

Senator Maria Cantwell
Senate Committee on Commerce, Science, and Transportation
Hearing on the European Union Emissions Trading System
June 6, 2012
Responses to Questions for the Record

Questions for Ms. Annie Petsonk, Environmental Defense Fund, apetsonk@edf.org

Question #1

Ms. Petsonk, Congressman Mica's "European Union Emissions Trading Scheme Prohibition Act" that passed the House of Representative last year and Senator Thune's Senate version both include the clause "take other actions necessary to ensure that operators of civil aircraft of the United States are held harmless from any emissions trading scheme unilaterally established by the European Union."

If I understand you, your interpretation is that the U.S. would indemnify the airlines from paying any fines to the EU that would occur for non-compliance. To take your argument one step further, "held harmless" really means the U.S. taxpayer would be paying the EU treasuries for any fines the U.S. commercial and non-commercial operators might incur.

When the Congressional Budget Office (CBO) scored Congressman Mica's bill it said "enacting H.R. 2594 would have no significant impact on the federal budget". Under your interpretation, I imagine there would be nominal if not significant impact to the federal budget. Did CBO just miss this? Can you explain?

Senator Cantwell, here's how CBO might have missed this. As you know, when the U.S. Congress amends a pre-existing law, analyzing the full impact of the amendment may require analyzing the pre-existing law as well as the amendment itself. And if the amendment delegates authority to the U.S. states to implement it, a full understanding of the amendment may entail also analyzing the state implementing rules.

Similarly, the EU Aviation Directive (Directive 2008/101/EC of the European Parliament and of the Council of 19 November 2008 (Official Journal of the European Union L 8/3, 13 January 2009)), brings aviation into the EU's emissions trading system (ETS). The Aviation Directive does so by amending a pre-existing law, the Emissions Trading Directive (Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a system for greenhouse gas emission allowance trading within the Community). The Emissions Trading Directive includes general enforcement provisions that apply to all sectors covered by the ETS, and directs member states of the EU to enforce its provisions, which the member states have done. So, to understand the full operation of the Aviation Directive, it is necessary to have in hand the Directive itself, the underlying Emissions Trading Directive, and the member state implementing regulations, all of which are attached to this Response.

We do not know which provisions of the EU legislation and member state implementing regulations, if any, were presented to CBO along with H.R. 2594. If all the texts were not

presented to CBO at the time, it would be understandable that its analysis did not cover this issue.

The enforcement provisions of the Emissions Trading Directive (Article 16) follow the general approach of, and are modeled on, the U.S. Sulfur Dioxide Acid Rain Trading Program, which is Title IV of the U.S. Clean Air Act Amendments of 1990. That is, for both the U.S. and the EU emissions trading program, the respective legislatures enacted automatic penalties. The automatic penalty provisions reflect legislative judgments that in exchange for receiving the benefits of broad flexibility in determining where and how to meet their targets, regulated entities should be held to the rigor of strong, automatic consequences if the regulated entities reap the advantages of flexibility but still fail to comply. That balance has ensured almost complete compliance with both the U.S. Acid Rain Trading Program and the EU ETS, at costs far below those anticipated when the laws were enacted.

The enforcement provisions of the Aviation Directive take the form of amendments to the underlying Emissions Trading Directive's enforcement provisions. Article 1, paragraph 14 of the Aviation Directive amends Article 16, Paragraph 3 of the ETS Directive as follows (changes highlighted in bold):

"3. Member States shall ensure that any operator **or aircraft operator** who does not surrender sufficient allowances by 30 April of each year to cover its emissions during the preceding year shall be held liable for the payment of an excess emissions penalty. The excess emissions penalty shall be EUR 100 [approximately US \$125.00] for each tonne of carbon dioxide equivalent emitted for which the operator **or aircraft operator** has not surrendered allowances. Payment of the excess emissions penalty shall not release the operator **or aircraft operator** from the obligation to surrender an amount of allowances equal to those excess emissions when surrendering allowances in relation to the following calendar year."

The full text of the Emissions Trading Directive contains, in paragraph 16, the following additional language, which does not appear in the Aviation Directive amending the ETS Directive, but which is part of the ETS framework:

" 4. The excess emissions penalty relating to allowances issued from 1 January 2013 onwards shall increase in accordance with the European index of consumer prices."

In terms of member state regulations implementing the ETS for aviation, here is an English-language example from the United Kingdom (which administers the ETS system for U.S. carriers United Airlines and American Airlines):

Failure to surrender sufficient allowances

38.—(1) The civil penalty in paragraph (2) applies where an aircraft operator—
(a) fails to surrender sufficient allowances or project credits, contrary to regulation 26(1);
or
(b) fails to surrender allowances or project credits equal to a deficit, contrary to regulation 26(2).

- (2) The civil penalty is the sterling equivalent of 100 Euros for each allowance or project credit that the aircraft operator failed to surrender.
- (3) In this regulation, “sterling equivalent” means—
- (a) in relation to a penalty relating to aviation emissions in 2012, the sterling equivalent converted by reference to the first rate of conversion to be published in September of the calendar year in which the aircraft operator is liable to the penalty in the C series of the Official Journal of the European Union; or
- (b) in relation to a penalty relating to aviation emissions on or after 1st January 2013, the sterling equivalent as defined in sub-paragraph (a) adjusted in accordance with paragraph (4).
- (4) If the last Harmonised Index of Consumer Prices for the member States of the European Union (“HICP”) published by Eurostat before the end of April in the year in which the aircraft operator failed to surrender the allowances or project credits shows an average percentage price increase as compared with the last HICP published before the end of April 2012, the sterling equivalent is increased by the same percentage.

Regulation 2010 No. 1996, Climate Change: The Aviation Greenhouse Gas Emissions Trading Scheme, Made 3rd August 2010, Laid before Parliament 6th August 2010, Coming into force 31st August 2010, at Part 8, paragraph 38.

Paragraphs 30 and 42 of the Regulation make clear that the regulator has very little discretion to waive or modify the imposition of the penalty, and can do so only if the regulator is satisfied that the aircraft operator has brought itself into compliance. Paragraphs 30 and 42 also provide that that in cases where the penalty is not paid, the regulator may sell the aircraft in order to satisfy the penalty.¹

Moreover, many U.S. carriers lease, rather than own, their aircraft. Aircraft leasing/financing companies that own these aircraft typically include in the leases clauses specifying that the lessee must operate the aircraft in compliance with applicable law. These leasing/financing companies are beginning to include provisions in their leases providing that the lessees (or permitted sublessors) will operate the aircraft in compliance with the EU ETS, including but not limited to the payment of any charges incurred pursuant to the ETS. They are also including provisions that ensure that any liability for non-compliance with the EU-ETS cannot be shifted to the owner/lessor/financer of the aircraft.² Consequently, an aircraft operator that fails to comply with the ETS could find itself not only liable for the government-imposed penalties for breach of applicable law, but also in breach of the provisions of its lease. Consequences for breaching an aircraft lease are typically spelled out in the lease. If the consequences include surrender of the aircraft, then the airline could need to incur expenses obtaining alternative aircraft.

