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Aviation, Carbon, and the Clean Air Act

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Abstract

This paper explores the policy options available to the United States for regulating greenhouse gas emissions from aircraft under existing law: the Clean Air Act (CAA). Europe has unilaterally and controversially moved to include aviation emissions in its Emissions Trading System. The United States can, however, allow its airlines to escape this requirement by imposing “equivalent” regulation. U.S. aviation emissions rules could also have significant environmental benefits and would limit domestic emissions beyond the reach of the European Union. With new legislation unlikely, the CAA is the only plausible vehicle for such regulation. Title II Part B of the CAA does grant EPA broad regulatory authority over aviation emissions, though this authority has not been used aggressively. EPA could impose meaningful aviation GHG limits and, by using performance standards, give airlines incentives to creatively comply. It might further be possible to allow some forms of emissions trading, though the law is unclear. Emissions by foreign airlines in the United States could be covered under the act, though international law might impose barriers.

Key Words: Clean Air Act, aviation, aircraft, carbon, emissions, GHGs, European Union, trading, flexibility

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I. Introduction

Airplanes emit 2 to 3 percent of total global greenhouse gases (GHGs) per year.¹ This amount is small compared with emissions from other sectors, such as ground transportation and electric power, but by no means trivial. Moreover, the amount is growing quickly, with aviation emissions projected to increase between 290 percent and 667 percent by 2050.² There is also evidence that high-altitude aircraft emissions contribute disproportionately to climate change.³ Until recently, however, the global aviation sector has faced no limits on its emissions.

Meanwhile, a series of recent events has left the U.S. Environmental Protection Agency (EPA) as the only realistic venue for federal-level climate policy in the United States, primarily via its powers under the existing Clean Air Act (CAA).⁴ Since 2009, the agency has embarked on a regulatory program using the various tools available under the Act to regulate greenhouse gas emissions from a variety of sources, including road vehicles and certain power plants and industrial facilities.⁵

The CAA also includes provisions granting EPA significant authority to regulate air pollution from aircraft, a significant source of GHG emissions. The agency has used this

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¹ International Civil Aviation Organization. *ICAO Environmental Report 2010*, 31, <http://www.icao.int/environmental-protection/Pages/EnvReport10.aspx>. See also James E. McCarthy, *Cars, Trucks, and Climate: EPA Regulation of Greenhouse Gases from Mobile Sources*, Congressional Research Service, 13 (May 4, 2010).

² Percent change relative to a 2006 baseline. See Artur Runge-Metzger, *Aviation and Emissions Trading: ICAO Council Briefing*, (29 September 2010), available at http://ec.europa.eu/clima/policies/transport/aviation/docs/presentation_icao_en.pdf.

³ See U.S. Government Accountability Office (GAO), *Aviation and Climate Change: Aviation Emissions Expected to Grow, but Technological and Operational Improvements and Government Policies Can Help Control Emissions*, 13 (June 2009), <http://www.gao.gov/products/GAO-09-554> (noting that stratospheric nitrogen oxide emissions have a greater effect on climate than those at ground level, and that contrail and cloud formation by aircraft appear to have a warming effect, though this is not as well understood).

⁴ Clean Air Act, 42 U.S.C. §§ 7401–7671q (Westlaw 2010) [hereinafter CAA].

⁵ See Nathan Richardson, Art Fraas, and Dallas Burtraw, *Greenhouse Gas Regulation under the Clean Air Act: Structure, Effects, and Implications of a Knowable Pathway*, 41 *Env'tl L Rep News & Analysis* 10098–101 (2011).

authority in the past to regulate other pollutants from aircraft, though since 1982 it has closely followed standards set by the International Civil Aviation Organization (ICAO). ICAO has not issued GHG standards and appears unlikely to do so any time soon.⁶ EPA has so far shown relatively little desire to use its CAA authority to regulate GHGs independently of ICAO—despite petitions to do so and an ensuing lawsuit.

GHG emissions from aviation have become a contentious international issue. In 2008, the EU broke with ICAO, deciding to independently regulate aviation GHG emissions by requiring airlines to participate in its cap-and-trade system, the Emissions Trading System (ETS), starting in 2012.⁷ Controversially, the EU policy requires both foreign and domestic airlines to comply, and requires purchase of ETS allowances sufficient to cover the entire flight path of any journey beginning or ending at an EU airport.⁸ The U.S. and many other countries strongly objected to this decision, with the U.S. House of Representatives—in a rare parallel with Chinese policy⁹—passing a bill that would make it illegal for U.S. carriers to comply.¹⁰ A 2011 ruling by the European Court of Justice upheld the EU policy, including its extraterritorial elements.¹¹ This dispute shows no sign of quick resolution, and legal action under international treaty or trade law, diplomatic maneuvering, and further domestic action are likely.

The EU decision contains an escape clause, however. Carriers from countries that have “equivalent” aviation GHG emissions policies can be exempted from the ETS.¹² The U.S. could

⁶ See Kirsty McGregor, Attention focuses on ICAO as emission trading row rumbles on, *Flightglobal* (April 30, 2012), <http://www.flightglobal.com/news/articles/in-focus-attention-focuses-on-icao-as-emission-trading-row-rumbles-on-371009/>.

⁷ See Directive 2008/101 of the European Parliament and of the Council of 19 November 2008 Amending Directive 2003/87/EC so as to Include Aviation Activities in the Scheme for Greenhouse Gas Emission Allowance Trading within the Community ¶ 9, 2009 O.J. (L 8) 3 (EC), <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:008:0003:0003:EN:PDF> [hereinafter EU Directive].

⁸ *Id.* at 5.

⁹ See Mavis Toh, China Bans Airlines from Complying with EU ETS, *Flightglobal* (Feb. 6 2012), <http://www.flightglobal.com/news/articles/china-bans-airlines-from-complying-with-eu-ets-367796/>.

¹⁰ See European Union Emissions Trading Scheme Prohibition Act of 2011, H.R. 2594, 112th Cong. (2012).

¹¹ Case C-366/10, *Air Transp. Ass'n of America v. Sec'y of State for Energy and Climate Change* (2011), <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:62010CJ0366:EN:HTML>.

¹² See EU Directive, *supra* note 8, ¶ 17. The Directive explicitly mentions only other countries' policies limiting emissions from flights to the EU, but indicates that the EU should seek “optimal interaction” with other countries' policies and “avoid double regulation”. This leaves ample room to exempt any emissions covered by another country's regulatory scheme from the ETS.

therefore craft an aviation emissions policy on its own terms and possibly avoid the burden of EU regulation. However, the current political climate in Congress makes new legislation imposing GHG limits unrealistic for the time being. If the U.S. is to adopt such a policy in the near future, therefore, the CAA appears to be the only plausible vehicle.

Can CAA regulation achieve aviation emissions regulations significant enough to establish equivalency with EU policy while remaining cost-effective and politically acceptable? Fully answering this question requires judgments about the range of options realistically available to EPA in the current U.S. political environment and about the range of policies the EU would consider “equivalent”—judgments that would be, at best, informed guesses.

But the core part of the question is legal—what tools are available to the agency under the CAA to regulate aviation emissions, and how might they be used for GHGs? This paper is an attempt to answer that core legal question.

The agency’s powers to address aviation GHGs under the Act have not been thoroughly studied. A few court decisions, EPA documents, and petitions to the agency have looked at the issue or aspects of it, but none is a comprehensive assessment. One relatively brief scholarly treatment exists,¹³ and although it is a useful introduction to many of the relevant issues, much has changed since it was published in 2009. I also reach different conclusions on some points, as noted below.

EPA regulation of aviation GHG emissions under the CAA is the subject of current litigation.¹⁴ However, that litigation concerns whether the agency *must* regulate such emissions. This threshold issue is relevant, but both parties to the litigation agree that EPA has authority to regulate aviation emissions. Moreover, the outcome of the suit does nothing to clarify *how* the agency could regulate, whether it chooses to do so or is compelled. It is this latter question that this paper seeks to answer.

In short, the legal analysis that follows indicates that the CAA does provide EPA with substantial and flexible authority to regulate aviation GHG emissions. Doing so will require the agency to depart from its traditional use of this authority, but neither the statute nor international law appears to stand in the way. The Act further appears to give the agency authority to

¹³ Daniel H. Conrad, Into the Wild Green Yonder: Applying the Clean Air Act to Regulate Emissions of Greenhouse Gases from Aircraft, 34 *N.C.J. Int’l L. & Com. Reg.* 919 (2009).

¹⁴ *Center for Biological Diversity et al. v. U.S. EPA*, Civil Action 10-00985 (DC Cir. 2010).

implement smart regulation in the form of performance standards that give compliance flexibility to industry and perhaps allow limited use of market-based mechanisms. Political and administrative challenges remain for EPA, however.

II. The Clean Air Act and Aviation

The Clean Air Act grants EPA expansive authority to regulate aviation emissions. EPA has exercised this authority for a number of pollutants since the 1970s, but over the past 30 years it has always modeled its regulations under this title after international standards. In part due to this link, EPA regulations have not generally forced manufacturers to significantly change their products. Nevertheless, EPA's regulatory track record under the Act is relevant, as it may indicate EPA's own judgment about the extent of its authority.

A. Aviation Provisions in the Act

Provisions granting authority to regulate aviation emissions date to the 1970 enactment of the core of the modern CAA. Title II of the statute governs emissions from mobile sources; while the vast majority of it (Part A) is devoted to fuel and emissions standards for surface vehicles, Part B of the Title is specifically aimed at aviation emissions.¹⁵ This Part grants EPA broad powers to set "emissions standards" for aircraft engines. The agency, however, has used these powers only infrequently and in limited fashion.

Part B is quite short—only about a page long—and its substantive provisions are even shorter. A single paragraph, Section 231(a)(2)(A), is the source of the agency's authority:

The Administrator shall, from time to time, issue proposed emissions 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.¹⁶

Much of the remainder of Part B deals with procedural issues, such as a requirement that EPA consult with the Federal Aviation Administration (FAA) in issuing standards. The only substantive limitation imposed is that standards may not be changed so as to significantly increase noise or decrease safety. The Part also includes a preemption clause prohibiting states

¹⁵ CAA § 231 et seq.

¹⁶ CAA § 231(a)(2)(A).

from adopting independent aircraft emissions standards. FAA is also solely responsible for regulation of aviation fuels.

The core of Part B is similar to other provisions contained elsewhere in the CAA that apply to other sources. In particular, its language is nearly identical to that found in the core Section of Title II Part A (Section 202).¹⁷ Both sections require the agency to determine whether a given type of air pollution “endanger[s] public health or welfare” and, if so, whether emissions from the class of sources in question “causes, or contributes to” that pollution. These determinations, respectively, are the “endangerment” and “cause or contribute” findings. Positive endangerment and cause/contribute findings are the prerequisites for regulation, but they also compel the agency to regulate due to the mandatory language in both Sections.

