

Dealing with aviation's carbon challenge in the lead up to the Paris climate summit

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There is a considerable 'wedge gap' between the continuing growth of carbon dioxide emissions from international air transport and their mitigation from technological and operational improvements and the use of alternative fuels. In a decision to address this gap, the ICAO Assembly in 2013 agreed that the Organization should develop a global scheme on market-based measures (MBMs) for consideration by its next Assembly in 2016 and intended implementation from 2020. The critical meeting of the UNFCCC to be held in Paris in December this year will review progress by ICAO and may provide new direction. A discussion of this agenda emphasises a need for more far-reaching and better directed efforts towards a meaningful price on air transport's carbon emissions, along with some specific suggestions.

Contribution of air transport emissions to global warming

Commercial aircraft burn fossil fuels. Air transport thus represents about 1% of global GDP directly, but 2% of human-generated carbon dioxide emissions – more than the *all-sector* CO₂ emissions from countries such as Canada or the United Kingdom. Taking into account other greenhouse gases such as nitrous oxides and methane, plus cirrus cloud induced from aircraft condensation trails, on which there is admittedly less certainty, aviation's contribution to global warming could be significantly greater, reaching 5% or more. On the basis of the CO₂ component, on which there is now strong certainty, air transport's emissions are expected to double by 2035 under business-as-usual. They are growing at a higher rate than the average for all other sectors, *inter alia* placing pressure on other sectors to mitigate more. Air traffic growth without advanced carbon abatement will bring aviation's carbon footprint in conflict with a global emissions trajectory that will limit the aggregate global temperature increase to below 2° C above pre-industrial levels.

Airlines are doing all they can to reduce emissions where there is saving in operating costs, particularly as fuel has represented - at least until very recently - around 30% of these costs on average. This has led to an ongoing average 1.5% reduction per annum *per unit of traffic* globally, but represents improvements in efficiency rather than sustainability *per se*. Air transport traffic continues to grow at 4.5% to 5.0% per annum globally. There is thus a very significant gap which needs to be plugged even before we talk about actually *reducing* emissions from air transport.

There is much hyped promise regarding biofuels for air transport. The feasibility of many feedstocks and pathways for “drop-in” fuel - using existing delivery channels and aircraft engines - is now well established. But costs are high and realistically available scale-up volume is limited, especially following full lifecycle assessment given the conflict many biofuels have with land for food crops and water usage. Beyond conventional biofuels, solar-to-liquid “drop-in” fuels are mooted as a truly sustainable solution for aviation; but development is at a very early stage and they would require immense solar arrays, for example an estimated 21km by 21km to serve the needs of Manchester airport in the UK.

As for other alternatives to fossil fuels, liquid natural gas has its own lifecycle costs and risks and, as with liquid hydrogen, would require major aircraft design changes. There is no radically improved air transport aircraft design beyond the drawing board even on the long-term horizon, in a manufacturing industry where the investments are massive and the timelines are measured in decades.

Currently introduced aircraft types (eg Airbus A350XWB and A380; Boeing B787; Bombardier CSeries; Mitsubishi MRJ) will help. A recent study by the universities of Sheffield, Cambridge and University College London (UCL) concludes that by 2050 a global fleet of composite structure airplanes could reduce aviation carbon emissions by between 14 and 15 per cent. But older aircraft types have long lifespans. A quantum leap forward (for example the long-mooted Blended Wing Body aircraft or an open rotor aeroplane) has yet to come.

Improved air traffic management and “Continuous Descent Approach” will also help. In sum, though, technology and operational developments will be significant

but they will still fall well short of countering anticipated traffic growth. The aviation industry's long-term target of reduction of net emissions by 50% by 2050 over 2005, and ICAO's aspirational goal of 2% reduction in net emissions per annum which would imply a reduction of 60% by 2050, are purely conjectural and have not been substantiated by any framework strategy or plan.

Thus the unbridled growth of aviation - absent some form of economic regulation - is now and for the foreseeable future definitively unsustainable from an environmental perspective. Even accepting that biofuels will provide some alleviative effect, the technical and operational developments are simply inadequate. There is thus a fundamental need for some kind of cap or market-based measure to apply to aircraft emissions pending real and vindicated reductions in absolute terms.

Mitigation approaches

Given the transborder and 'over high seas' features of international air transport, global co-ordinating responsibility to "pursue limitation or reduction of emissions of greenhouse gases" from aviation fuels was handed off by the UNFCCC to ICAO in 1997 through the Kyoto Protocol. For the aviation and shipping sectors – uniquely – emissions from international operations have not been included by the UNFCCC in national emissions inventories or targets.

The UNFCCC Conference of the Parties meeting (COP21) in Paris in December this year is expected to adopt a new legally-binding climate change agreement applicable to all 196 UNFCCC Parties to come into effect from 2020 and which may modify ICAO's existing mandate.

