facilitate and improve air navigation.”

<sup>139</sup> The ICAO, a UN specialized agency established pursuant to the Chicago Convention, is responsible for coordinating and regulating international aviation.

<sup>140</sup> See Resolution 17/1: *Consolidated statement of continuing ICAO policies and practices related to environmental protection* (amending Resolution A35-5 (WP/35)), A/36-WP/355 P/53 (Sept. 9, 2007), available at [http://www.icao.int/icao/en/assembl/a36/wp/wp355\\_en.pdf](http://www.icao.int/icao/en/assembl/a36/wp/wp355_en.pdf).

<sup>141</sup> The FAA recently announced that it was proposing a new rule requiring all aircraft flying in the nation’s busiest airspace to have satellite-based navigation. 72 Fed. Reg. 56,947 (Oct. 5, 2007). However, more is needed in both the near- and long-term to address greenhouse gas emissions from aircraft. For example, while FAA estimates that the rule will result in approximately nineteen million metric tons less carbon dioxide emissions, the vast majority of this reduction, eighteen million tons, would not take place until between 2017 and 2035. *Id.* at 56,965.

<sup>142</sup> *Id.* at Appendix K, ¶ 14.

program specifically designed to address the climate impacts of all aircraft operating in the United States is clearly needed.

Finally, adopting standards to address the climate impact of aviation is consistent with the United States' obligation under the UN Framework Convention on Climate Change ("UNFCCC"). Article 4 of the UNFCCC obligates the United States to "adopt national policies and take corresponding measures on the mitigation of climate change, by limiting anthropogenic emissions of greenhouse gases."<sup>143</sup>

#### **E. EPA Has the Authority Under Both the Clean Air Act and International Law to Regulate Greenhouse Gas Emissions from Foreign Aircraft Operating in the United States.**

As described above, *all* aircraft operating in the United States contribute to global warming. Therefore, EPA must regulate greenhouse gas emissions from not only U.S. certified aircraft, but also foreign aircraft arriving in and departing from the United States.

Designing a regulatory program to address the climate impacts from aviation that extends to foreign aircraft operating within the United States is consistent with U.S. law. First, the Clean Air Act gives EPA unambiguous authority to regulate air pollutants from both U.S.-certified aircraft and foreign aircraft. Pursuant to Section 231(2)(A) of the Act, EPA is authorized to set emission standards from "any class or classes of aircraft engines." 42 U.S.C. § 7571(a)(2)(A). The EPA regulations define "aircraft" as "any airplane for which a U.S. standard airworthiness certificate or equivalent foreign airworthiness certificate is issued." 40 C.F.R. § 87.1. The FAA, which is responsible under the Act for prescribing regulations to implement emission standards for aircraft established by EPA, 42 U.S.C. § 7572(a), also has authority to regulate foreign aircraft. *See, e.g.*, 14 C.F.R. § 129.11 (operation specifications for foreign air carriers and foreign operators of U.S.-registered aircraft engaged in common carriage); 14 C.F.R. § 91.711 (special rules for foreign civil aircraft).

In addition, establishing greenhouse gas emission standards for foreign aircraft operating within U.S. airspace is consistent not only with general principles of international law but also the United States' obligations under both the UNFCCC and the Chicago Convention. International law requires nations to ensure that activities within their territory do not cause transboundary environmental harm. For example, in adopting the 1972 Declaration of the United Nations Convention on the Human Environment ("Stockholm Declaration") and the 1992 Rio Declaration on Environment and Development, the United States and 179 other nations agreed that States must "ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction."<sup>144</sup> The preamble to the UNFCCC, to which the United States is a party, applies

---

<sup>143</sup> United Nations Framework Convention on Climate Change (UNFCCC), art. 4, § 2(a), May 9, 1992, Doc. A/AC.237/18, (Part 11)/Add.1 and Corr.1, 31 I.L.M. 848.

<sup>144</sup> Stockholm Declaration of the United Nations Conference on the Human Environment, Principle 21, G.A. Res. 2997, U.N. GAOR, 27th Sess., U.N. Doc. A/ Conf.48/14/Rev/1, 11 I.L.M. 1416 (1972); Rio Declaration on Environment and Development, *supra*, at Principle 2. The Heavy Metals Protocol to the Convention on Long-Range Transboundary Air Pollution, which the United States has accepted, echoes the Rio Declaration's agreement



this well-established principle to greenhouse gas emissions.<sup>145</sup> Allowing aircraft flying within U.S. airspace, whether U.S. or foreign, to continue to emit significant and increasing levels of greenhouse gases that are contributing to global climate change contravenes this principle.

International law also recognizes the sovereign right of nations to regulate activities within their jurisdiction or control, especially where those activities adversely affect the health and welfare of their own citizens.<sup>146</sup> Therefore, EPA has the authority not only to regulate and establish emissions standards for aircraft certified pursuant to U.S. laws and regulations – whether traveling domestically or abroad – but also to address greenhouse gas emissions from foreign aircraft operating within U.S. territory.