The similarities between Part A and Part B end there, however. Section 202 is followed by over 40 pages of substantive and procedural text that clarifies, limits, and dictates the regulatory authority given to the agency over surface vehicles.¹⁸ As noted above, Part B contains almost no such explanatory and limiting text. This makes interpretation somewhat more difficult, though it likely also means that the agency’s powers under Part B are broader, especially given the deference shown to agency interpretations of their statutory authority under *Chevron*.

Another important difference between aviation regulation under Part B and surface vehicle regulation in Part A is that authority is divided between EPA and FAA. Although EPA is solely responsible for setting environmental standards for aircraft, FAA is charged with actual regulation of the industry, and the act requires EPA to consult with FAA in setting standards.¹⁹

B. History of Clean Air Act Aviation Rules

Though Part B grants EPA broad authority to regulate aviation emissions, the agency has in the past exercised this authority conservatively. The agency first issued aviation emissions standards under Title II Part B in 1973, imposing limits on smoke, fuel venting, and specified

¹⁷ CAA § 202.

¹⁸ A share of Part A is devoted to provisions granting authority to regulate vehicle fuels. *See* CAA § 211. No corresponding provision exists for aircraft fuels under the act. FAA authority to regulate these fuels may provide an alternative vehicle for regulation to reduce aviation GHG emissions, perhaps via incentives for biofuels. The scope of this authority is not examined here, however.

¹⁹ CAA § 231(a)(2)(B)(i).

pollutants: hydrocarbons, carbon monoxide, and nitrogen oxides (NO_x).²⁰ The standards applied to newly produced engines, future designs, and existing engines, though the stringency of the standards differed between these types. Over the next decade, the agency revised these standards, in most cases making them less stringent—first by excluding general aviation engines,²¹ then by reducing the general stringency and scope of the standards in 1982.²² This loosening of emissions standards was designed to bring U.S. regulations in line with initial standards issued by ICAO.²³

Since 1982, EPA standards have closely followed those issued by ICAO.²⁴ NO_x standards, for example, were revised in 1997²⁵ and 2005,²⁶ and further revisions were proposed in 2011.²⁷ In each case, the regulations were revised to match updated ICAO standards,²⁸ though in some cases compliance dates were more aggressive than those required internationally.²⁹ As a result, U.S. aviation emissions regulations are no more stringent than international standards and do not cover pollutants—such as GHGs—not currently subject to international standards.

Since ICAO standards have not been particularly aggressive, and since U.S. manufacturers must comply with them anyway to sell engines on the international market, EPA's Title II Part B standards have not independently resulted in significant changes to engine or aircraft design—in other words, they have not been technology-forcing regulations. Some states and environmental groups have criticized this approach, resulting in a federal suit, *NACAA v.*

²⁰ Environmental Protection Agency, Control of Pollution from Aircraft and Aircraft Engines, 38 *Fed. Reg.* 19088 (July 17, 1973).

²¹ Environmental Protection Agency, Control of Air Pollution from Aircraft and Aircraft Engines; Amendments to the Emission Standards for Aircraft Engines, 45 *Fed. Reg.* 1419 (January 7, 1980).

²² Environmental Protection Agency, Control of Air Pollution from Aircraft and Aircraft Engines; Emission Standards and Test Procedures, 47 *Fed. Reg.* 58462 (December 30, 1982).

²³ Arnold W. Reitze, *Air Pollution Control Law: Compliance and Enforcement*, 316 (2001).

²⁴ *Id.*

²⁵ Environmental Protection Agency, Control of Air Pollution from Aircraft and Aircraft Engines; Emission Standards and Test Procedures, 62 *Fed. Reg.* 25356 (May 8, 1997).

²⁶ Environmental Protection Agency, Control of Air Pollution from Aircraft and Aircraft Engines; Emission Standards and Test Procedures, 70 *Fed. Reg.* 69664 (November 17, 2005).

²⁷ Environmental Protection Agency, Control of Air Pollution from Aircraft and Aircraft Engines; Proposed Emission Standards and Test Procedures 76 *Fed. Reg.* 45012 (July 27, 2011).

²⁸ *Id.* at 45015.

²⁹ Reitze, *supra* note 23, at 317.

EPA (489 F.3d 1221, DC Circuit, 2007), with the National Association of Clean Air Agencies (NACAA) seeking to compel EPA to issue stricter standards. The DC. Circuit rejected this challenge, however, holding that Section 231 does not require technology-forcing standards and that the agency acts within its authority when it follows ICAO standards, even if doing so means that it “will not impose any additional burden on manufacturers.”³⁰

Note, however, that this decision is based on a reading of Title II Part B that grants EPA sufficiently broad authority that it *may* follow ICAO if it wishes to do so, not a reading that the agency’s authority is so narrow that it *must* follow ICAO. In other words, nothing in the decision precludes the agency from deviating from ICAO standards in the future.³¹ Section 0 discusses whether international law may impose any such limitations.

In general, EPA has applied its past aviation emissions standards to a limited set of pollutants and imposes no requirements above and beyond those required of all ICAO members. Their effect on engine manufacturers has been small. However, the language of Title II Part B is broad, and on the one occasion when federal courts have been asked to define the limits of EPA’s authority, they have found it to be expansive. But how expansive? Can the agency regulate aviation GHG emissions under the CAA? If so, what tools can it use? And must it do so in concert with ICAO?

III. The Clean Air Act and Carbon

Action in the courts and lack of action in Congress to pass new climate legislation have enabled EPA to pursue limits on GHG emissions from a variety of sources under provisions of the CAA.

A. 2007: *Massachusetts v. EPA*

The Supreme Court’s 2007 decision in *Massachusetts v. EPA*, 549 U.S. 497 (2007), opened the way for regulation of GHGs from a variety of sources under the Clean Air Act. In its decision, the Court held that, contrary to past EPA interpretation, GHGs were pollutants within the definition of the statute, and that therefore EPA must decide (on non-arbitrary grounds)

³⁰ *National Association of Clean Air Agencies v. EPA*, 489 F.3d 1221 at 1225, 1229–32 (2007).

³¹ *See id.* at 1229 (noting that the agency’s delegation of authority in § 231 to “issue such regulations . . . as he deems appropriate” is “both explicit and extraordinarily broad”).

whether to issue an endangerment finding.³² By the end of the Bush administration in 2008, the agency had not decided whether to issue such a finding, though it did issue an Advance Notice of Proposed Rulemaking (ANPR) discussing possible regulatory actions and requesting comment (discussed in Section 0 below).³³

B. 2009–2012: Initial CAA Carbon Regulation

The Obama EPA has relatively rapidly (by EPA standards) moved ahead with GHG regulations under the CAA. The agency made formal endangerment and cause/contribute findings for motor vehicle GHGs in late 2009 under Section 202 of the Act (the subject of *Massachusetts*).³⁴ Since that finding, it has issued a series of regulations applying to different classes of sources, including fleet emissions standards for new vehicles³⁵ and inclusion of GHG emissions in permit applications for new and modified large stationary emitters.³⁶ It has also committed to issue GHG performance standards for new and existing stationary sources in the two sectors with the largest emissions—steam-fired power plants (mostly coal)³⁷ and petroleum refineries.³⁸

In the meantime, comprehensive climate legislation famously failed to pass the Senate in 2010,³⁹ and the political climate in Congress has turned sharply against such legislation, at least for the time being. Congress has not, however, overruled *Massachusetts* or otherwise stripped powers to regulate GHGs under the CAA from EPA. The practical result of this dual inaction is to leave EPA as the only viable venue for climate policy at the federal level. (States can, and

³² *Massachusetts v. EPA*, 549 U.S. 497, 528–29 (2007).

³³ Environmental Protection Agency, Advance Notice of Proposed Rulemaking: Regulating Greenhouse Gas Emissions under the Clean Air Act, 73 *Fed. Reg.* 44354 (July 30, 2008) [hereinafter ANPR].

³⁴ Environmental Protection Agency, Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act, 74 *Fed. Reg.* 66496 (Dec. 15, 2009).

³⁵ Environmental Protection Agency, Light-Duty Vehicle Greenhouse Gas Emissions Standards and Corporate Average Fuel Economy Standards; Final Rule, 75 *Fed. Reg.* 25324 (May 7, 2010).

³⁶ See Environmental Protection Agency, Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule, 74 *Fed. Reg.* 55292, 55297 (2009).

³⁷ (Fossil-Fueled Power Plants) Settlement Agreement, *State of New York, et al. v. EPA*, No. 06-1332, DC Cir. (2007), <http://www.epa.gov/airquality/cps/pdfs/boilerghgsettlement.pdf>.

³⁸ (Petroleum Refineries) *Id.* <http://www.epa.gov/airquality/cps/pdfs/refineryghgsettlement.pdf>.

³⁹ Gail Russell Chaddock, *Harry Reid: Senate Will Abandon Cap-and-Trade Energy Reform*, *Christian Science Monitor* (July 22, 2010), <http://www.csmonitor.com/USA/Politics/2010/0722/Harry-Reid-Senate-will-abandon-cap-and-trade-energy-reform>.

some do, have important climate policies of their own⁴⁰ and play important roles in many EPA-led CAA programs,⁴¹ but state regulation of aviation emissions is expressly preempted by the CAA,⁴² despite the statute's general federalist structure.)

IV. Aviation GHG Developments So Far

Though it has been petitioned by the states and sued by environmental groups, EPA has yet to implement regulations of GHG emissions from aviation. Moreover, neither EPA's statements to date nor the petitions and lawsuits shed significant light on EPA's regulatory options. Therefore, new examination of the relevant statute is needed.

A. EPA Inaction

As noted, EPA has not moved to regulate GHG emissions from aviation under the CAA. On one hand, this is not surprising. While U.S. GHG emissions from aviation are not trivial, as shown in **Error! Reference source not found.**, they are dwarfed by those from the primary sectors EPA has moved to regulate—transportation and coal-fired power⁴³ (though they are comparable to those from the refining sector, which the agency has also committed to regulate).⁴⁴ It is understandable for EPA to seek to address the largest GHG sources first, given its limited resources. Regulators may assume that the sectors with the greatest emissions also have the greatest potential for cost-effective reductions, though this is not necessarily the case. Emissions from the surface transportation and electricity sectors may be so large that regulators assume they are the best targets.