Preceding COP21, a UN Summit in New York in September will be aimed at updating and replacing the largely successful Millennium Development Goals set in 2000 with Sustainable Development Goals post-2015. This will undoubtedly influence both ICAO and the UNFCCC, notably on the crucial issue of Common But Differentiated Responsibilities and Respective Capabilities (CBDR). Over the years ICAO has reflected and even enhanced airline progress on the technical and operational front, including developments in sustainable aviation biofuels. At the

same time, it has recognised that these technical, operational and biofuel instruments, albeit providing a significant alleviating contribution, will be in sum inadequate to reduce aviation's emissions from current and projected levels. But the Organization has repeatedly failed to deliver on an emissions cap or any market-based measure, in essence pursuing improvements in efficiency rather than on sustainability *per se*.

There are two primary reasons for this. ICAO, with its theme of "unifying aviation", has a natural tendency to protect and promote the aviation sector. Secondly, the issue of CBDR has been particularly difficult pending agreement on a framework for application of the principle by the UNFCCC given the context of the equal application provisions of ICAO's founding Chicago Convention.

At the same time, ICAO's global mandate pending achievement has actually been used by some of its members to halt national or regional action on market-based measures, notably Europe's attempt to include intercontinental emissions in its flagship carbon trading scheme, the EU ETS. Meanwhile, ICAO continues to promote exemption from fuel tax for international flights, an indemnity still applied uniquely to this specific sector and almost universally.

So far, the best ICAO can do regarding MBMs, more than 17 years after being given its Kyoto mandate, is to follow industry and start, just last year, to consider a framework of carbon offsetting aimed at carbon-neutral growth of aviation from 2020. The Organization and some of its members, along with the aviation industry, are now devoting a great deal of resources to this critically misplaced objective. Aside from the necessity to *reduce* rather than to *neutralise* emissions, offsetting is a flawed instrument.

Offsetting is essentially an excuse by a polluter to continue to churn out emissions on the grounds that someone else will mitigate them. It also often lacks due diligence on effectiveness and it requires costly management and administration. Furthermore, the ICAO framework would include a range of exemptions and not be legally binding or by any means universally applied in practice.

Pending actual reductions in emissions, carbon offsets, despite their flaws, can assist to a limited extent in reducing climate change impact, provided they are of well-validated (gold standard) quality and preferably use the UN's Clean Development Mechanism. Given its Kyoto Protocol detachment, international aviation is not presently eligible for application of the CDM. Domestic emissions, being ascribed to national inventories, have been eligible since 1997. In February this year the CDM Executive Board did agree to development of a new emissions baseline and monitoring methodology which will expand the scope of application to aviation emissions projects, but international aviation remains ineligible.

While accepting the concept of offsets, ICAO is concerned at the use of international aviation as a potential source of mobilisation of revenue for climate finance to other sectors, and the current negotiating text for COP21 calls on ICAO to develop a levy scheme to provide financial support to the UNFCCC's climate Adaptation Fund – for which aviation may or may well not receive emissions credits. But ICAO seems to be missing the fundamental point that without real reductions in aviation emissions, albeit in the medium- to long-term, the air transport industry is simply not sustainable. It is not a tenable position for the industry – and by extension ICAO – to merely write out a cheque for carbon offsets to cover its excess emissions above the 2020 cap and then say “now leave us alone to keep on growing” and carry on emitting at a far faster rate than other sectors. Increasing emissions in one sector leads to a need for greater reductions in others; some of these, such as tourism and certain industries, are of course generators of air transport demand.

Somewhat surprisingly, ICAO continues to work in the aviation silo – and an opaque and secretive silo at that, with many meetings and documents being closed or restricted. Air transport makes a fundamental contribution to society, well beyond the sector's borders, and in this broader context can appear more sustainable. For example, air transport may be more beneficially set against the collectivity of travel and tourism. Take the island nation of Seychelles. Tourism is the principal economic sector, predominantly dependent on long-haul international air transport. Tourism has enhanced the establishment of nature parks and marine protection areas. Partly in consequence, the country claims to

be a *net absorber* of greenhouse gases, to balance against the emissions from travel to and from the country.

More generally, as mentioned above, air transport represents about 1% of global GDP directly, but 2% of human-generated carbon dioxide emissions. But emissions from travel and tourism, including air transport, are estimated to contribute about 5% in terms of global CO₂ emissions, about the same percentage as the sector's contribution to world GDP. At the same time, air transport represents 60% of the greenhouse gas emissions from international tourism worldwide on average and a much higher proportion for many long-haul destinations. Changing towels in the hotel bathroom less frequently, or even having a 100% renewable energy supply for the hotel, is simply not going to crack it. Paradoxically, ICAO's leitmotif for its environmental programme is "destination green" and not "travel green".