Finally, the United States' obligations under the Chicago Convention do not constrain EPA's authority to adopt a program to address aviation's global warming impacts that includes foreign aircraft as well. In fact, numerous State Parties to the Chicago Convention have endorsed this view. For example, the European Commission, recognizing climate change as "the most significant adverse impact of aviation,"<sup>147</sup> adopted a proposal in December 2006 to include greenhouse gas emissions from all domestic and international flights arriving in and departing from EU airports, including U.S.-certified aircraft, in the EU Emissions Trading Scheme ("ETS").<sup>148</sup> The European Parliament recently voted to strengthen the proposal by moving the compliance date from 2012 to 2011.<sup>149</sup> If the proposal is adopted, aircraft from non-EU countries not meeting the emission standards established within the EU will be required to purchase greenhouse gas emission allowances in order to land at and take off from European airports.

In addition, a wide array of measures is available to address the climate impacts from aircraft, including many endorsed by the ICAO, such as developing new operational and procedural measures. Many of these could be applied to foreign aircraft without imposing more

---

that states must prevent transboundary harm. Heavy Metals Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution on Heavy Metals, preamble, June 24, 1998, U.N. Doc. E/ECE/EB.AIR/66/1999, U.N. Sales No. E.99.II.E.21 (1999).

<sup>145</sup> UNFCCC Preamble, *supra* note 143 ("States have, in accordance with the Charter of the United Nations and the principles of international law...the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction"); *see also United States v. Canada*, Arbitral Tribunal, 1941, 3 UN Rep. Int'l Arb. Awards (1941) ("under the principles of international law, as well as the law of the United States, no State has the right to use or permit the use of its territory in such a manner as to cause injury by fumes in or to the territory of another or the properties or persons therein, when the case is of serious consequence and the injury is established by clear and convincing evidence.")

<sup>146</sup> Restatement of the Law Third, The Foreign Relations Law of the United States, The American Law Institute, Vol. 1 § 402 (stating that "[A] state has jurisdiction to prescribe law with respect to... conduct that, wholly or in substantial part, takes place within its territory.")

<sup>147</sup> Aviation and the Environment, *supra* note 5, at 12.

<sup>148</sup> European Parliament Commission Proposal, *supra* note 6.

<sup>149</sup> Resolution on the proposal for a directive of the European Parliament and of the Council amending Directive 2003/87/EC so as to include aviation activities in the scheme for greenhouse gas emission allowance trading within the Community, EUR. PARL. DOC. (COM(2006)0818 – C6-0011/2007 – 2006/0304(COD)) (Nov. 13, 2007), available at <http://www.europarl.europa.eu/sides/getDoc.do?Type=TA&Reference=P6-TA-2007-0505&language=EN>.

stringent airworthiness standards as provided under Article 33 of the convention.<sup>150</sup> Finally, EPA must recognize that its primary responsibility is to protect U.S. public health and welfare, and the United States' obligations under international agreements such as the Chicago Convention are applicable only to the extent they do not endanger U.S. public health and welfare.

In sum, EPA has a clear and unambiguous mandate under the Clean Air Act to set emissions standards for aircraft, including foreign aircraft, necessary to prevent the significant harm that will occur as a result of global warming.

### CONCLUSION

Based on the foregoing, Petitioners respectfully request that EPA:

- (1) Make a finding that greenhouse gas emissions from aircraft engines may reasonably be anticipated to endanger public health and welfare pursuant to Section 231(a)(2)(A) of the Clean Air Act, 42 U.S.C. § 7571(a)(2)(A);
- (2) Issue proposed standards for greenhouse gas emissions from aircraft engines pursuant to Section 231(a)(2)(A) of the Clean Air Act, 42 U.S.C. § 7571(a)(2)(A);  
and
- (3) Promulgate final regulations within 90 days of the issuance of such proposed standards pursuant to Section 231(a)(3) of the Clean Air Act, 42 U.S.C. § 7571(a)(3).

Sincerely,



Alice R. Thomas  
George M. Torgun  
Martin Wagner  
Earthjustice  
426 17th Street, 6th Floor  
Oakland, CA 94612  
(510) 550-6700

Attorneys for Petitioners Friends of the Earth,  
Oceana, the Center for Biological Diversity, and the  
Natural Resources Defense Council

---

<sup>150</sup> Convention on International Civil Aviation, art. 33, Dec. 7, 1944, T.I.A.S. 1591, 61 Stat. 1180 ("Certificates of airworthiness and certificates of competency and licenses issued or rendered valid by the contracting State in which the aircraft is registered, shall be recognized as valid by the other contracting States, provided that the requirements under which such certificates or licenses were issued or rendered valid are equal to or above the minimum standards which may be established from time to time pursuant to this Convention.").