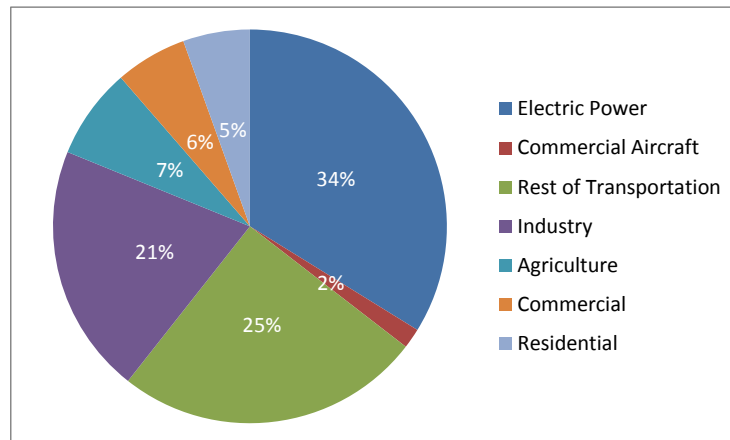
⁴⁰ The Regional Greenhouse Gas Initiative (RGGI) in the Northeast and California's cap-and-trade program under its A.B. 32 law are the best examples.

⁴¹ For example, performance standards for existing emissions sources under CAA § 111(d) are implemented and enforced by states under EPA guidelines.

⁴² CAA § 233.

⁴³ Compare David McCollum et al., Greenhouse Gas Emissions from Aviation and Marine Transportation: Mitigation Potential and Policies, Pew Center on Global Climate Change Solutions White Paper Series, 5 (Dec. 2009), <http://www.c2es.org/docUploads/aviation-and-marine-report-2009.pdf> (estimating 2005 domestic aviation GHG emissions of 180 million metric tons of CO₂-equivalent or 250 tons when U.S. carriers' international emissions are included) with Environmental Protection Agency, Regulator Impact Analysis for the Mandatory Reporting of Greenhouse Gas Emissions Final Rule (GHG Reporting); Final Report, 5-2, http://www.epa.gov/climatechange/emissions/downloads09/GHG_RIA.pdf (estimating GHG emissions from U.S. petroleum refineries of 204.7 tons in 2006).

⁴⁴ See (Petroleum Refineries) Settlement Agreement (*supra* note 38).

Figure 1. U.S. GHG Emissions by Sector, 2010⁴⁵

On the other hand, as noted above, Title II Part B closely parallels Title II Part A, the CAA section that was the subject of *Massachusetts* and under which EPA issued its 2009 endangerment finding and the ensuing road-vehicle fleet emissions standards. In a procedural sense, at least, aviation regulation would therefore seem straightforward. This, of course, ignores the substantial technical and structural dissimilarities between the two sectors, which would inevitably require the agency to do new analysis.

B. The California and Environmental Petitions

States and environmental groups separately petitioned EPA to regulate aviation GHGs shortly after the *Massachusetts* decision in 2007.⁴⁶ These petitions noted the close parallels between Sections 202 and 231 and argued that both Sections “require EPA to adopt emissions control regulations for emissions that are reasonably anticipated to endanger public health or welfare”.⁴⁷ The petitions called on EPA to issue a GHG endangerment finding (recall that it

⁴⁵ Calculated from data in Environmental Protection Agency (EPA), [Draft Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2010](http://www.epa.gov/climatechange/emissions/usinventoryreport.html), (February 27, 2012), <http://www.epa.gov/climatechange/emissions/usinventoryreport.html>.

⁴⁶ See State of California et al., Petition for Rule Making Seeking the Regulation of Greenhouse Gas Emissions from Aircraft (Dec. 4 2007), http://ag.ca.gov/cms_attachments/press/pdfs/n1501_aircraft_petition_final.pdf [hereinafter State Petition]; see also Friends of the Earth et al., Petition for Rulemaking under the Clean Air Act to Reduce the Emission of Air Pollutants from Aircraft That Contribute to Global Climate Change (Dec. 31, 2007), http://docs.nrdc.org/globalwarming/files/glo_07123101a.pdf [hereinafter Environmental Petition].

⁴⁷ State Petition, *supra* note 46, at 15.

would not do so until 2009) and, more specifically, a cause/contribute finding for aircraft.⁴⁸ Petitioners further argued that opportunities to reduce aviation GHG emissions via engine design, airframe design, and operational changes are available and should be targeted by EPA standards under Title II Part B.⁴⁹

C. The 2008 ANPR

The agency did not formally respond to these petitions. Instead, it reiterated its arguments in the 2008 ANPR and requested comment.⁵⁰ EPA also included a broad, albeit relatively brief, discussion of options for regulating aircraft emissions in the document. In this discussion, the agency suggests technological and operational opportunities for aviation emissions reductions,⁵¹ echoing the petitions, and options for regulatory design.⁵² The ANPR, however, gives relatively little indication of the agency's view of the petitioners' arguments, the legal limits of regulation under Title II Part B, or its regulatory policy preferences for aircraft GHG emissions. For the most part, the document simply lays out options and requests comment.

D. Recent Litigation—Must EPA Regulate?

The agency's failure to respond or to regulate aircraft GHG emissions as requested led the environmental petitioners to sue in 2010, arguing not only that the agency had violated the CAA by failing to respond, but also that the statute *requires* EPA to determine whether it will issue endangerment and cause/contribute findings, and presumably therefore to regulate aviation emissions.⁵³ Specifically, the environmental plaintiffs allege that EPA's failure to issue an endangerment decision under Section 231 constitutes an unreasonable delay, given its existing Section 202 finding and the statutory text.⁵⁴

⁴⁸ State Petition, *supra* note 46, at 13; Environmental Petition, *supra* note 46, at 26.

⁴⁹ State Petition, *supra* note 46, at 11–13, Environmental Petition, *supra* note 46, at 8–14.

⁵⁰ See ANPR, *supra* note 33, at 44460–62.

⁵¹ *Id.* at 44469–71.

⁵² *Id.* at 44472–73.

⁵³ Complaint for Declaratory and Injunctive Relief at 28–30, *Center for Biological Diversity et al. v. EPA*, No. 10-985 (DC Cir. Jun. 11, 2010).

⁵⁴ *Id.*

EPA, however, claims that Section 231 gives it the discretion to choose when and whether to consider an endangerment finding.⁵⁵ The agency agrees, however, with the plaintiffs that, once such an endangerment finding (and a related cause/contribute finding) has been made, the mandatory language of Section 231 requires it to regulate.⁵⁶ If the environmental plaintiffs prevail, the agency will be compelled to make endangerment and cause/contribute determinations for aviation GHG emissions and, if those findings are positive, to impose GHG emissions standards.

This case has not yet been resolved. Defendant EPA moved to dismiss the case on various grounds. In July 2011, the court denied this motion, at least with respect to the plaintiffs' claims regarding aviation emissions regulations under Title II Part B.⁵⁷ In its decision on the motion, the court ruled that although *Massachusetts* itself cannot be read to indicate that an endangerment finding under Section 231 is mandatory, "Congress's use of mandatory language, and paragraph 231(a)(2)(A)'s role in the aircraft-emissions-regulation regime created by section 231, strongly suggest that Congress intended the predicate endangerment finding to be a compulsory step."⁵⁸ This ruling appears to undermine the core of EPA's argument, at least with respect to Title II Part B.⁵⁹ A final determination depends on the court's ruling on the merits, however.

E. Beyond Litigation

Even if the plaintiffs win and EPA is compelled to make endangerment and cause/contribute determinations, relatively little is resolved. First, the agency could make a negative endangerment or, much more likely, cause/contribute determination, either of which would preclude regulation. This seems extremely unlikely for an endangerment finding, since the agency has issued a similar finding under Section 202. Analysis of the threat to public health and

⁵⁵ See Memorandum in Support of Partial Motion to Dismiss at 12-13, *Center for Biological Diversity et al. v. EPA*, No. 10-985 (DC Cir. Aug. 20, 2010).

⁵⁶ *Id.* See also Inimai M. Chettiar and Jason A. Schwartz, *The Road Ahead: EPA's Options and Obligations for Regulating Greenhouse Gases*, Institute for Policy Integrity, New York University School of Law (2009) at 26, <http://policyintegrity.org/files/publications/TheRoadAhead.pdf>.

⁵⁷ See Memorandum Opinion and Order (denying partial motion to dismiss) at 13-19, *Center for Biological Diversity et al. v. EPA*, No. 10-985 (DC Cir. Jul. 5, 2011).

⁵⁸ *Id.* at 19.

⁵⁹ The court did grant EPA's motion to dismiss the plaintiffs' separate claim that it was required to issue endangerment findings for nonroad engines under a different section of the Act. See *id.* at 13.

welfare is identical for all GHGs, regardless of their source, because GHGs are a global, uniformly mixing pollutant. But it is conceivable that the agency might determine that emissions from aircraft do not cause or contribute to GHG harms sufficiently to constitute endangerment. Such a finding undoubtedly would be challenged by environmental groups but is not obviously arbitrary or unreasonable, given the difference in total emissions between the two sectors (motor vehicles and aviation).⁶⁰

Moreover, even if the agency issues positive findings and is therefore compelled to regulate aviation emissions in some fashion, it retains broad discretion over the form and stringency of those regulations—a fact that the *Center for Biological Diversity (CBD)* court scrupulously noted in its denial of EPA’s summary judgment motion, citing the DC Circuit’s earlier holding in *NACAA*.⁶¹ The breadth of the agency’s authority is rooted in the relative lack of restrictions imposed by the (brief) plain language of the statute and the agency’s discretion to interpret that language under the *Chevron* doctrine.⁶²

The outcome of *CBD v. EPA* is therefore interesting and important, but it would do nothing to clarify the options available to EPA when and if it actually regulates aviation GHG emissions. The 2008 ANPR is somewhat more helpful in this regard, but its preliminary character and noncommittal language limit its value. A new look at Title II Part B is therefore needed, informed by both its past use and more recent regulatory action for GHGs under other parts of the CAA.

V. What Can EPA Regulate, and How?

Whether the agency chooses to regulate aviation GHG emissions under Title II Part B or its hand is forced by courts, it will have three fundamental policy choices to make. The agency must decide the scope of the regulation, its stringency, and the regulatory tool it will use—

⁶⁰ Some scholars have argued that failure to issue a cause/contribute finding for aviation emissions could be rejected by a court on the grounds that it would in fact be arbitrary or capricious, given the volume of aviation GHG emissions and the Supreme Court’s dicta in *Massachusetts* that the contribution of the U.S. transportation sector to global emissions (6 percent at the time) was “enormous.” See Chettiar and Schwartz, *The Road Ahead*, *supra* note 56, at 27.

⁶¹ *Id.* at 19.

⁶² *Chevron U.S.A., Inc. v. Natural Resources Defense Council, Inc.*, 467 U.S. 837 (1984) (in which the Supreme Court held that agency interpretations of ambiguous statutory language prevail unless they are not “reasonable” or “permissible”).

including, possibly, market-based mechanisms. The permissible scope of regulation and the set of tools available to EPA are legal questions, and the following sections address them in some detail. Stringency is predominately a policy question, but some relevant legal constraints are worth considering.