¹ Similar provisions exist in the other EU member states which are the reporting states for the largest U.S. carriers, i.e., France (see articles L.229.5 to L.229-19 and R. 229-1 to R.229-44 of the French Environmental Code), and Germany (Treibhausgas-Emissionshandelsgesetz. Note that the regulator may refrain from imposing a fine if the operator was prevented from fulfilling its duty because of a force majeure event; the question whether enactment of the Thune bill would constitute a force majeure event would be a matter of German law). See generally "Aviation Briefing: EU Emissions Trading Scheme" (Watson, Farley & Williams August 2011), text available at [http://www.wfw.com/Publications/Publication938/\\$File/WFW-Aviation-EUETSEuropewide-2011.pdf](http://www.wfw.com/Publications/Publication938/$File/WFW-Aviation-EUETSEuropewide-2011.pdf).

² See "Aviation Briefing: EU Emissions Trading Scheme" (Watson, Farley & Williams August 2011), supra.

A U.S. law that prohibited U.S. aircraft operators from participating in the EU system therefore would expose the operators to a broad range of penalties and consequences. If a U.S. law were to require the Secretary of Transportation to ensure that U.S. aircraft operators are held harmless, how would the Secretary do so? He could try to convince the EU and its twenty-seven member states to change their laws so as to revoke the mandatory imposition of penalties for violation of EU law. But if he is unsuccessful in convincing them, then he would have to find other ways of holding the airlines harmless.

One way of holding the airlines harmless would be to find other entities to pay any penalties owed under EU, to supply alternative aircraft if aircraft are sold, and to supply alternative aircraft if breach of the law in turn breaches aircraft leases and the lessors then take possession of the planes. If those other entities included the U.S. Treasury, then the U.S. law would have an impact on the federal budget. For our testimony, we conservatively estimated the costs of non-participation for the five largest U.S. passenger airlines that fly to Europe - United, Continental (since merged with United), American, Delta, and US Airways. Together, they emitted almost 16 million tonnes of carbon dioxide on flights between the U.S. and Europe in 2010. Using the U.S. Federal Aviation Administration (FAA) official projections for aviation growth, at today's exchange rate, the financial liability of these carriers would be \$2 billion in 2012, growing to \$2.8 billion in 2020. If, as part of holding the carriers harmless for the compliance liabilities arising out of S. 1956, the Secretary were to shift the burden to U.S. taxpayers, then the total impact on the federal budget of enactment of S. 1956 could be on the order of \$22 billion for the 2012-2020 period.

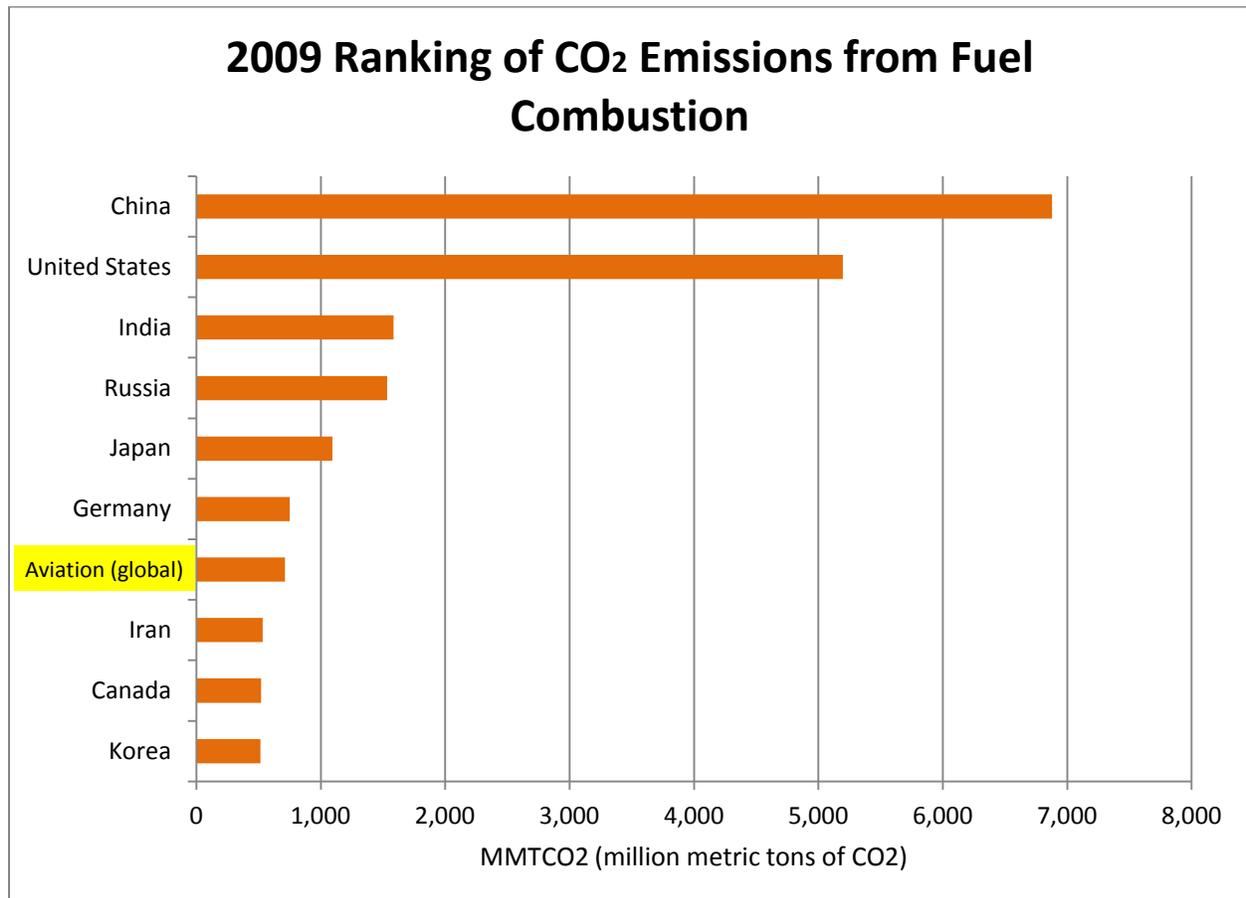
Question #2

Ms. Peterson, as I mentioned in my opening statement, there is virtually unanimous agreement in the scientific community that human-caused global warming is real and there is not a single scientific body of national or international standing that does not support this conclusion. And while there may be some remaining uncertainty as to the timing and scope of climate change, I don't believe the United States can continue to ignore this threat to our environment and to America's future prosperity.

- *Do you concur with the scientific consensus that human-caused global warming is real?*
Yes.
- *Do you agree that climate change will negatively impact the American economy and our citizens?* Yes.
- *How would you characterize the aviation industry's contribution to the build-up of greenhouse gases in the world's atmosphere? Is it a significant problem today and how will aviation's contribution change over time?* If aviation were a country, at least some analyses indicate that it would rank 21st in the world in terms of Gross Domestic Product (GDP), which is considerably larger than some members of the G20.³ As the chart below indicates,

³ <http://www.oxfordeconomics.com/FREE/PDFS/OEAVIATION09.PDF> at 1.

if aviation were considered a country, it would rank **seventh in the world** in terms of greenhouse gas emissions from fossil fuel combustion.⁴



- Industry projections forecast that the number of passengers will rise by 145% between 2007 and 2026 from just below 2.5 billion to 6 billion.⁵ Aviation's emissions are predicted to grow substantially over time, even taking into account the IATA voluntary goals and the ICAO General Assembly 2010 goals discussed below. Laws have been enacted or are under development to cap and cut emissions from sectors like electricity and road transportation in a broad range of jurisdictions, including the U.S., California, the Northeast U.S. States (RGGI), the EU, Australia, New Zealand, the Republic of Korea (South Korea), Mexico, Brazil, and several Brazilian states, among others, and pilot programs are under development

⁴ International Energy Agency. 2011. CO₂ Emissions from Fuel Combustion Highlights – 2011 Edition. <http://www.iea.org/co2highlights/co2highlights.pdf> (visited July 19, 2012); EDF estimates based on United Nations Environment Programme. 2011. Bridging the Emissions Gap, available at http://www.unep.org/pdf/UNEP_bridging_gap.pdf, and International Civil Aviation Organization. 2009. Global Aviation CO₂ Emissions Projections to 2050. Group on International Aviation and Climate Change (GIACC) Fourth Meeting. http://www.icao.int/environmental-protection/GIACC/Giacc-4/Giacc4_ip01_en.pdf.