Current UNFCCC context

Some guidance as to the context in which aviation will be placed in the ongoing UNFCCC negotiations may be gleaned from the following conclusions of recent major UN conferences:

- "Priority should be accorded to the special needs of Africa, small island developing States, least developed countries and landlocked developing countries" (Rio+20, 2013);
- "Sustainable tourism represents an important driver of sustainable economic growth and decent job creation, [and] can have a positive impact ... on the fight against poverty and hunger" (UN General Assembly 2014);
and
- "Climate action should be undertaken within the context of efforts to eradicate extreme poverty and promote sustainable development" (UN Climate Change Summit 2014).

In the buildup process to COP21, UNFCCC is propounding a more globally inclusive approach to emissions mitigation commitments than through its founding

Convention of 1992 and Kyoto Protocol of 1997. Rather than having emissions reduction targets binding under international law solely for developed countries, as a basis for a new global agreement all States, both developed and developing, have been requested to specify “Intended Nationally Determined Contributions” (INDCs) well in advance of COP21. The INDCs will be reviewed and assessed in aggregate and possibly adjusted prior to endorsement by COP21.

Indications from major developed country emitters at present are: United States, 26-28% below 2005 emissions levels by 2025; EU states and Switzerland (already filed) at least 35% below 2005 by 2030 (EU 40% and Switzerland 50% below 1990 by 2030); and Canada, 17% below 2005 by 2020. Against this, the ICAO/industry objective for aviation – which is not subject to the ‘Determined Contribution’ process – of carbon-neutral growth from 2020 on current estimates would be well over 50% *above* 2005 levels, with even that figure dependent on carbon offsetting from 2020. The ICAO process does of course already cover all its 191 member states and, in accordance with the principle of CBDR, commitments by developing countries are expected to be lower or, for countries such as those cited in the bullet points above, not required. As the prime example, China has simply indicated that its CO₂ emissions will peak by 2030, although it will try for an earlier date.

Moving ahead

Clearly, international air transport deserves special consideration because of the socio-economic contribution it generates and because, unlike surface-based transport and other industries, it has no mainstream alternative source to fossil fuel imminently on tap. But there is a fundamental need for some robust form of cap or market-based measure beyond carbon offsetting to apply to aircraft emissions pending real and vindicated reductions in absolute terms.

One way forward would be for COP21 to revert to the inclusion of international aviation emissions into national emissions inventories and commitments. While the existing framework of separation of aviation from the generic process may at this stage prove too entrenched for this to happen this year – particularly as the aviation industry is naturally very close to the ICAO process and sees the current

ICAO path as a ‘get out of jail nearly free’ card – the approach is worth considering because of its several advantages.

Admittedly, the approach was rejected in 1997 and raises allocation issues, but these are by no means insuperable. For example, the emissions could be based on the “principal place of business” of each air carrier – a well established regulatory criterion in international aviation. If it is felt necessary to reflect the elemental root of the emissions, adjustments could be made to reflect the origins of the passengers and freight. Data for such an approach are well-established and largely available already.

Advantages of such an approach would include:

- a national imperative to balance out amongst various sources of emissions according to the situation of the State concerned, rather than attempting to do this for a single source at a disparate multinational level;
- application of the generic CBDR principles as agreed in Paris rather than a differentiated, complex and perhaps inconsistent application for aviation alone – indeed removing the perceived conflict between the uniform application provisions of the Chicago Convention and the UNFCCC principle of CBDR rather than having to get round it;
- each country taking into account in its emissions reductions the competitiveness of all its affected industries – including aviation at a generic company-wide level (as with the application of corporate taxes) – which would not only avoid conflict with Chicago provisions but would also avoid complex route-by-route competitive address;
- eligibility of international aviation emissions for the CDM; and
- homogenisation of domestic and international operations, which are difficult to separate in some cases.

The approach would also release ICAO from the MBM and CBDR aspects of its obligation, which take up a disproportionate amount of the Organization’s time and resources and for which it lacks both motivation and practical experience.

While clearly advantageous but accepting the above approach may not fly right now, as a 'Plan B' COP21 should at least set targets for reduction of emissions from aviation through ICAO, both in absolute terms and separately taking into account MBMs such as offsets or emissions trading. Indeed the current negotiating text for COP21 mentioned above includes wording that "Parties agree on the need for global sectoral emission reduction targets for international aviation". While this text may well be amended or replaced in the process for COP21, it does provide the important signal that international aviation should not be given an almost free pass as a consequence of its segregation from national emissions mitigation commitments.

In the first instance, the primary means of addressing the absolute emission reduction targets would be to apply a long overdue effective price on air transport's carbon to adjust demand and fund emissions mitigation. The atmosphere only understands one language and that is reduced emissions.

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