A. Scope

Past EPA regulation under Title II Part B has been limited in scope, focusing almost exclusively on new aircraft engines. The statute allows much broader regulation, however, as the following sections explain. Even where it imposes apparent limitations, such as its focus on aircraft *engines*, EPA can design its regulation so as to allow operators a broad range of compliance options.

1. Traditional Standards for New Engines

In its past regulatory actions under Title II Part B, EPA has generally used standards aimed at new aircraft engines. The standards are technological in the sense that they discriminate among different classes of engines and are based, ultimately, on ICAO's technological assessments, but they do not generally require that new engines adopt specific technological upgrades. In this sense, they are really performance standards, though the agency does not refer to them as such. Under such standards, newly designed (more accurately, newly *certified*) or in some cases newly produced engines must meet a specified emissions rate. For example, the 2005 revised NO_x standards required engines with thrust rated over 89 kN to achieve emissions reductions of about 16 percent over previous standards (based on a complicated formula that considers design-specific characteristics).⁶³

The agency could undoubtedly impose similar standards on aircraft engine GHG emissions, as it notes in its 2008 ANPR.⁶⁴ Such standards would limit the GHG emissions of newly designed engines to a specified rate, presumably based on the thrust capacity of the engine. Since engine GHG emissions are essentially a function of fuel use, such standards would

⁶³ See EPA, *Control of Air Pollution from Aircraft*, *supra* note 26, at 69574 (2005). Recall that in practice, this did not result in a 16 percent emissions reduction from new engine designs, since the 2005 standards were identical to ICAO standards issued earlier with which engine manufacturers were already complying.

⁶⁴ See ANPR, *supra* note 33, at 44472.

in effect be fuel efficiency standards. Current engine testing procedures already track CO₂ emissions, making implementation of such standards relatively straightforward.⁶⁵

The only differences between these GHG standards and past EPA aviation engine standards is that they would apply to GHGs and would lead, rather than follow, ICAO limits, as ICAO has not yet developed standards for GHGs. Imposing more stringent regulations than ICAO is probably permissible, at least for domestic U.S. carriers and engine manufacturers, as discussed in Section 0 below.

2. Existing Engines

Issuing standards for new engines would, of course, reduce future emissions only as those more efficient engines entered service. Because aircraft engines stay in service for years or even decades, these reductions would come at a relatively slow pace. If the agency desires a steeper decline in aviation emissions, could it also use Title II Part B to issue standards for *existing* engines, requiring either retrofit or replacement of engines that do not meet the standards?

First, the statutory language supports EPA jurisdiction over existing engines. Section 231 allows the agency to impose emissions standards on “any class or classes of aircraft engines.”⁶⁶ This language does not limit standards to new engines (or indeed, to any particular class). Section 202, on the other hand, specifically restricts the agency’s authority to regulate to new motor vehicles and engines.⁶⁷ Congress therefore was aware of the significance of such a limitation and knew how to draft it. If Congress had intended to so restrict the agency’s powers for aviation standards, it presumably would have done so in Section 231. Legislative history of the 1970 CAA also provides some evidence that Congress intended to grant EPA authority to regulate existing engines in Title II Part B.⁶⁸

Second, EPA has regulated existing engines in the past, requiring retrofits for some engines as part of its first set of emissions standards in 1973. Although the agency has not

⁶⁵ *Id.*

⁶⁶ CAA § 231(a)(2)(A).

⁶⁷ CAA § 202(a)(1).

⁶⁸ *See* 116 Cong. Rec. 691210 (1970) (Statement of Sen. Muskie discussing the reasons for regulating emissions from jet engines and identifying methods of regulation for both new and existing jet engines), 116 Cong. Rec. 700610 (1970) (Representative Skubitz describing the effect of aviation emissions standard as driving retrofits of new and existing aviation engines), 116 Cong. Rec. 700922 (1970) (Senator Cooper describing the intent of the CAA as to regulate both new and existing aviation engines).

imposed standards on existing engines in more recent regulation⁶⁹ (and in fact has been at pains to clarify that new standards do *not* require retrofits),⁷⁰ the 1973 standards provide important precedent should it choose to do so again.

3. Engines or Aircraft?

In principle, efficiency improvements from aircraft and corresponding reductions in GHG emissions might be available from changes in design of airframes as well as engines.

Environmental groups asked EPA to consider issuing airframe-level standards in their 2007 petition, citing a variety of possible efficiency-boosting improvements from weight reduction to “blended wing” airframes.⁷¹

However, all past EPA aviation standards have applied only to aircraft engines, not to aircraft as a whole. Section 231 specifically refers to aircraft engines,⁷² unlike Section 202, which separately refers to motor vehicles and motor vehicle engines.⁷³ This implies that Congress intended EPA aviation standards to apply only to engines. In his 2009 article, Daniel Conrad concludes, based on this language, that “Section 231 limits the EPA’s authority to regulate ‘aircraft engines’ rather than the entire aircraft”.⁷⁴

However, evidence from the legislative history indicates that Congress intended to grant EPA authority to regulate aircraft in general via Section 231 standards—for example, the Conference Report for the 1970 CAA amendments notes that aviation standards apply to both “civil aircraft and aircraft engines”.⁷⁵

Congressional intent is therefore difficult to determine, and it is hard to predict how a court would rule if the agency were to pursue standards directly aimed at airframe design choices. It is plausible that a court would find that the plain language of the CAA rules out

⁶⁹ The agency did consider “retrofit kits” as part of a voluntary program associated with its 2005 NO_x standards, but these were not widely used and the efforts to build a voluntary program broke down. *See* EPA, *Control of Air Pollution from Aircraft*, *supra* note 26, at 69664, 69683 (2005).

⁷⁰ *See, e.g., id.* at 69664, 69667 n18.

⁷¹ *See* Environmental Petition, *supra* note 46, at 12; *see also* GAO, *Aviation and Climate Change*, *supra* note 3, at 22–26.

⁷² CAA § 231(a)(2)(A).

⁷³ CAA § 202(a)(1).

⁷⁴ Conrad, *Into the Wild Green Yonder*, *supra* note 13, at 948.

⁷⁵ 116 Cong. Rec. 701218, 42386 (1970).

standards that apply directly to airframes.⁷⁶ And EPA, fearing such a result, might conclude that breaking with past practice and regulating airframes is not worth the risk. As noted below, however, this limitation on the agency's authority may not matter much in practice.

4. Operational Standards

Similarly, the aviation industry could reduce its overall emissions through operational changes independent of engine or airframe design. Reductions in idle times, flight speeds, taxiing, use of reverse thrust, and other practices would reduce fuel use and therefore emissions.⁷⁷ Could EPA impose operational standards on airlines that would require changes to these practices? Superficially, this question seems tied to the previous one—if Section 231 is limited to aircraft engines, it would appear to rule out operational standards as well as aircraft design standards. Conrad is highly skeptical toward the permissibility of operational standards, largely for this reason.⁷⁸

Conrad also argues that other Sections of the CAA effectively limit EPA authority to issue operational aviation standards.⁷⁹ Specifically, he points to language in Section 108 of the CAA that requires EPA to publish “transportation control measures” that states could implement in order to comply with national air quality standards. Section 108 provides examples of such measures, which, though stated in terms that clearly refer to motor vehicles, are similar in many respects to operational standards that EPA might seek to impose on air carriers.⁸⁰ This requirement in Section 108, Conrad argues, indicates that Congress intended policies aimed at operational transportation practices to be part of the national air quality standards program under Sections 108–110, not mobile source regulation under Title II.⁸¹ Conrad bases this argument on the traditional canon of statutory interpretation that “however inclusive may be the general language of a statute, it will not be held to apply to a matter specifically dealt with in another part of the same enactment.”

⁷⁶ Under *Chevron*, courts will first determine whether statutory language is ambiguous (Step One). If there is no ambiguity, no discretion is left to agencies. Only if there is ambiguity do courts reach Step Two, at which reasonable agency readings of statutory language prevail. See *Chevron*, 467 U.S. 837, 842–44 (1984).

⁷⁷ See Environmental Petition, *supra* note 46, at 9–11; see also GAO, *Aviation and Climate Change*, *supra* note 3, at 26–30.

⁷⁸ Conrad, *Into the Wild Green Yonder*, *supra* note 13, at 948.

⁷⁹ *Id.* at 932–33.

⁸⁰ CAA § 108(e-f).

⁸¹ Conrad, *Into the Wild Green Yonder*, *supra* note 13, at 932–33.

Conrad's interpretation of Section 108's significance is too broad, however. First, the language in Section 108 clearly refers to operational policies targeted at motor vehicles. None of its examples are relevant to aviation, at least not without creatively broad interpretation. This interpretation is strengthened by the fact, noted above, that federal standards for motor vehicles are restricted to new vehicles. Even if Section 108 did not exist, EPA could not impose operational requirements on motor vehicle owners because it lacks the authority to regulate existing vehicles or engines. Together, therefore, Sections 202 and 108 divide authority over motor vehicle regulation between EPA, which handles standards for new vehicles, and states, which—via their State Implementation Plans—may impose operational requirements or other, broader transportation policies to reduce overall emissions from motor vehicles.

Second, and relatedly, Congress cannot have intended EPA to leave operational standards for aviation to states, whether based on federal recommendations under Section 108 or not. Regulation of the aviation industry is highly federalized, and states lack the authority to implement most if not all plausible operational standards for the industry. Title II Part B itself explicitly preempts state regulation of aviation emissions.⁸² If states cannot regulate such emissions, whether through operational standards or otherwise, the division of aviation regulatory authority implied by Conrad's interpretation of Section 108 is impossible and cannot have been intended by Congress.

There is some support for this interpretation in the legislative history. For example, the Conference Report on the 1970 CAA notes that Section 231 standards “may well specify a limitation upon the number of civil aircraft which may land at any airport within such areas.”⁸³ Such a limitation is clearly operational in effect. Conrad, however, cites some statements in the legislative history that could be interpreted to indicate Congress had a narrower view of the standards.⁸⁴

The 2008 ANPR also implies that EPA does not view Section 231 as limiting standards to aircraft engines. In the document, the agency discusses both airframe changes and operational measures as opportunities for GHG emissions reduction that might be targeted by EPA

⁸² CAA § 233.

⁸³ CR 701218, 42393; see also similar comment by Sen. Muskie, CR 701218, 42393.

⁸⁴ Conrad, *Into the Wild Green Yonder*, *supra* note 13, at 934–35.

regulation.⁸⁵ This discussion would make little sense if the agency believed such measures were beyond the reach of the Act.

Nevertheless, directly mandating operational changes via Section 231 standards would be a break with agency past practice. As with standards aimed at airframes, such regulation would be at some risk of being rejected by courts, and a cautious agency might therefore decide not to take the risk. As explained in the next Section, however, this limitation may not matter in practice.