⁵ <http://www.oxfordeconomics.com/FREE/PDFS/OEAVIATION09.PDF> at 2.

in various provinces in China. As the emissions of other sectors decline under these laws and programs, aviation's relative share will increase.

Question #3

Ms. Petsonk, during the June 6, 2012 hearing, we discussed some of the voluntary commitments the aviation industry has made to reduce their greenhouse gas emissions beyond business-as-usual.

- *Can you specify what those commitments are?*

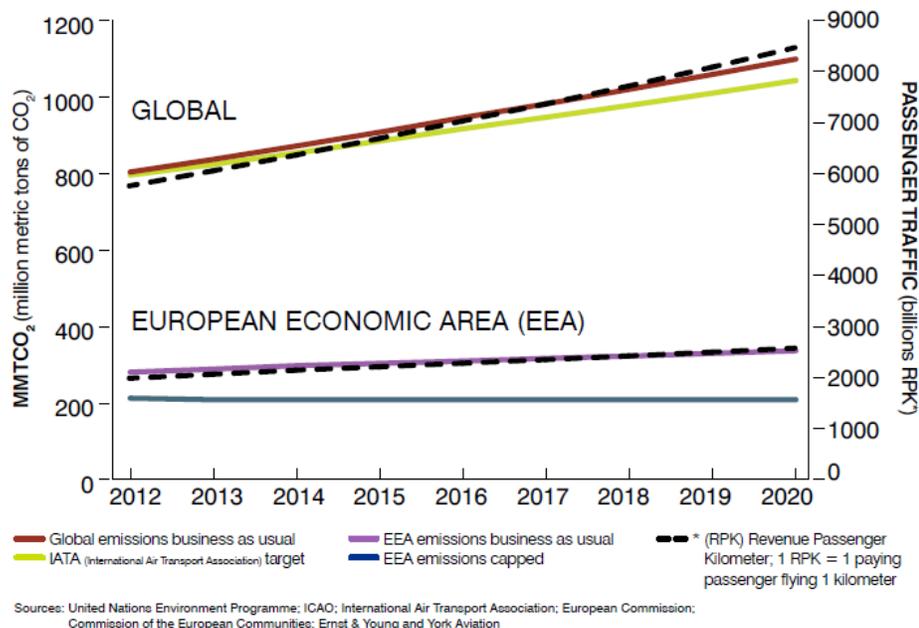
A. IATA and its voluntary commitments. In 2009, the International Air Transport Association (IATA), an international trade body representing 240 airlines which together comprise 84% of total global air traffic, voluntarily adopted a set of targets to mitigate greenhouse gas emissions from aviation.⁶ These targets are first, to achieve “an average improvement in fuel efficiency of 1.5 percent per year from 2009 to 2020.” Second, IATA aims to put “a cap on CO₂ emissions from aviation from 2020 (carbon-neutral growth).” That is, starting in 2021, IATA members will voluntarily offset any emissions they incur beyond the amount that IATA members emitted in 2020. Third, by 2050, IATA aims to attain “a reduction in CO₂ emissions of 50% by 2050, relative to 2005 levels.” IATA proposed, as part of the means to achieve these voluntary targets, principles for the use of market-based measures for international aviation.

In IATA’s words, “these collective goals were endorsed by the aviation industry in the joint industry submission to ICAO in September 2009.” We thus understand that IATA’s three targets apply to the collective fuel efficiency of and CO₂ emissions by its members’ aircraft fleets. Given the lack of specific language, it appears that IATA intends that the fuel efficiency improvement set out in the first target refers to actual efficiency (what is measured in reality, taking into account actual loads and routes), rather than theoretical efficiency (what is technically achievable). Furthermore, since there was no reference to the type of aircraft or aviation operations, we think it reasonable to interpret the fuel efficiency improvement in the first target as the average improvement across the entire fleet operated by each of IATA’s members, including both existing and future aircraft.

IATA's voluntary commitment, in comparison to business-as-usual projections of emissions, is displayed by the pale green line in Chart 3 accompanying our June 6, 2012 testimony, just below the red "business-as-usual" line in the Chart. Chart 3 is reprinted for your convenience below:

⁶ International Air Transport Association. 2009. *A Global Approach to Reducing Aviation Emissions*. http://www.iata.org/SiteCollectionDocuments/Documents/Global_Approach_Reducing_Emissions_251109web.pdf (visited July 19, 2012). g\

Aviation Emissions - Policy Scenarios



B. ICAO and its voluntary commitments. The International Civil Aviation Organization (ICAO), a specialized agency of the United Nations that “sets standards and regulations necessary for aviation safety, security, efficiency and regularity, as well as for aviation environmental protection,” and that “serves as a forum for cooperation in all fields of civil aviation among its 191 Member States” has adopted a voluntary resolution pertaining to the reduction of greenhouse gas emissions. Specifically, the ICAO General Assembly, which meets every three years, resolved at its 2010 meeting “that States and relevant organizations will work through ICAO to achieve a global annual average fuel efficiency improvement of 2 per cent until 2020 and an aspirational global fuel efficiency improvement rate of 2 per cent per annum from 2021 to 2050, calculated on the basis of volume of fuel used per revenue tonne kilometre performed.”⁷

Furthermore, at that General Assembly meeting, ICAO recognized that “the aspirational goal of 2 per cent annual fuel efficiency improvement is unlikely to deliver the level of reduction necessary to stabilize and then reduce aviation’s absolute emissions contribution to climate change, and that goals of more ambition will need to be considered to deliver a sustainable path for aviation.”⁸

⁷ International Civil Aviation Organization. 2010. ASSEMBLY — 37TH SESSION REPORT OF THE EXECUTIVE COMMITTEE ON AGENDA ITEM 17 (Section on Climate Change) at Resolution 17-2 (“Consolidated statement of continuing ICAO policies and practices related to environmental protection – Climate change”) at operational paragraph 4, A37-WP/402, http://legacy.icao.int/icao/en/assembly/a37/wp/wp402_en.pdf (visited July 19, 2012). It should be noted that some 40 ICAO member states entered reservations to various portions of this Resolution.

