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Designing a Market-Based Measure for International Aviation Emissions

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- The aviation sector's greenhouse gas emissions are increasing. By 2020, international aviation emissions are projected to be around 70% higher than in 2005 globally, even if the International Civil Aviation Organisation (ICAO) achieves its goal for fuel efficiency to improve by 2% per year until 2020.
- ICAO is now working on defining a global market-based measure (MBM) to cut emissions, for adoption in 2016 and possible implementation from 2020. An MBM remains the only cost-effective option for airlines to make significant reductions to their emissions, until new technologies are taken up and biofuels become widely available.
- In defining the scheme, ICAO should include different segments of the aviation sector to garner industry support for the scheme at every stage, including low-cost and dedicated freight/cargo operators.
- The MBM needs to take into account the treatment of developing countries. Some of them will see major growth in international flights after 2020; others are dependent on aviation for economic growth, such as small island states reliant on tourism.
- The global mechanism can combine a cap-and-trade scheme and offsetting, with differential treatment of flights between industrialised countries, advanced developing countries and LDCs/SIDS/ developing countries highly dependent on aviation.
- Auctioning should be the primary mechanism for distribution in a possible cap-and-trade scheme – to ensure fairness, to provide a price signal and to create revenues for climate-related finance.
- The global MBM should be flexible enough to accommodate schemes in regions or countries that are more ambitious environmentally. It should include the whole flight, and not be limited to airspace or to the high seas and polar regions.

Designing a Market-Based Measure for International Aviation Emissions

Introduction

Aviation is a high-growth sector. By 2020, international aviation emissions are projected to be around 70% higher than in 2005 globally, even if the International Civil Aviation Organisation (ICAO) achieves its goal for fuel efficiency to improve by 2% per year until 2020. ICAO also aims to achieve CO_2-neutral growth from 2020, and eventually reducing emissions by a further 50%, against an ICAO projection for CO_2 emissions from aviation increasing by 400% by 2050[1].

There is a limit to the speed and extent to which new technologies and practices can cut greenhouse gas (GHG) emissions from aviation. The industry emissions reduction roadmap developed by the Air Transport Action Group (ATAG) shows that technical operations and infrastructure will only slow down the growth of emissions (Figure 1). ATAG envisages that 'economic measures' like emissions trading will be needed to achieve cost-effectively the goal of carbon-neutral growth from 2020 up to 2038, or at least such time as biofuels become widely available, and 'radical' technical solutions in engine configuration and airframe architecture have been taken up across a significant proportion of the global fleet.

Certain efficiency measures could be introduced sooner, but as the cost of fuel now represents an average 40% of operational costs for airlines, there is pressure to achieve fuel efficiency already. In fact, aircraft today are 70% more efficient than 40 years ago, and ICAO considers its target of 2% efficiency improvement per year to 2020 to be 'achievable'.[2] But that will not be enough to cut emissions from the sector.

Despite the projected growth in emissions from aviation, ICAO has not yet defined specific measures nor adopted a binding target. EU attempts at regulating international flights proved highly controversial and have been rolled back. Now ICAO is working on defining a global market-based measure to help achieve cuts in aviation emissions.

GHG emissions from flights and waterborne journeys within countries, i.e. domestic transport, are accounted for under the UN Framework Convention on Climate Change. International air and sea transport are treated separately as distinct sectors, because these have their own treaties that govern the treatment of operators by foreign authorities and the high seas[3]. In this regard, the EU bloc acts as a domestic market for the purposes of managing emissions from flights between its member states.

The developing-country issue is acute in the aviation sector. The Chicago Convention requires equal treatment of operators on a particular route, regardless of where the airlines are registered. This raises issues of the appropriate treatment of emissions from flights to/from developing countries.

The emissions forecast shown in Figure 2 is based on published flight schedules for scheduled airlines and major charter airlines. The data include all flights departing from an airport within the continents listed (thus including all intra-continental flights). The forecast excludes dedicated freight.

The forecast shows international aviation emissions rising for all regions, ranging from a small 3% increase in the mature market of North America to almost a doubling in the Middle East. Asia as a whole is forecast to increase by 70% on average, much of the growth coming from China and India. In terms of the share of the forecast growth, emissions from North America and Europe represent a 55% share of global aviation emissions in 2009, falling to 43% in 2020. Asia and Middle East are projected to increase their combined share of emissions from 32% to 42% over the same period.