It should be noted that many aspects of airline operational practices are governed by FAA regulations. Airlines' ability to make emissions-reducing operational changes may therefore be limited even if they are given incentives to do so by EPA regulation. EPA and FAA should therefore coordinate any future regulations, as the statute requires them to do.

5. Aviation Standards as Performance Standards

If EPA cannot include airframe design or operational practices in its aviation standards, its ability to achieve GHG emissions reductions—and, in particular, cost-effective reductions—is sharply limited. Standards for new engines, as noted, will take time to show emissions benefits. Retrofits for some existing engines may be available, but these opportunities are likely to be limited and may be less cost-effective than operational changes. It is therefore not only in EPA's (and environmentalists') interest that operational changes be available as compliance options, but in industry's interest as well. A wider set of compliance options almost certainly means less costly regulation, holding stringency constant.

EPA is probably not as limited as the above analysis of the statute suggests, however. Even if Title II Part B standards must use engine emissions as the *measure* of compliance, operational and airframe changes can still likely be valid compliance options. By framing requirements as performance standards, the regulation would nominally target engines but leave discretion over compliance options to carriers. Such regulations would achieve a similar (and perhaps superior) practical result to regulation that explicitly sets standards for airframe design and operational practices, but they would place decisionmaking power in the hands of those with the best information—the industry.

⁸⁵ See ANPR, *supra* note 33, at 44470–71.

The key to such a regulatory approach is a simple insight: all GHG emissions from aircraft come from engines. Therefore, even if the CAA is interpreted as giving EPA authority only to regulate engines, this is all the authority the agency needs. The problems described above with airframe and operational-level standards appear only when engines are treated as discrete devices, rather than the emitting part of a larger system. This is a natural understanding when regulation is focused on new engines, which might be installed on any of a variety of aircraft, operating in a variety of conditions. In reality, however, emissions from engines depend fundamentally on the airframe to which they are attached and the conditions under which they are used.

EPA regulation can implement an inclusive performance standard by expressing the standard for existing engines in terms of an emissions rate, such as tons of CO₂ emitted per mile traveled. In such a program, airlines, not engine manufacturers, would be the point of regulatory compliance. EPA would set a benchmark emissions rate for each airline (or for the sector as a whole, if trading is to be permitted). An airline whose emissions rate exceeds that benchmark would have a variety of options to bring its performance in line with the standard. It could retrofit the engines on its aircraft, replace them with new engines, make retrofits to its airframes, or upgrade to entirely new aircraft. It could also make operational changes. If trading is allowed, it could purchase credits from other airlines or overcomply and sell credits. Any of these moves would, in principle, reduce emissions associated with the airline's flights (or in the case of buying credits, overall emissions in the sector). And these reductions would ultimately come (physically, at least) from aircraft engines, the target of EPA's Title II Part B standards.

As noted above, even traditional EPA aircraft engine standards are properly described as performance standards, since they require compliance with a specific emissions rate target but do not require that any specific technology be used. The key difference between such standards and the broader performance standards described in this Section is in what is being measured. By targeting emissions per mile of engines in use rather than a onetime lab measurement of emissions from each engine model, the range of compliance options is greatly expanded.

EPA suggested and requested comment on a broadly similar regulatory approach in its 2008 ANPR, though it did not call it a performance standards program:

[I]n the case of aircraft, it may be more practical and flexible to directly regulate airline fleet average GHG emissions. Under such an approach we would set a declining fleet average GHG emission standard for each airline[. . .].
Although we might develop such a declining fleet average emissions program

based on engine emissions . . . [it] could potentially be designed to consider the whole range of engine, aircraft and operational GHG control opportunities[.].⁸⁶

EPA requested comment on this suggestion, in particular on implementation and administrative issues,⁸⁷ but showed no indication that it believed such an approach would be legally problematic.

Performance standards are widely used under the CAA, most notably for stationary sources under Section 111.⁸⁸ In fact, the agency is currently in the process of designing GHG performance standards for coal plants and other large sources.⁸⁹ The agency⁹⁰ and observers⁹¹ have discussed setting these standards in terms of emissions rates, in part to take advantage of possible opportunities for efficiency upgrades at existing coal plants. Performance standards for aircraft engines under Title II Part B could work in broadly similar fashion.

One might argue that aircraft engine performance standards are not permissible under Section 231, presumably relying on the fact that the Section refers only to “standards” without the “performance” modifier. Because standards under Section 231 have traditionally been narrowly focused on engine design characteristics, and because Congress clearly knows how to instruct EPA to issue performance standards, this argument goes, performance standards may be outside the scope of the statutory grant of authority.

But this argument is relatively weak. Nothing in the statute precludes performance standards, and Congress may have intended to give the agency broad discretion under Section 231 by not specifying what kind of standards it must use. Any lack of precedent for such standards would not be legally determinative and, in any case, may have as much to do with the

⁸⁶ *Id.* at 44472–73.

⁸⁷ *Id.* at 44473.

⁸⁸ See CAA § 111(b), (d).

⁸⁹ See (Fossil-Fueled Power Plants) Settlement Agreement, *supra* note 37; see also Dallas Burtraw, Arthur G. Fraas, and Nathan Richardson, Tradable Standards for Clean Air Act Carbon Policy, Resources for the Future Discussion Paper Series, 1 (Feb. 2012), <http://www.rff.org/Publications/Pages/PublicationDetails.aspx?PublicationID=21738> (forthcoming *Env't L Rep News & Analysis* 2012).

⁹⁰ See, e.g., Environmental Protection Agency, *Standards of Performance for Greenhouse Gas Emissions for New Stationary Sources: Electric Utility Generating Units (Proposed Rule)*, 77 Fed. Reg. 22392, 22392 (Apr. 13, 2012) (proposing GHG new source performance standards for fossil fuel power plants set at an emissions rate of 1,000 lbs. of CO₂ per megawatt-hour of electricity output).

⁹¹ See, e.g., Dallas Burtraw, Art Fraas, and Nathan Richardson, Greenhouse Gas Regulation under the Clean Air Act: A Guide for Economists, 5 *Rev. Energy Econ. & Policy* 293, 299–305 (2011).

fact that EPA has historically avoided regulating existing aircraft engine emissions (for which performance standards are the best fit) as with any previous belief on the agency's part that performance standards were not permissible under the Act. The agency appears never to have claimed that performance standards are impermissible, and even if the agency once had that view, it would likely be entitled to change it.⁹²

Finally, any argument for a narrow reading of Section 231 must confront the agency's discretion over interpreting its own statutes under *Chevron*.⁹³ This is a particularly high bar here, since the relevant part of the statute is so short—there is little on which to hang a plain language argument. The court in *NACAA* appears to agree that this brevity and the language of the Section give the agency broad interpretive authority.⁹⁴

To claim that EPA cannot issue performance standards under Title II Part B is, in effect, to claim that the agency cannot give the industry flexibility to comply with those standards. This is bad policy, and such a position is unlikely to be supported (or advanced in litigation) by industry. Moreover, it is inconsistent with precedent. Past EPA aviation emissions standards have been framed in terms of emissions rates for given classes of engines, but the agency has not necessarily prescribed specific emissions-reducing technologies.⁹⁵ Engine manufacturers therefore have been free to adopt whatever measures they deem appropriate to meet the standard in their new designs. In this sense, past EPA regulations have really been performance standards, simply restricted to new engines (or new designs). To issue regulations allowing airlines to comply via airframe design or operational changes, it is necessary to apply the standards to existing engines and to restate the benchmark in terms of emissions per mile (or some similar metric), but it is not necessary to change the fundamental tool that has been used in the past. In other words, the agency has always used performance standards under Title II Part B, and any argument that it cannot do so must confront that precedent.

⁹² See *Rust v. Sullivan*, 500 U.S. 173 (1991) (holding that “[t]his Court has rejected the argument that an agency's interpretation ‘is not entitled to deference because it represents a sharp break with prior interpretations’ of the statute in question) (quoting *Chevron*, 467 U.S. at 862).

⁹³ See *Chevron*, 467 U.S. 837, 842–44 (1984).

⁹⁴ *National Association of Clean Air Agencies v. EPA*, 489 F.3d 1221 at 1225, 1229–1232 (2007).

⁹⁵ See, e.g., EPA, *Control of Air Pollution from Aircraft*, *supra* note 26, at 69674 (2005) (setting emissions rate-based NO_x standards without reference to any specific control technology).

It therefore appears very likely that the agency could issue performance standards for existing engines and frame them in such a way as to allow use of airframe design and operational measures to comply with the standards. Indeed, EPA should assume that such measures will be used. To the extent possible, the agency will need to model their impact when it determines the appropriate stringency of the standards and estimates their costs.

If the agency can issue such performance standards, it will still have important scope-related decisions to make. For example, it may decide that technology-based standards are more appropriate for new engines and apply performance standards only to existing engines—or use a hybrid approach. If it bases performance standards on an emissions-per-mile benchmark, it will need to decide how to account for emissions associated with ground operations. The agency also will need to determine the point of compliance—would emissions be measured on a per-flight, per-aircraft, or per-firm basis?

6. Foreign Aircraft

Finally, the agency would need to determine how and whether to include foreign aircraft within the scope of its regulation. The EU, as noted above, has taken an ambitious approach, requiring carriers to purchase ETS allowances for any flights that leave from or arrive at European airports.⁹⁶ These allowances must cover the entire emissions for the flight, even those for portions of the flight outside Europe.⁹⁷

As the EU approach illustrates, regulation of “foreign” aircraft emissions has two components: regulation of foreign-flag aircraft emissions, and regulation of emissions that occur outside the regulating country. Legal analysis of each component is different.

Nothing in the CAA prevents EPA from regulating emissions from foreign-flag aircraft in the United States. Foreign carriers already must comply with FAA and EPA regulations, including existing EPA emissions standards for NO_x and other pollutants. There is no reason for EPA to take a different approach with carbon emissions standards. Doing so would effectively favor foreign over domestic carriers with no environmental benefit. Although the CAA does not

⁹⁶ See EU Directive, *supra* note 7, at ¶16 (“In order to avoid distortions of competition and improve environmental effectiveness, emissions from all flights arriving at and departing from Community aerodromes should be included from 2012.”).

⁹⁷ *Id.* (making no distinction between emissions inside and outside EU territory).

limit the agency's authority over foreign carriers, international law might: see Section 0 below. If so, this raises competitiveness concerns, which are discussed in Section 0.