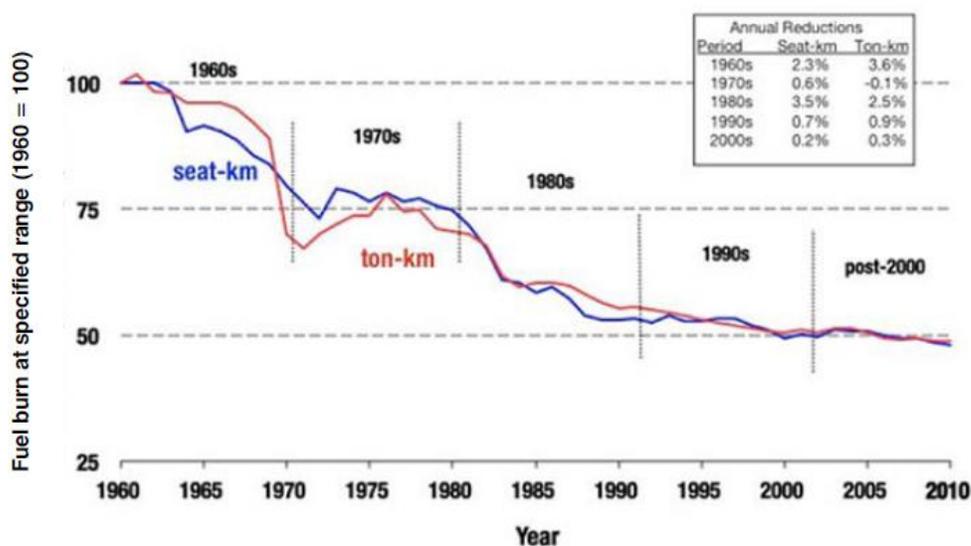
⁸ Id. at preambular paragraph 14.

- *How confident are you that these commitments will be met?*

With regard to IATA’s first target (of achieving a 1.5 percent per annum improvement in fuel efficiency between 2009 and 2020): In its 2010 Environmental Report, ICAO projected that aircraft fuel efficiency would improve by an average of close to 1.4 percent every year between 2006 and 2036, under its most optimistic scenario, which “goes beyond industry-based recommendations for potential improvements.”^{9,10} To our knowledge, this is ICAO’s latest long-term projection for global fuel efficiency. Given that even ICAO’s extremely optimistic estimate falls short of IATA’s target of 1.5 per cent per annum fuel efficiency improvements per year, it appears that IATA currently is unlikely to meet its own voluntary commitments, absent policy measures to stimulate greater emission reductions. Here's some further background:

CHART 5

Average fuel burn for new jet aircraft, 1960-2010



Source: The International Council on Clean Transportation (updated through 2010)

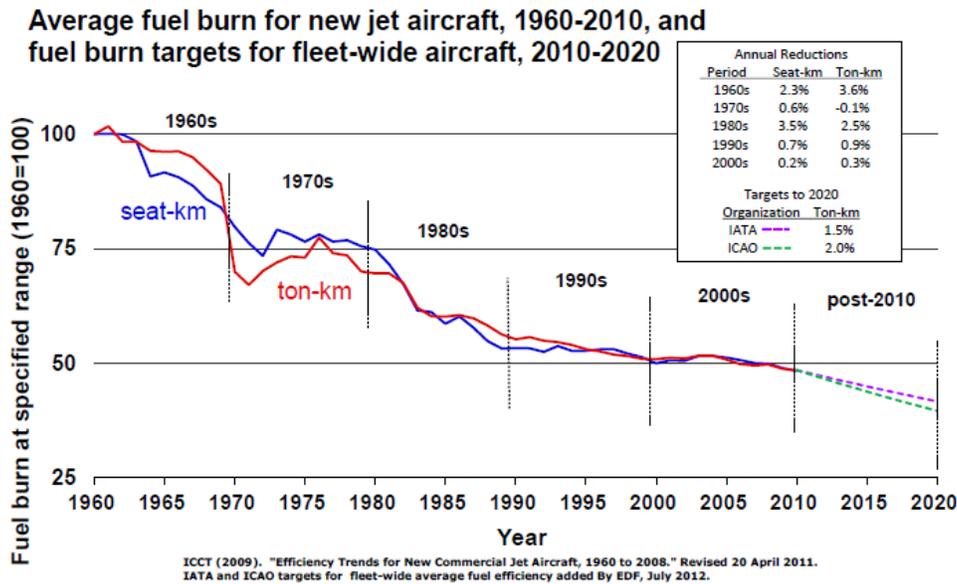
Chart 5, "Average Fuel Burn for New Jet Aircraft, 1960-2010," which accompanied EDF's June 6, 2012 testimony and which is reprinted here, demonstrates graphically the fuel efficiency improvements of new aircraft over the past half-century. As Chart 5 indicates,

⁹ International Civil Aviation Organization. 2010. *Environmental Report 2010*. Available at <http://www.icao.int/environmental-protection/Pages/EnvReport10.aspx>.

¹⁰ ICAO’s most optimistic scenario for fuel efficiency improvement includes “the improvements associated with the migration to the latest operational initiatives, e.g. those planned in NextGen and SESAR,” “an optimistic fuel burn improvement of 1.5% per annum for all aircraft entering the fleet after 2006 out to 2036,” and “additional fleet-wide advanced operational improvements by region.” The report further notes that this scenario “goes beyond industry-based recommendations for potential improvements.”

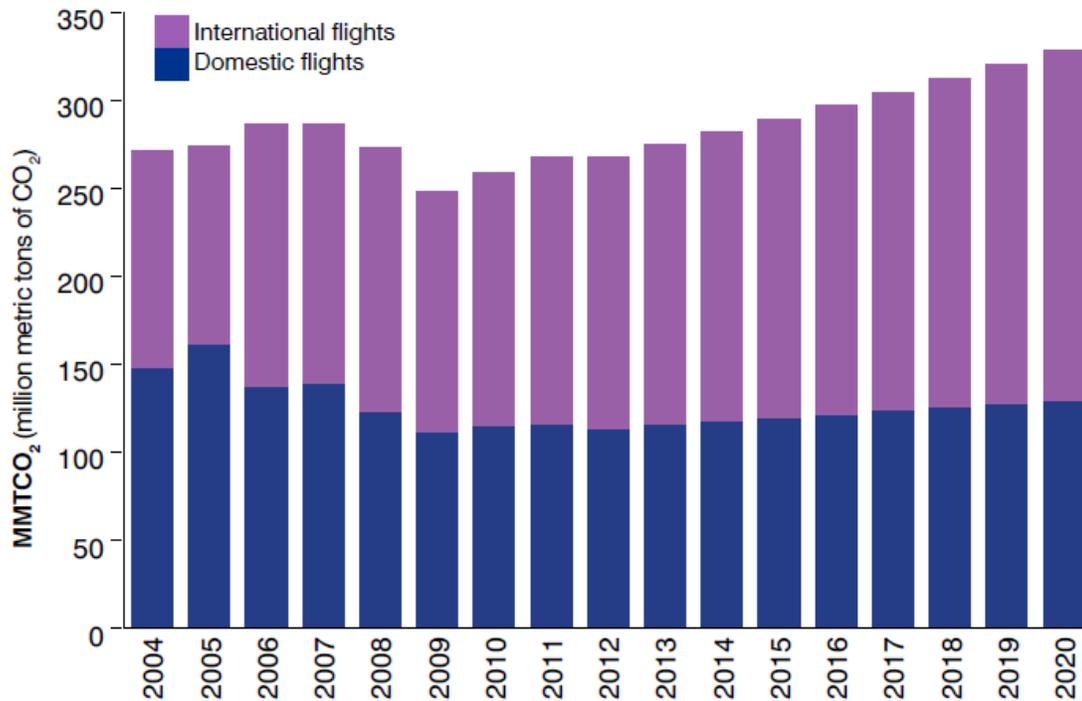
aircraft fuel efficiency improvements have averaged less than 0.5 percent per annum throughout the past decade, far lower than IATA’s hope for 1.5 percent and ICAO’s for 2 percent.

To achieve the IATA and ICAO targets for fleet-wide average fuel efficiency improvements by 2020, fleet-wide average fuel efficiency would have to improve by 14 to 18 percent over the ten-year period from 2010, which is substantially more than the 9 to 12 percent the industry has actually achieved for new aircraft in the twenty-year period from 1990 to 2010. To demonstrate this graphically, below please find a revision of Chart 5, "Average Fuel Burn for New Jet Aircraft, 1960-2010 and Fuel Burn Targets for Fleet-Wide Aircraft, 2010-2020." The dashed purple and green lines on this graph show the fleet-wide fuel efficiency improvements that would need to be achieved during the current decade in order to meet the IATA (purple) and ICAO (green) aspirational goals for efficiency improvement. Even this numerical comparison is an understatement of the improvement required; since fuel efficiency improvements in new aircrafts translate to a lower average fleet-wide improvement, IATA’s target requires an improvement in new aircraft fuel efficiency higher than the stated 1.5% average rate.



Emissions from aviation are projected to grow in the US (Chart 1 accompanying our June 6 testimony, reprinted below).

U.S. Aviation Emissions



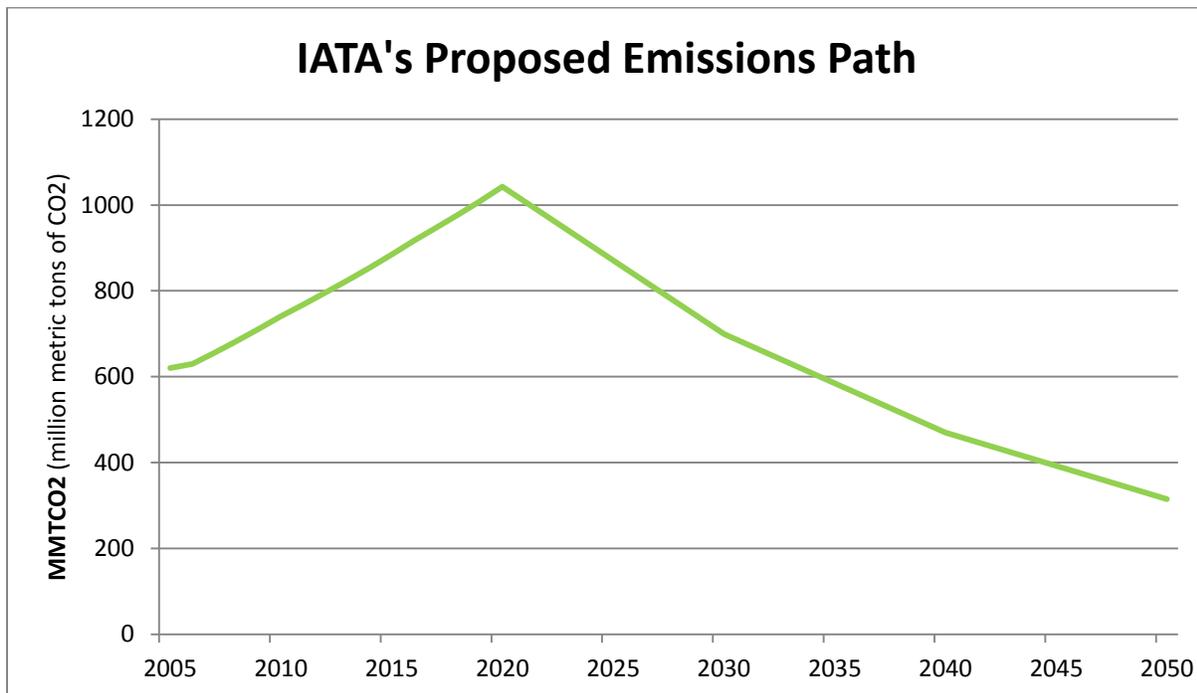
Sources: United Nations Framework Convention on Climate Change; United States Federal Aviation Administration [1, 2]

On business-as-usual, aviation emissions globally are also predicted to grow (red line on Chart 3, reprinted above). This is true even if IATA were to achieve its fuel efficiency target (pale green line on Chart 3), since growth in traffic (shown in dashed lines on Chart 3) is predicted to outpace fuel efficiency gains. As noted above, ICAO has specifically recognized that its “aspirational goal of 2 per cent annual fuel efficiency improvement is unlikely to deliver the level of reduction necessary to stabilize and then reduce aviation’s absolute emissions contribution to climate change, and that goals of more ambition will need to be considered to deliver a sustainable path for aviation.”¹¹ At the same time, however, it is important to note that every bit of fuel efficiency improvement the aviation industry can achieve can help in terms of emissions, as long as the "rebound effect" is less than 100 percent. (The “rebound effect” is the increase in demand for an energy service when it becomes cheaper as a result of increased energy efficiency. In the context of aviation, we can imagine that when fuel efficiency improves, flights may become cheaper, leading to more travelers choosing to fly.)

With regard to IATA's second target of achieving "carbon-neutral growth from 2020, it is important to clarify that IATA does not mean that the entire emissions of aviation will be

¹¹ International Civil Aviation Organization. 2010. ASSEMBLY — 37TH SESSION REPORT OF THE EXECUTIVE COMMITTEE ON AGENDA ITEM 17 (Section on Climate Change)A37-WP/402. Available at http://legacy.icao.int/icao/en/assembl/a37/wp/wp402_en.pdf

carbon-neutral starting in 2020. Rather, IATA means that starting in 2021, its members will voluntarily offset that fraction of their emissions which exceeds whatever their emissions actually are in 2020. Understanding whether IATA can achieve this goal requires a deeper consideration of the mitigation measures available to the industry. Achieving this goal essentially means that any growth in air traffic above the level of emissions incurred in 2020, requires an equivalent countering effect from a combination of fuel efficiency improvements and other measures. According to ICAO’s projection, global aviation demand (in terms of revenue passenger-kilometers) is expected to grow by some 4 to 5.5 percent every year (higher dotted line on Chart 3).¹² This means that even if IATA achieves its first target, carbon dioxide emissions will continue to grow beyond 2020 (pale green line on Chart 3). With a trajectory that has been increasing and that is expected to continue increasing, it is difficult to see how the green line can suddenly flatten after 2020. In other words, IATA will very likely fail to achieve its second target if no other mitigation measures are employed. To achieve carbon-neutral growth from 2020 onwards, IATA must essentially implement a measure that fixes the amount of industry-wide emissions at 2020 levels and then employs offsetting for amounts above 2020 levels. IATA has not specified how it would source those offsets.



IATA's third target (or halving 2050 carbon emissions over 2005 levels), besides being longer-term, is also more stringent. Being more ambitious than stabilizing emissions, this target requires the global aviation industry to reduce its emissions by, on average, some 3.5 percent every year from 2020 to 2050. Not only does the pale green line on Chart 3 have to flatten, it has to decline steeply. The graph above indicates one potential trajectory for

¹² International Civil Aviation Organization. 2009. *Global Aviation CO2 Emissions Projections to 2050*. Group on International Aviation and Climate Change Information Paper GIACC/4-IP/1). Available at http://www.icao.int/environmental-protection/GIACC/Giacc-4/Giacc4_ip01_en.pdf.

meeting this target. A much wider range of measures than solely fuel efficiency improvements would need to be taken to achieve this kind of trajectory.