The agency's authority likely does not reach aviation emissions from portions of flights that take place outside the United States, however. The CAA does not explicitly limit the agency's authority over these emissions, no more than it does for foreign-flag carriers. However, because these emissions occur outside U.S. borders, the agency would be acting extraterritorially if it sought to regulate them. Courts interpret statutes not to grant such authority unless explicitly specified by Congress.⁹⁸ No such grant exists in Title II Part B. Other parts of the CAA, such as Section 115, do give the agency the authority to regulate U.S. emissions whose harms are felt in other countries,⁹⁹ so Congress was clearly aware of cross-border pollution problems. Nevertheless, it chose not to grant any extraterritorial authority to the agency in Title II. Even under Section 115, the agency must consult with the Department of State and can impose regulations on emissions sources only in the United States.¹⁰⁰ This presumption against extraterritoriality effectively trumps the deference shown to agency interpretation of the statutes under *Chevron*.

Furthermore, this limitation applies equally to foreign and domestic carriers. EPA has no more authority to regulate GHGs emitted over the Atlantic Ocean from a Delta flight than from a Lufthansa flight. This example illustrates a potential problem. If the United States does not regulate its carriers' emissions outside the United States, the European Union might continue to do so—creating continuing tension. If the European Union does not, these “Atlantic” emissions would not be regulated at all. This problem is one illustration of why internationally-coordinated aviation emissions regulation is superior to a country-by-country approach.

Note however that many regulatory approaches that are permissible under the CAA, and many possible industry responses to performance standards, would effectively reduce emissions not only in the United States but outside it. If EPA were to implement traditional engine

⁹⁸ See Pamela Karten Bookman, Solving the Extraterritoriality Problem: Lessons from the Honest Services Statute, 92 *Va. L. Rev.* 749, 751 (2006) (“Extraterritoriality doctrine creates a presumption against the application of domestic statutes to conduct committed abroad. It presumes that Congress intends to regulate only domestic conduct unless it specifies otherwise. The presumption is triggered when two criteria are met: (1) the alleged conduct is committed abroad and (2) the statute regulating that conduct does not specify whether it is intended to apply domestically or abroad.”).

⁹⁹ CAA § 115(a).

¹⁰⁰ *Id.*

emissions standards for CO₂, compliant engines would have lower associated emissions wherever they operate. Similarly, if carriers were to adopt different airframe or engine designs in response to performance standards, their emissions would be reduced on a per-mile basis wherever they operate. This is not true, however, with most operational measures airlines might adopt to comply with a performance standard, such as lower cruise speeds or reduced taxiing.

B. Regulatory Tools—Can EPA Allow Trading?

In addition to determining the reach of aviation standards, EPA also must choose how carriers may comply. One approach is simply to require that every engine or every flight meet the relevant standard. The agency might offer compliance flexibility, however.

Economists are nearly unanimous in their view that market-based tools are the most cost-effective means for regulating emissions, particularly those of globally mixed pollutants like GHGs. The EU's ETS is itself such a market-based system. A 2009 Government Accountability Office (GAO) report favored market-based tools for regulating aviation emissions.¹⁰¹ If EPA could create a market-based regulatory system for aviation GHGs, it would almost certainly be more cost-effective than traditional performance standards and might also be more likely to be deemed "equivalent" to EU regulation. But is the grant of authority in Title II Part B sufficiently broad to allow the agency to implement such a program? Maybe.

1. Trading under Title II

EPA has used trading elements in past Title II regulation. "Averaging, banking, and trading" (ABT) approaches are used in various programs for on-road vehicles. These programs allow manufacturers to average emissions across all relevant models they build, bank current overcompliance for future use, and in some cases trade with other manufacturers.¹⁰² Such programs provide at least a basic model for a trading approach under Title II Part B, and EPA suggested such an approach for aircraft engines in its 2008 ANPR.¹⁰³

¹⁰¹ See GAO, *Aviation and Climate Change*, *supra* note 3, at 35–46 ("[E]conomic research indicates that market-based policies are more likely to better balance the benefits and costs of achieving reductions in greenhouse gases and other emissions").

¹⁰² See ANPR, *supra* note 33, at 44472.

¹⁰³ *Id.*

There are important differences between these ABT programs and a hypothetical trading program for aviation emissions. First, they are implemented under different statutory provisions, though as noted above, the language in Section 231 governing aircraft emissions is very similar to that in Section 202 governing on-road vehicle emissions. Second, these programs are restricted to manufacturers of new vehicles or engines. They therefore provide evidence of the theoretical compatibility of trading with Title II regulation but are not directly applicable models—at least, if the agency intends to go beyond regulating new engines.

2. Aviation-Sector Trading under Title II Part B

The language of Section 231 does not plainly rule out a market-based approach, unless one adopts a very narrow definition of “emissions standards”. As noted, the statute itself does not define the term. Similar terms are defined elsewhere and have been subject to agency and outside interpretation regarding this question, however. One parallel is with Section 111 of the Act, which governs performance standards for new and existing stationary sources. EPA and outside observers, myself included, have argued that Section 111 performance standards can allow trading among regulated sources.¹⁰⁴ If “performance standards” can be flexible, is there any reason to treat “emissions standards” differently?

It is hard to say for sure. The argument that Section 111 standards can permit trading is based in part on language in the statutory definition of “performance standards” indicating that they must “reflect” the “best system of emission reduction”; trading, the argument goes, is the “best system”. Section 231 does not refer to a “best system” or have any equivalent language, and this argument is therefore unavailable there. As noted above, however, Section 231 gives EPA broad discretion over the form and substance of aviation standards; the Section does not say EPA cannot base standards on the “best system” or any other principle. “Emissions standards” is arguably a broader term than “performance standards”—if the former is interpreted to exclude trading, then it is difficult to argue that the latter does not as well.

Another argument in favor of trading under Section 231 is that it refers to EPA regulation of “classes” of aircraft engines: it is these classes, not individual engines, that are identified as

¹⁰⁴ See Nathan Richardson, *Playing without Aces: Offsets and the Limits of Flexibility under Clean Air Act Climate Policy*, Resources for the Future Discussion Paper 11-49 at 10–18 (December 2011), <http://www.rff.org/Publications/Pages/PublicationDetails.aspx?PublicationID=21699>; see also generally Gregory Wannier et al., *Prevailing View on Compliance Flexibility under § 111 of the Clean Air Act*, Resources for the Future Discussion Paper 11-29 (July 2011), <http://www.rff.org/RFF/Documents/RFF-DP-11-29.pdf>.

the object of regulation. This is not just compatible with trading, but it is essentially the definition of a market-based regulatory scheme. Under such a scheme, some measure of class performance is required, but individual members of the class may deviate from that standard, with trading (or averaging) the mechanism for assuring class-wide compliance.

Further, EPA has claimed that it has the authority under Section 231 to at least include averaging, banking, and trading programs, which allow manufacturers of new engines to comply with a fleet average standard while retaining some forms of flexibility.¹⁰⁵

Whether trading is permissible under Section 231 is a difficult call. On balance, I think the case for is stronger than the case against. The broad grant of authority in the section and its lack of restrictions on that authority, confirmed by the DC Circuit's holding in *NACAA*, are significant. Even more important is the deference to which the agency is entitled under *Chevron*. For trading to be ruled incompatible with the statute, a court would have to decide either that it is forbidden by the plain language of the statute (Step One) or that EPA's interpretation is unreasonable (Step Two). The former seems very difficult, given the brevity of the section, and the latter is such a permissive standard that agencies rarely if ever lose. Nevertheless, it is not a slam dunk. There is real risk that trading could be ruled incompatible with Section 111, most likely on *Chevron* Step One grounds, and the chances of that are greater under Section 231 because of the lack of the helpful "best system" language.

3. Revenue

Even if the agency were able to implement a market-based regulatory scheme for aircraft engines, it would not be able to auction allowances and generate revenue. EPA has never raised revenue under an emissions trading scheme without explicit congressional authorization, and doing so would arguably be unconstitutional.¹⁰⁶ For similar constitutional reasons, EPA could not impose a tax on aviation emissions without legislation granting new authority.

¹⁰⁵ See ANPR, *supra* note 33, at 44472.

¹⁰⁶ The power to raise revenue is restricted to Congress (and specifically the House, at least initially) under the Constitution, Art. 1 Sec. 7 Cl. 1. EPA has argued that this and other factors make it difficult or impossible for the agency to raise revenue via allowance auctions; see ANPR, *supra* note 33, at 44411. Note that even if EPA were to raise revenue, it would go directly to the Treasury under the Miscellaneous Receipts Act, 31 U.S.C. § 3302, not remain with EPA for promotion of environmental goals, such as climate finance. Separate legislation would therefore be necessary to direct any auction or other revenues toward environmental objectives.

Under EPA's existing stationary-source trading programs, states (which are not bound by EPA's limitations in this regard) have been delegated allocation authority and in some cases have auctioned allowances and raised revenue. But this option is not available, because aviation standards, unlike many other CAA programs, are *not* federalist in design—one of the few explicit limitations Congress put on aviation emissions regulations is a bar on state regulation.¹⁰⁷

Barring new legislation, therefore, if EPA were to implement a market-based approach to aviation emissions regulation, it would have to either adopt an approach that does not require any allocation at all, such as a tradable standard,¹⁰⁸ or freely distribute allowances.

C. Stringency and Consideration of Costs

Unlike other Sections of the Act, Title II Part B does not provide even an abstract measure of how stringent EPA regulations must be. Ambient air quality standards under Section 109 of the Act, for example, must be adequate to protect health and welfare (the former “with an adequate margin of safety”),¹⁰⁹ while performance standards under Section 111, as noted above, must reflect the “best system of emission reduction”.¹¹⁰ The only guidance given in Title II Part B is that EPA must consult with FAA and that aviation standards must not significantly increase noise or adversely affect safety.¹¹¹ Within these limits, EPA is free to choose any level of stringency it can non-arbitrarily justify. The Act also imposes no limits on the agency's ability to revise its standards, nor does it require the agency to do so at any specified time. Based on this authority, the agency has claimed that standards that decline over time are permissible.¹¹² Finally, and also unlike some other Sections of the Act,¹¹³ EPA is permitted to consider cost.

A frequent criticism of EPA regulation of GHGs under the CAA is that it will inevitably cause a “train wreck,” because the agency lacks the tools under the statute to cost-effectively

¹⁰⁷ CAA § 233.

¹⁰⁸ For a description of tradable standards as a policy tool in the GHG context, *see* Dallas Burtraw et al., *Tradable Standards for Clean Air Act Carbon Policy*, *supra* note 89, at 5–7.

¹⁰⁹ CAA § 109(b).

¹¹⁰ CAA § 111(a)(1).

¹¹¹ CAA § 231(a)(2)(B).

¹¹² *See* ANPR, *supra* note 33, at 44473.