Do you believe that there are enough tools available to ensure that all major emitting nations and their carriers participate and will meet these commitments?

We believe there is a broad range of tools that can ensure that all major emitting nations and their carriers participate in a global emissions limitation and reduction program, under ICAO auspices. We agree with ICAO that to make such a program effective in tackling aviation's share of the global warming problem, more ambitious commitments are needed. But bringing these tools forward, and obtaining the agreement and participation of all major emitting nations, will require bolder and more visionary leadership by the United States in ICAO.

What do you think are the most cost-effective ways to reduce greenhouse gases from the aviation industry?

- The aviation industry is a cornucopia of technological innovation. It has a wide range of opportunities to reduce greenhouse gas emissions available to it. A representative list of about twenty potential improvements to aircraft technology is attached, each of which has the potential to reduce fuel burn by about 1 percent.¹³ Taken together, their impact on emissions reduction could be significant.
- In addition, some in the industry have begun to experiment with potential step-change technologies for addressing greenhouse gas emissions. For example, Pratt & Whitney is in the process of launching its new geared turbofan engine, which it claims has the potential for step change improvements in terms of reducing both emissions and noise, while Airbus claims that the technologies and processes already exist for what it describes as "perfect flights" that have much lower emissions profiles than current flights.¹⁴ We hope the Committee will look closely at the potential for new step-change technologies.
- The U.S. Government has begun to identify some ways to reduce greenhouse gases from the aviation industry, but the quantification of these, and the policy framework for making them cost-effective, is unclear. The U.S. Federal Aviation Administration has developed "a suite of environmental analytical tools—including the System for assessing Aviation's Global Emissions (SAGE), a component of the Aviation Environmental Design Tool (AEDT) and the Aviation Portfolio Management Tool (APMT) in order to assess cost-effective options to limit or reduce fuel consumption and greenhouse gas emissions. This component of AEDT generates aviation fuel consumption and emissions inventories for baseline conditions based upon operational data, estimates future emissions based upon fleet forecasts including

¹³ EarthJustice. 2012. *Not Rocket Science: Efficiency Measures Available Now to Reduce Aviation Fuel Use*. Available at <http://www.usclimatenetwork.org/resource-database/not-rocket-science-efficiency-measures-available-now-to-reduce-aviation-fuel-use>

¹⁴ See, e.g., http://www.purepowerengine.com/pdf/Press_release/FINAL_2012-07-10_pw1200G_test_complete.pdf and see <http://www.flightglobal.com/news/articles/farnborough-airbus-environment-champion-andrea-debbane-hhoutlines-the-perfect-flight-373774/>.

technology advances, and also estimates future emissions based upon projections for changes in the National Air Space including operational improvements. The tool also has the capability to assess the influence of market-based measures to reduce fuel consumption and thus greenhouse gas emissions. Data from AEDT/SAGE is used to calculate the FAA's Flight Plan aviation fuel efficiency goal."¹⁵

- Last year, partly at the urging of the United States, ICAO asking its Member States to provide Action Plans indicating how they plan to implement their voluntary goals, and providing guidance to Member States on how to develop their Action Plans.¹⁶ The United States prepared an Action Plan and submitted it to ICAO in June 2012. According to the Action Plan, the Obama Administration has set an overarching goal of achieving carbon-neutral growth for U.S. commercial aviation by 2020, using the AEDT-generated data on 2005 emissions as a baseline.¹⁷ FAA states in the Plan that "Given current forecasts for aviation growth this equates to about a 115 million metric tons (MT) reduction in carbon dioxide emissions from commercial aviation by 2020, and by extending those approaches further there could be an additional 60MT reduction by 2026."¹⁸
- However, because the data underlying the AEDT is not publicly available, it is difficult to ascertain from the plan either the baseline level of emissions for 2005, or the FAA's projections of business-as-usual emissions. Consequently, it is not possible to tell if the plan is "ambitious", as FAA claims, or not. In May 2012, in our capacity as a member of the U.S. Interagency Group on International Aviation (IGIA), the Environmental Defense Fund submitted comments to the FAA (copies attached) on a draft of the Plan. In those comments we urged FAA to provide greater transparency. We also noted that a significant share of FAA's claimed reductions were attributed to biofuels. We called attention to the difficulties with biofuels accounting, and urged FAA to provide greater transparency in this area as well. Unfortunately, the June 2012 iteration of the plan fails to provide this transparency. We hope that FAA will revise the plan in the future to provide greater transparency.
- In practice, how cost-effective any of these greenhouse gas mitigation measures will be depends to a great extent on three main factors:
 - (a) the level of ambition that the over-arching policy framework demands of participants and the consequences for failing to meet that ambition level;
 - (b) the abatement flexibility that the policy framework affords to participants; and
 - (c) the extent to which the policy framework spurs competition to drive down the costs of the mitigation technologies and processes.

¹⁵ Our Changing Planet, 2008 report of the U.S. Global Change Research Program, Appendix 1, <http://www.usgcrp.gov/usgcrp/Library/ocp2008/ocp2008-dot.pdf> at page 178.

¹⁶ Guidance Material for the Development of States' Action Plans, ICAO (September 2011), http://www.icao.int/environmental-protection/Documents/GuidanceMaterial_DevelopmentActionPlans.pdf.

¹⁷ U.S. Aviation Greenhouse Gas Emissions Reduction Plan Submitted to the International Civil Aviation Organization, June 2012, page 1 (copy attached).

¹⁸ U.S. Aviation Greenhouse Gas Emissions Reduction Plan Submitted to the International Civil Aviation Organization, June 2012, page 1 (copy attached).

- Currently, there is no over-arching policy framework - other than uneven and uncertain pressures from the price of jet fuel¹⁹ - to deliver accountability, flexibility and competition. Applying market-based measures that cap greenhouse gas emissions without specifying the particular abatement technologies that firms must use, and that spur competition among firms to innovate to develop better, cheaper, faster means of abatement, would enhance cost-effectiveness because each participating entity could choose its lowest-cost method of reducing emissions, and because competition among different technologies and processes would grind down the costs of abatement. Recognizing cost-effectiveness as a key element of environmental effectiveness, the ICAO Assembly has endorsed “the development of an open emissions trading system for international aviation.”²⁰
- An economy-wide emissions trading system like the EU’s is even more cost-effective than an emissions trading program confined to one industry, because it allows and creates the incentive for firms in sectors that can more easily and cheaply reduce their emissions to do so. The international aviation industry has repeatedly voiced its preference for a single coordinated global emissions trading system for aviation emissions mitigation, because it knows that a segmented approach could inflict unnecessary cost to the sector. For instance, IATA, together with other aviation industry groups worldwide, requested the governments represented in ICAO to develop a global framework to address aviation emissions.²¹ In particular, they noted a principle critical to the frame work was “aviation CO₂ emissions should be addressed through a global framework and accounted for in a global emissions inventory, not at a regional or national level. It is essential that emissions from aviation are accounted for only once.”
- Furthermore, market-based measures complement technological advancement. The efforts by the aviation industry to improve fuel efficiency can and should run parallel to the implementation of a market-based measure. By putting in place a market-based mechanism that pairs the rigor of emissions caps with the flexibility of trading, the industry will have a greater economic incentive to improve fuel efficiency.
- The aviation industry's interest in market-based measures should not be surprising. The U.S. sulfur dioxide trading program has been enormously successful, and continues to be cited as a model for emission limitation policies around the world. A key success of the program is its cost-effectiveness, saving the electric power industry billions of dollars as a result of the

¹⁹ See, e.g., Hugo Martín, "Airlines' fuel surcharges far outpacing fuel prices: Since April 2011, fuel surcharges by U.S. airlines have risen 53%, while fuel prices have increased 24%, according to a study by Carson Wagonlit Travel" (Los Angeles Times, July 23, 2012), text available at <http://www.latimes.com/business/la-fi-travel-briefcase-20120723,0,196652.story>

²⁰ International Civil Aviation Organization. *Market-Based Measures*. <http://www.icao.int/environmental-protection/Pages/market-based-measures.aspx>. Accessed on July 17, 2012.

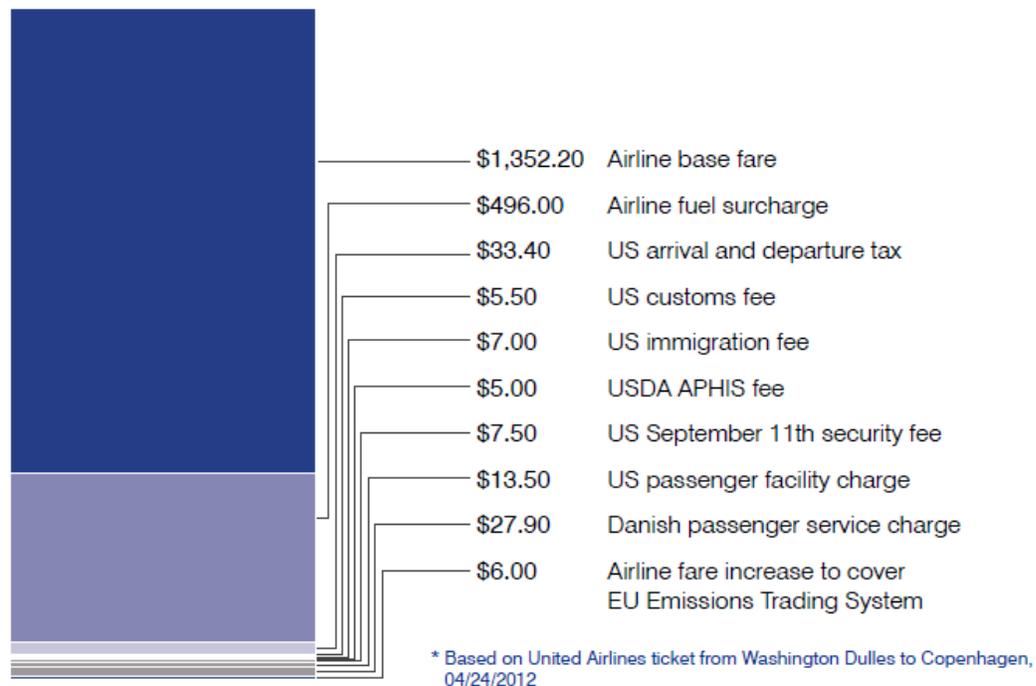
²¹ International Civil Aviation Organization. DEVELOPMENT OF A GLOBAL FRAMEWORK FOR ADDRESSING CIVIL AVIATION CO₂ EMISSIONS (Presented by the International Air Transport Association (IATA), on behalf of ACI, CANSO, IATA, IBAC and ICCAIA, referred to hereafter as the —aviation industry) A37-WP/217. http://legacy.icao.int/icao/en/assembl/a37/wp/wp217_en.pdf

program's flexibility and competition-spurring features, and saving hundreds of billions of dollars in health costs.^{22 23 24}

- Respected economic analyses underscore the cost-effectiveness aspect of a cap and trade program for the aviation industry. The recent analysis by the Massachusetts Institute of Technology (MIT), under a contract supported in part by FAA, found that U.S. airlines could comply with the EU ETS targets - which appear to be more rigorous than those in the FAA Plan - at a cost of \$3 per trans-Atlantic segment, and that airlines could potentially profit from such participation.²⁵ We believe the sliver of airfare (\$6) attributable to the EU-ETS in Chart 4 accompanying our testimony, reprinted below, is a small price to pay in order to reduce the large bloc (\$496.00) attributed by the airline to "Fuel Surcharge".

CHART 4

Round-trip Airfare to Denmark*



- In that regard, we note that the bloc of charges which United Airlines labeled "Fuel Surcharge" as shown in Chart 4 of our testimony, reproduced here, has since been re-characterized by United and other airlines. Shortly before the June 6 hearing, the airlines

²²W. Chameides, U.S. Acid Rain Regulations: Did They Work?, Nicholas School of the Environment, Duke University (May 10, 2012), text available at: <http://www.nicholas.duke.edu/thegreengrok/acidrain-regs>

²³ Hodges, Hart (1997). *Falling Prices: Cost of Complying with Environmental Regulations Almost Always Less Than Advertised*. (Economic Policy Institute Briefing Paper). Available at <http://www.epi.org/page/-/old/briefingpapers/bp69.pdf>.

²⁴ Burtraw, Dallas (1996). "Trading Emissions to Clean the Air: Exchanges Few but Savings Many." *Resources for the Future Report*, Winter.

²⁵ Robert Molina et al., The Impact of the European Union Emissions Trading Scheme on US Aviation, 19 *Journal of Air Transportation Management* 36-41, 2012.

received a letter from the Department of Transportation General Counsel's Office cautioning the carriers that "such charges must be displayed on a per-passenger basis, accurately reflect the actual costs of the service covered, and not otherwise be deceptive. (14 CFR 399.84, 76 Fed. Reg. 23110, 23143). When a cost component is described as a fuel surcharge, for example, that amount must actually reflect a reasonable estimate of the per-passenger fuel costs incurred by the carrier above some baseline calculated based on such factors as the length of the trip, varying costs of fuel, and number of flight segments involved." Shortly after the hearing, all of the airlines that we checked had re-labeled that block of surcharge as "International Surcharge." We are unsure as to the basis for this "International Surcharge," since it is more than one hundred times the amount identified in the FAA-supported MIT study about the costs of compliance with the EU-ETS.²⁶

Are there particular efforts or case-studies, such as the Green Skies program at SeaTac Airport, you believe Congress should look at when considering how best to address this issue?

We believe the SeaTac program is a great model, and we commend SeaTac for considerable constructive work in this area. Following the model of SeaTac, we recommend that Congress suggest that the Administration consider approaches in ICAO that engage the talents and creativity of the entire aviation sector, not just airlines and equipment manufacturers, but also air traffic control, airports, and the flying public, in the challenge of reducing aviation's impact on the global environment. We also suggest that Congress consult with forward-looking actors in industry, such as the Berkshire Hathaway company NetJets, whose European division have committed to be 100% carbon neutral.