¹¹³ *See Whitman v. American Trucking Associations*, 531 U.S. 457, 464 (2001) (holding that EPA is not permitted to consider costs when setting national ambient air quality standards under § 109 of the CAA).

regulate such a ubiquitous pollutant.¹¹⁴ At least for aviation regulation under Title II Part B, such a result is implausible. First, the agency retains nearly unlimited discretion over the stringency of its regulations. It is simply directed to “issue. . . standards” without any requirement that they be sufficiently stringent to achieve even ambiguous goals such as protecting the public health or welfare.¹¹⁵ The agency therefore is not compelled to regulate stringently. A useful parallel here is the agency’s Tailoring Rule, under which it has restricted consideration of GHGs in permit applications to certain large emitters, despite the plain language of the statute requiring such consideration for any emitter of over 250 tons of a pollutant. No such ambitious interpretation of the statute is necessary here for the agency to have control over the breadth and stringency of the standards it proposes.

Second, and perhaps more important, Title II Part B explicitly directs the agency to consider cost when determining the compliance schedule for the standards it issues.¹¹⁶ The agency could therefore adopt stringent standards and give emitters more time to comply (perhaps to allow time for engine and airframe upgrades in due course) or choose less stringent standards and require quick compliance. Either way, the agency is compelled to consider cost. Stringent, short-term standards that would impose large costs on the industry are not a realistic danger.

VI. International Law Limitations on EPA Authority

Congress’ grant of authority to EPA under the CAA may not be the only limitation on its ability to regulate aviation emissions, however. As a signatory to the 1947 Chicago Convention,¹¹⁷ U.S. powers to regulate the aviation sector are circumscribed. As noted above, the agency traditionally has used its CAA powers to regulate in parallel with ICAO emissions

¹¹⁴ See, e.g., American Legislative Exchange Council, *EPA’s Regulatory Train Wreck: Strategies for State Legislators* (2011), <http://www.alec.org/publications/epas-regulatory-train-wreck-2/> (characterizing a suite of recent and near-future EPA regulations, including those on GHGs).

¹¹⁵ CAA § 231(a)(2)(A).

¹¹⁶ CAA § 231(b).

¹¹⁷ Convention on International Civil Aviation (Chicago Convention), Dec. 4, 1944, T.I.A.S. 1591, 15 U.N.T.S. 295 [hereinafter Chicago Convention].

standards. Regulating GHGs using these powers would require a departure from this practice, since ICAO appears unlikely to issue standards for GHGs any time soon.¹¹⁸

Interpretations of the Convention and other international agreements were key issues in the European Court of Justice's recent decision upholding the EU's move to include foreign aircraft emissions in the ETS and will be significant in any further legal action over that decision. In many ways, understanding the scope of EPA authority requires similar analysis. Unfortunately, matching the depth of international law analysis in that case and in other discussion of EU policy is beyond the scope of this paper. Nevertheless, a brief overview of the relevant part of the Convention and related arguments is useful. If the Convention does substantially restrict the agency's regulatory authority, the range of options under the CAA described above might be largely irrelevant.

Note that this section considers only potential limitations international law may impose on the ability of EPA to regulate emissions from foreign aircraft. Critics of EU policy have also argued that the Convention prohibits regulation of extraterritorial emissions as well. But because, as noted above, the CAA almost certainly does not grant such authority to EPA, the question is not relevant here.

A number of Articles in the Convention are relevant to this question. Article 37 instructs ICAO to "adopt and amend . . . as may be necessary, international standards and recommended practices and procedures" toward a variety of ends. Although polluting emissions are not specifically mentioned, ICAO has issued such standards, and they are generally understood to be within the scope of its standard-setting powers in Article 37.¹¹⁹ While it encourages "the highest practicable degree of uniformity,"¹²⁰ the Convention in Article 38 does allow states to deviate

¹¹⁸ See GreenAir, US Representative to ICAO Says General Consensus Remains That Market Measures Should Only Be Implemented from 2020 (Apr. 27, 2012), <http://www.greenaironline.com/news.php?viewStory=1454> (reporting that "[t]he current directive to the ICAO Council following the 2010 Assembly was a derivative of the 2007 Assembly resolution, [the U.S. ambassador to ICAO] said. 'This is hardly surprising since the general consensus had not changed much at all between 2007 and 2010.'"); but see Allison Martell and Susan Taylor, U.N. Aviation Body Says Emissions Proposal by Year-End, Reuters (Mar. 2, 2012) <http://www.reuters.com/article/2012/03/02/us-airlines-emissions-idUSTRE8211M820120302> (reporting comments by the head of ICAO that the organization plans to propose international GHG emissions limitations by the end of 2012).

¹¹⁹ See Chicago Convention, *supra* note 117, art. 37.

¹²⁰ *Id.*

from ICAO standards, requiring only that they notify ICAO of their decision to do so.¹²¹ However, the Convention also requires member states to recognize aircraft certifications issued by other member states, so long as those certifications are based on standards at least as stringent as those issued by ICAO.¹²² Article 12 also requires member states to “to keep [their] own regulations in these respects uniform, to the greatest possible extent, with those established from time to time under [the] Convention.

A. Domestic Aircraft

The Convention appears to indicate that states issuing more stringent standards can enforce those standards against their own aircraft and airlines but must allow (“recognize[] as valid”) incoming or outgoing flights by foreign aircraft that comply only with the less-stringent (or in the case of GHGs, non-existent) ICAO regulations. Indeed, EPA appears to take this view of obligations under the Convention. In its 2005 aviation NO_x rulemaking, the agency claims:

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. . . . As long as a participating nation of ICAO adopts aircraft emission standards that are equal to or more stringent than ICAO’s standards, the certificates of airworthiness for such nations are valid. Thus, aircraft belonging to countries with more stringent standards are permitted to travel through the airspace of other countries without any restriction. . . . if a nation sets tighter standards than ICAO, air carriers not based in that nation (foreign-flag carriers) would only be required to comply with the ICAO standards.¹²³

Both California and the environmental groups petitioning the agency agree with this position, at least with respect to domestic carriers.¹²⁴

In short, the Chicago Convention does not restrict EPA authority to regulate GHG emissions from U.S. aircraft or to regulate U.S. aircraft engine manufacturers.

¹²¹ *Id.*, art. 38.

¹²² *Id.*, art. 33.

¹²³ See EPA, *Control of Air Pollution from Aircraft*, *supra* note 26, at 69667 (2005).

¹²⁴ See State Petition, *supra* note 46, at 15; Environmental Petition, *supra* note 46, at 24–25.

B. Foreign Aircraft

The implications of the Convention for EPA regulation of foreign aircraft operating in the United States are less clear, however. As noted above, EPA in 2005 took the position that such regulation is not permissible under the Convention, at least in cases where the ICAO has issued standards for the pollutant in question.¹²⁵ Industry groups have taken a similar position, most notably in litigation over the EU's aviation ETS decision.¹²⁶

California and the environmental groups, however, have argued in their petitions that international law imposes no such limitation. The environmental groups argue that “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”.¹²⁷ Their petition offers no justification for this position based on the Convention itself, claiming only that “numerous State Parties. . . have endorsed this view.” The only example given is the EU’s decision to regulate foreign aircraft.

As noted above, this decision is controversial, and its compliance with the terms of the Convention is untested. In its 2008 decision to incorporate aviation emissions into the ETS, the EU claimed that doing so is permissible under the Convention. It noted that ICAO in 2007 “urged” member states not to unilaterally incorporate aviation emissions into trading schemes, but the EU reserved its right to do so at that time.¹²⁸ In the 2008 decision, the EU claimed that “the Chicago Convention recognises expressly the right of each Contracting Party to apply on a non-discriminatory basis its own air laws and regulations to the aircraft of all States” and that therefore imposing emissions regulation on foreign aircraft is permissible.¹²⁹

Regardless of the Convention, the environmental petitioners argue that “[i]nternational law requires nations to ensure that activities within their territory do not cause transboundary

¹²⁵ See EPA, *Control of Air Pollution from Aircraft*, *supra* note 26, at 69667 (2005).

¹²⁶ See International Air Transport Association, IATA Disappointed with CJEU Opinion—Urges Global Solution through ICAO (Oct. 6, 2011), <http://www.iata.org/pressroom/pr/pages/2011-10-06-01.aspx> (“While the Advocate General of the CJEU believes that Europe is within its rights to move forward with this extra-territorial measure, that opinion is not shared in the international community. Many governments are rightly concerned about the infringements on sovereignty and the Chicago Convention that Europe’s plans pose.”).

¹²⁷ See Environmental Petition, *supra* note 46, at 25.

¹²⁸ See EU Directive, *supra* note 7, at ¶9.

¹²⁹ *Id.*

environmental harm,”¹³⁰ which, they argue, not only allows but requires the United States to regulate aviation GHG emissions (from both foreign-flag and domestic aircraft). The petition cites documents in which such statements appear, such as the 1992 Rio Declaration,¹³¹ but these documents are not treaties or international agreements creating binding obligations.¹³² The cited environmental goals should therefore be interpreted as aspirational principles. Even if they did create a binding obligation or codify a principle of customary international law, such general principles should not trump the specific treaty obligations under the Chicago Convention.

In short, these arguments by the petitioners are relatively unconvincing and are unlikely, on their own, to persuade EPA to change its position on regulation of foreign aircraft. Nevertheless, EPA is legally entitled to change its interpretation. The agency could also argue that its past statements do not apply to the facts of aviation GHG emissions, possibly because those statements apply only to cases in which ICAO has issued relevant standards. In cases where ICAO has no standards, such as GHGs, the agency might take a different view—in principle including the EU view that the Convention imposes no real limits on regulation of foreign aircraft. There does not appear to be a strong basis in the Convention for such an interpretation, however.

This is not to say, however, that the Convention unambiguously forbids regulation of foreign aircraft emissions. Creative arguments exist. For example, Article 35 of the Convention allows member states to “regulate or prohibit the carriage in or above its territory of [specified] articles” “for reasons of public order and safety,” provided that similar limits apply to domestic aircraft.¹³³ A country might argue that inefficient aircraft engines are “articles” and ban them on domestic and foreign aircraft for “public safety” reasons related to climate change. Doing so would appear to allow application of technological engine standards to foreign aircraft, though it might not allow performance standards, given the focus on specific “articles”. Other

¹³⁰ See Environmental Petition, *supra* note 46, at 24.

¹³¹ *Id.* at 24.

¹³² With the exception of the 1992 UN Framework Convention on Climate Change, though the cited language appears only in the preamble of that agreement.

¹³³ See Chicago Convention, *supra* note 117, art. 35.

interpretations of the Convention that might allow regulation of foreign aircraft also may be possible. Scholars have argued both sides of this issue in the context of the EU ETS policy.¹³⁴

In any case, imposing EPA aviation emissions standards on foreign-flag aircraft would likely be challenged in court. No matter what the agency does to regulate aviation emissions, some litigation by industry groups is likely. If the agency regulates foreign aircraft, it will need to explain why its understanding of the Chicago Convention has changed since 2005—or why its earlier statements do not apply in the GHG context.