Among other studies, we recommend that Congress look at:

1. The Aviation and the Global Atmosphere, J.E.Penner, D.H.Lister, D.J.Griggs, D.J.Dokken, M.McFarland (Eds.), Intergovernmental Panel on Climate Change (Prepared in collaboration with the Scientific Assessment Panel to the Montreal Protocol on Substances that Deplete the Ozone Layer), Cambridge University Press, 1999 (hereinafter "IPCC Special Report on Aviation"), Summary for Policymakers available at <http://www.ipcc.ch/pdf/special-reports/spm/av-en.pdf> (accessed June 3, 2012).
2. Commission of the European Communities. Summary of the Impact Assessment: Inclusion of Aviation in the EU Greenhouse gas Emissions Trading Scheme (EU ETS). 2006.
3. Chicago Department of Aviation Environmental Sustainability Report (2011). The CDA, which oversees both O'Hare and Midway airports, has prepared a sustainability report which is a leader in the field. <http://ohare.com/Environment/sustainabilityreport.aspx>
4. Sustainable Airport Manual (AirportsGoingGreen.org 2010) and supplements, available at <http://www.airportsgoinggreen.org/SAM>. Airports Going Green brings together airports seeking to make step change advancements in managing greenhouse gas emissions and other environmental concerns at airports.

²⁶ Letter from Samuel Podberesky, Assistant General Counsel for Aviation Enforcement and Proceedings, United States Of America, Department Of Transportation, Office Of The Secretary, Washington, DC, Dated: February 21, 2012: "Additional Guidance On Airfare/Air Tour Price Advertisements," text available at airconsumer.dot.gov/rules/Notice.Taxes.fees.sam.dl.13.website.docx

5. Guidance Manual: Airport Greenhouse Gas Emissions Management (Airports Council International (2008) and supplements. This manual and its supplements provide guidance for airport operators wishing to manage greenhouse gas (GHG) emissions. The manual provides: clear definitions of terms; why an airport operator would manage GHG emissions; how to conduct a GHG emissions inventory; what GHG emissions species to include; how to categorize sources; references to documents assisting with the calculations of the quantities of emissions; the goals of an emissions management programme; GHG emissions reduction projects; becoming Carbon Neutral; reviewing programmes and reporting progress; and gaining accreditation for achievements made. available at http://www.aci.aero/cda/aci_common/display/main/aci_content07_banners.jsp?zn=aci&cp=1-6-44%5E33815_725_2__
6. NetJets 2010 Environmental Update Report, http://www.netjetseurope.com/Global/Reports/Environment%20Update%20Report_UK%20Final%20version.pdf.
7. Robert Molina et al., The Impact of the European Union Emissions Trading Scheme on US Aviation, 19 Journal of Air Transportation Management 36-41, 2012.
8. A New Flightplan: Getting Climate Measures for Aviation off the Ground (Transport & Environment, Environmental Defense Fund, The International Council on Clean Transportation and the Aviation Environment Federation, February 2012) (copy attached).

Question #4

Ms. Petsonk, carbon emissions are ubiquitous within the U.S. economy and almost every economy around the globe. Isolated efforts to reduce greenhouse gas emissions will not alter or mitigate the devastating impacts of a warming planet. I believe this reality provides additional urgency for the United States, as the world's sole superpower, to act and lead the world to a clean energy future with innovative policies. Curbing carbon emissions to the level necessary to avert a climate crisis will require innovation within almost every sector of the economy. It seems to me that the global scope of carbon pollution poses a somewhat different challenge than more localized pollutants.

- *Rather than regulating downstream at the point of emission such as an airplane's exhaust, would limiting carbon emissions upstream where fossil fuels are extracted possibly be a more efficient and technology-neutral way to squeeze carbon out across the economy?*
- *Would an upstream carbon limit reduce the need for more monitoring, enforcement, and regulatory complexity?*

For a range of technical and political reasons, we do not believe that an upstream limit would be feasible in the near-term in the context of ICAO. We would be happy to discuss with you in detail our reasons for that view.

Senator John F. Kerry
Senate Committee on Commerce, Science, and Transportation
Hearing on the European Union Emissions Trading System
June 6, 2012
Questions for the Record

Ms. Annie Petsonk of the Environmental Defense Fund (QFR2):

S. 1956 would authorize the Secretary of Transportation to prohibit an airline from complying with the EU ETS, thereby removing a flying option for Americans and potentially raising prices for remaining flights to Europe. As a recent CRS study pointed out, “If either of the bills (the Thune bill or its House companion) were to be enacted, the language could pose challenges for U.S. aircraft operators serving the EU. Were the Secretary of Transportation to prohibit them from participating in the EU ETS, this could be construed as an instruction not to comply with the laws of the EU and its member States and prevent those operators from receiving their shares of allowances. It also could subject those operators to non-compliance penalties, including exclusion from the EU aviation market.” We would therefore be authorizing through legislation the ability for U.S. companies to break the law of another country. Can you please comment on what precedent this sets? Are there other examples where the U.S. has prohibited an industry from complying with another country’s laws? How would prohibiting a carrier from complying with EU law ever be “in the public interest” for Americans who would like to fly to Europe?

We think such a law would set a terrible precedent. There are many areas where the U.S. seeks the cooperation of other nations in law enforcement cases where infractions of U.S. law transcend national boundaries. These include enforcement efforts not only in environmental cases, but also in the financial area, in banking secrecy cases, in drug enforcement, and a whole host of fields where American law enforcement authorities seek cooperation from foreign law enforcement authorities to enforce U.S. law abroad.

Only on the rarest occasions has the U.S. Congress enacted legislation prohibiting U.S. companies from complying with foreign laws. In fact, we have been able to identify only two examples. The first is the Comprehensive Anti-Apartheid Act of 1986, Public Law No: 99-440.²⁷ This law, enacted, over a Presidential veto, banned all new U.S. trade and investment in South Africa as a sanction against that country’s apartheid laws. The law was repealed as of June 8, 1994.²⁸

The second set of laws, which remain in effect today, are the Antiboycott Laws under the Export Administration Act, specifically the 1977 amendments to the Export Administration Act (EAA) and the Ribicoff Amendment to the 1976 Tax Reform Act (TRA).²⁹ The Antiboycott laws

²⁷ Text available at <http://thomas.loc.gov/cgi-bin/bdquery/z?d099:HR04868:@@L&summ2=m&>

²⁸ <http://uscode.house.gov/download/pls/22C60.txt>

²⁹ Section 8 of the Export Administration Act of 1979, as amended, 50 U.S.C. app. §§ 2401 – 2420 (2000), International Emergency Economic Powers Act, 50 U.S.C. §§ 1701-1707 (2000); and the “Ribicoff Amendment” to the Tax Reform Act of 1976, adding § 999 to the Internal Revenue Code. See

discourage, and in some circumstances, prohibit U.S. companies from furthering or supporting the boycott of Israel sponsored by the Arab League, and certain other countries, including complying with certain requests for information designed to verify compliance with the boycott. Compliance with such requests may be prohibited by the Export Administration Regulations (EAR).³⁰ Currently U.S. companies may be prohibited from complying with requests for proof of boycott compliance when doing business in Bahrain, Iraq, Libya, Saudi Arabia, Syria, and Yemen, among others.

We respectfully submit that it would be inappropriate, to say the least, to place apartheid and the anti-Israel boycott in the same category at the European Union's legislation to limit global warming pollution from aircraft landing at and taking off from European airports. Yet that is what enactment of legislation authorizing the Secretary of Transportation to prohibit U.S. airlines from participating in the EU ETS would effectively do.

<http://www.bis.doc.gov/complianceand enforcement/comparison-antiboycott-laws.pdf> and see <http://www.bis.doc.gov/complianceand enforcement/antiboycottcompliance.htm>.

³⁰ <http://www.bis.doc.gov/antiboycottcompliance/oacantiboycottrequestexamples.html>