This assumes, however, that a U.S. court would be willing to enforce the requirements of the Chicago Convention. The Convention is almost certainly a non-self-executing international agreement. It also predates the CAA, which, as noted above, includes no limitation on the EPA's authority over foreign aircraft. Pointing to this evidence, and depending on the judges' views on international law, a court might find no basis in U.S. law for restricting the agency's authority.

Even if a court were to reach this result under U.S. law, it appears likely (though by no means certain) that EPA regulation of foreign-flag aircraft would violate U.S. obligations under the Convention. Perceptive readers will have noted that this is in tension with the EU's plan to regulate such emissions, which is itself at least partly the motivation for EPA regulation. The implications of the Convention for EU policy remain unclear. The European Court of Justice avoided analysis of the Convention's implications in its decision by determining that it did not apply because the EU is not a signatory.¹³⁵ This position is likely to be challenged in any future international litigation and is certainly a point of dispute in diplomatic negotiations.¹³⁶

Limiting regulation to U.S. carriers would reduce the environmental benefits of regulation and, as discussed in the next section, create competitiveness problems.

¹³⁴ See also GAO, *Aviation and Climate Change*, *supra* note 3, at 65, citing Daniel B. Reagan, Putting International Aviation into the European Union Emissions Trading Scheme: Can Europe Do It Flying Solo?, 35 *B.C. Envtl. Aff. L. Rev.* 349 (2008) (arguing that ICAO, not the EU, is the appropriate venue for aviation GHG limits); and Gisbert Schwarze, Including Aviation into the European Union Emissions Trading Scheme, *European Envtl. L. Rev.* (2007) (arguing that ETS coverage of aviation emissions is not precluded by the Chicago Convention or other international agreements).

¹³⁵ Case C-366/10, *Air Transp. Ass'n of America v. Sec'y of State for Energy and Climate Change*, ¶ 72 (2011) <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:62010CJ0366:EN:HTML>.

¹³⁶ Letter from Hillary Clinton, U.S. secretary of state, and Raymond LaHood, U.S. secretary of transportation, to Jose Manuel Barroso, European Union president (Dec. 16, 2011), <http://www.nbaa.org/ops/environment/eu-ets/20111216-eu-ets-us-state-department-clinton.pdf> (“The EU's application of the ETS to airlines of non-EU States is inconsistent with the legal regime governing international aviation”).

C. Competitiveness

If EPA were to regulate GHG emissions from domestic airlines but not similar emissions from foreign carriers, U.S. airlines would be at a competitive disadvantage relative to foreign airlines (with the exception of transatlantic routes, whose emissions would be subject to the ETS). Japan Airlines, for example, could charge a lower price for flights to Japan than United Airlines could, all else equal, because (of the two) only United would be required to comply with EPA regulations.

This problem illustrates the long-term desirability of internationally standardized aviation emissions regulations. Without such standardized rules, measures to address competitiveness are necessary. Options include excluding certain flights by U.S. carriers from regulatory requirements, subsidizing flights on routes where U.S. airlines compete with unregulated foreign airlines, or imposing taxes on foreign carriers.

The last two options create further problems, however, since they are functionally identical to the EU's move to impose extraterritorial regulation. They not only would expose the United States to claims of hypocrisy, but also may make its legal position untenable, because the same trade and international law arguments being made against the EU could be directed at the United States. Both would also require new legislation.

The only viable option therefore might be to exclude many international flights by U.S. carriers from regulation under the CAA. Doing so could open EPA to charges of arbitrary regulation, however, because the reasons for discriminating in this way have nothing to do with either the public health benefits of the regulation or its cost.

VII. Conclusions

The aviation sector is responsible for a small but significant part of the world's GHG emissions. Stalled efforts to limit these emissions through ICAO and the EU's recent decision to regulate them unilaterally have presented the United States with an opportunity to regulate aviation emissions on its own terms.

The Clean Air Act gives EPA powerful tools to regulate these emissions. In the past, the agency has used these powers only to implement limits that have already been agreed on at the international level. But neither the act nor, apparently, international law prevents the agency from acting on its own initiative, at least domestically. Courts will soon decide whether the agency *must* regulate aviation GHG emissions. But even if it is not required to do so, EPA *could* regulate at least some aviation emissions at any time.

When and if the agency does move to regulate these emissions, the statute gives it broad discretion over scope, stringency, and regulatory mechanism. By framing regulations in the form of performance standards, the agency could provide incentives not only to reduce direct emissions from engines, but also to make changes in operational practices and, over time, aircraft design that would increase efficiency and lower both GHG emissions and fuel costs. Furthermore, the agency may be able to use at least some market-based tools to increase the cost-effectiveness of these regulations.

The statute requires EPA to consider costs in the timing of its rules and permits it to do so generally. There is also some evidence that the agency could adopt flexible compliance approaches, including trading. This is important because cost-effective regulation not only reduces regulatory burdens (both social costs and industry costs), but also allows the agency to pursue greater emissions reductions at similar cost. In other words, more cost-effective regulation increases the size of the pie, which can then be divided between environmental outcomes and economic impacts.

There are important limits to the agency's capabilities, however. For example, the agency could not auction allowances under a tradable system or otherwise use the regulatory program to generate revenue. CAA regulation therefore would be unable to contribute meaningfully to climate finance projects, in the United States or elsewhere. Ironically, imposing CAA regulation could *reduce* the amount of money globally available for climate finance, since it would presumably allow U.S. carriers to escape the ETS, which does generate such revenue. U.S. policy would reduce domestic emissions that the ETS cannot reach, but (at least without new legislation) at the cost of revenue to support other mitigation or adaptation projects.

Moreover, it is unclear what type of regulation and what level of stringency would be sufficient for the EU to determine that U.S. regulation is "equivalent", allowing U.S. airlines to escape the ETS.

Determining the policy tools available to EPA does not determine how stringent any aviation GHG regulations should be, or even whether they should be implemented at all. Some in the aviation industry and, until recently, ICAO have argued that existing market pressures to reduce fuel costs already provide adequate incentives to reduce fuel consumption and, therefore, emissions. If this view is correct, then cost-effective opportunities for emissions reduction may not be available, and the agency should not regulate (and is likely entitled to refuse to do so on these grounds). This argument is weaker in a world in which some U.S. aircraft emissions are subject to EU regulation, because associated regulatory burdens must be borne whether EPA

regulates or not. In any case, if the agency believes cost-effective technological or operational measures are available, it has the tools available to require and/or incentivize their adoption.

Regulating aviation emissions is politically sensitive, as U.S. outrage over EU policy shows. The political impact of the EU policy for U.S. emissions regulation is ambiguous. On the one hand, it could make domestic regulation more palatable, because it would be done on U.S. terms rather than European ones. On the other hand, EPA could more easily be portrayed as caving to European pressure.

These legal and political issues make it difficult to predict what EPA will do regarding aviation emissions, much less to recommend any specific course of action. Nevertheless, it is clear that Title II Part B of the CAA gives the agency the necessary authority to implement environmentally significant, cost-effective aviation emissions standards. When and if the agency decides to (or is forced to) use these powers, it can do so effectively—provided it is both bold and smart.

VIII. Appendix: Clean Air Act Title II Part B

Part B—Aircraft Emission Standards

§ 7571. [§ 231] Establishment of Standards

(a) Study; proposed standards; hearings; issuance of regulations

(1) Within 90 days after December 31, 1970, the Administrator shall commence a study and investigation of emissions of air pollutants from aircraft in order to determine—

(A) the extent to which such emissions affect air quality in air quality control regions throughout the United States, and

(B) the technological feasibility of controlling such emissions.

(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.

(B)

(i) The Administrator shall consult with the Administrator of the Federal Aviation Administration on aircraft engine emission standards.

(ii) The Administrator shall not change the aircraft engine emission standards if such change would significantly increase noise and adversely affect safety.

(3) The Administrator shall hold public hearings with respect to such proposed standards. Such hearings shall, to the extent practicable, be held in air quality control regions which are most seriously affected by aircraft emissions. Within 90 days after the issuance of such proposed regulations, he shall issue such regulations with such modifications as he deems appropriate. Such regulations may be revised from time to time.

(b) Effective date of regulations—Any regulation prescribed under this section (and any revision thereof) shall take effect after such period as the Administrator finds necessary (after consultation with the Secretary of Transportation) to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period.

(c) Regulations which create hazards to aircraft safety—Any regulations in effect under this section on August 7, 1977, or proposed or promulgated thereafter, or amendments thereto, with respect to aircraft shall not apply if disapproved by the President, after notice and opportunity for public hearing, on the basis of a finding by the Secretary of Transportation that any such regulation would create a hazard to aircraft safety. Any such finding shall include a reasonably specific statement of the basis upon which the finding was made.

§ 7572. [§ 232] Enforcement of standards

(a) Regulations to insure compliance with standards—The Secretary of Transportation, after consultation with the Administrator, shall prescribe regulations to insure compliance with all standards prescribed under section 7571 of this title by the Administrator. The regulations of the Secretary of Transportation shall include provisions making such standards applicable in the issuance, amendment, modification, suspension, or revocation of any certificate authorized by part A of subtitle VII of title 49 or the Department of Transportation Act. Such Secretary shall insure that all necessary inspections are accomplished, and, [1] may execute any power or duty vested in him by any other provision of law in the execution of all powers and duties vested in him under this section.

(b) Notice and appeal rights—In any action to amend, modify, suspend, or revoke a certificate in which violation of an emission standard prescribed under section 7571 of this title or of a regulation prescribed under subsection (a) of this section is at issue, the certificate holder shall have the same notice and appeal rights as are prescribed for such holders in part A of subtitle VII of title 49 or the Department of Transportation Act, except that in any appeal to the National Transportation Safety Board, the Board may amend, modify, or revoke the order of the Secretary of Transportation only if it finds no violation of such standard or regulation and that such amendment, modification, or revocation is consistent with safety in air transportation.

§ 7573. [CAA § 233] State standards and controls

No State or political subdivision thereof may adopt or attempt to enforce any standard respecting emissions of any air pollutant from any aircraft or engine thereof unless such standard is identical to a standard applicable to such aircraft under this part.

§ 7574. [CAA § 234] Definitions

Terms used in this part (other than Administrator) shall have the same meaning as such terms have under section 101 of the Federal Aviation Act of 1958.

Further Reading

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Friends of the Earth et al., Petition for Rulemaking under the Clean Air Act to Reduce the Emission of Air Pollutants from Aircraft that Contribute to Global Climate Change (Dec. 31, 2007), http://docs.nrdc.org/globalwarming/files/glo_07123101a.pdf.

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U.S. Government Accountability Office, *Aviation and Climate Change: Aviation Emissions Expected to Grow, but Technological and Operational Improvements and Government Policies Can Help Control Emissions*, 13 (June 2009), <http://www.gao.gov/products/GAO-09-554>.