EU ETS: Two Steps Forward, One Step Back

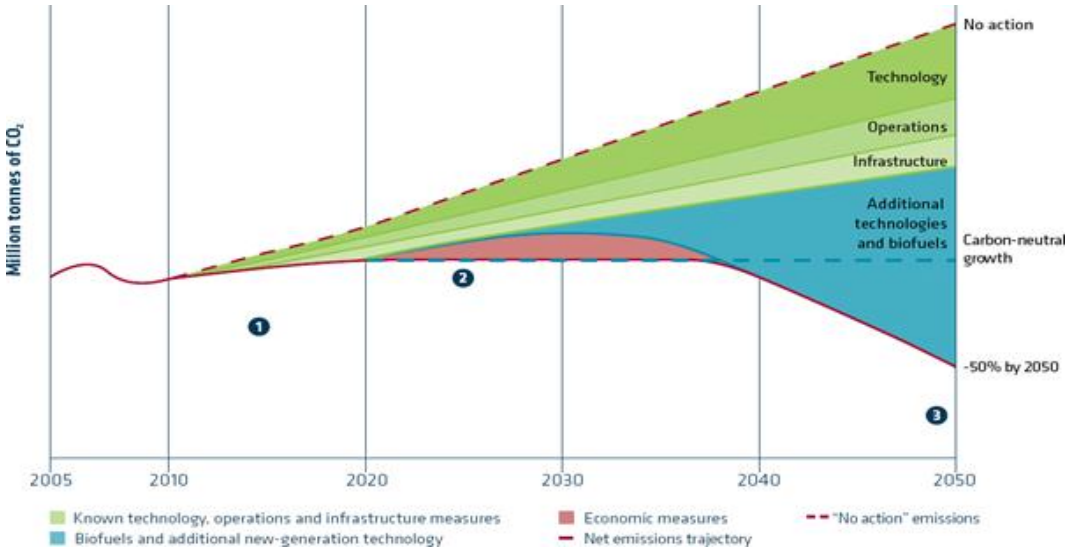
In the EU, GHG emissions from other industrial sectors stabilized over the 1990–2006 period. Overall, total emissions from all sectors were down 2% over the period. Emissions from transport within the EU rose by 25% over the same period, whereas emissions from international aviation increased by almost 100%, based on bunker fuel consumption.

[1] Group on International Aviatin and Climate Change (GIACC), Final Report.

[2] *Achieving Climate Change Goals for International Aviation*, ICAO, 2007.

[3] Article 2-2 of the Kyoto Protocol states: "The Parties included in Annex I shall pursue limitation or reduction of emissions of greenhouse gases not controlled by the Montreal Protocol from aviation and marine bunker fuels, working through the International Civil Aviation Organization and the International Maritime Organization, respectively."

***Figure 1**. ATAG roadmap for achieving 50% cut in emissions from aviation from 2020, by 2050.*



Note: (1) 2% annual efficiency gain, (2) carbon-neutral growth, (3) 50% cut on 2020-level emissions by 2050.
Source: Air Transport Action Group

The decision of the European Commission (EC) to propose in 2006 that aviation be included in the EU ETS was based on this picture of rising emissions, and on ICAO's perceived lack of progress on establishing a limit on aviation emissions with a market-based measure (MBM) for achieving it.

The aviation ETS Directive,[4] adopted in November 2008, imposed obligations on operators of flights that took off from, and/or landed in the European Economic Area (EEA). Operators' fuel burn for the whole of the flight within, to or from the EEA were to be monitored from 2012, from which the quantity of CO_2 emitted was to be calculated using a formula published in the EU Directive.

The Directive applies to flight sectors, irrespective of the country of registration of the operator of that flight. That led to protests from operators registered outside the EEA. At the international level, a group of non-EU Parties to the Chicago Convention teamed up to reject application of the ETS to their airlines, with the BRIC countries at the fore. In parallel, some of these countries *required* their airlines not to comply (China, India). China was reported to have threatened to halt procurement of Airbus-manufactured aircraft. There was also the threat of imposing retaliatory measures against EU-registered aircraft, such as over-flight rights and airport landing and take-off slots.

In the autumn of 2012, the EC proposed an amendment to the Directive that would reduce the scope of the EU ETS on aviation to apply solely to flights that both originate and end within the EEA, thereby excluding all intercontinental flights and hence most non-EU operators from the obligation to surrender allowances against their emissions for the year 2012. This was a temporary arrangement for that year only, referred to as the 'stop the clock' derogation. From 2013, the scope of the scheme reverted to full coverage, meaning that all airlines were required to submit verified emissions reports by the end of March 2014 and to surrender allowances by the end of April 2014.

This would allow the EU to take into account the results of the ICAO General Assembly held in September/October 2013, at which parties agreed to report back in 2016 with a proposal for a global MBM scheme that could be implemented by 2020.[5] As a result of this agreement, the EU adopted in April 2014 a regulation[6] to maintain the 'stop the clock' scope so that only intra-EEA flights were included until 2016.

ICAO will hold its next General Assembly in 2016, when it will consider agreeing on a market-based measure for international aviation. The EC will then take stock and consider proposing a further amendment to the EU ETS. If no amendment is adopted, the scheme is to revert to full scope in 2017, i.e. including all flights that take off or land in the EEA.

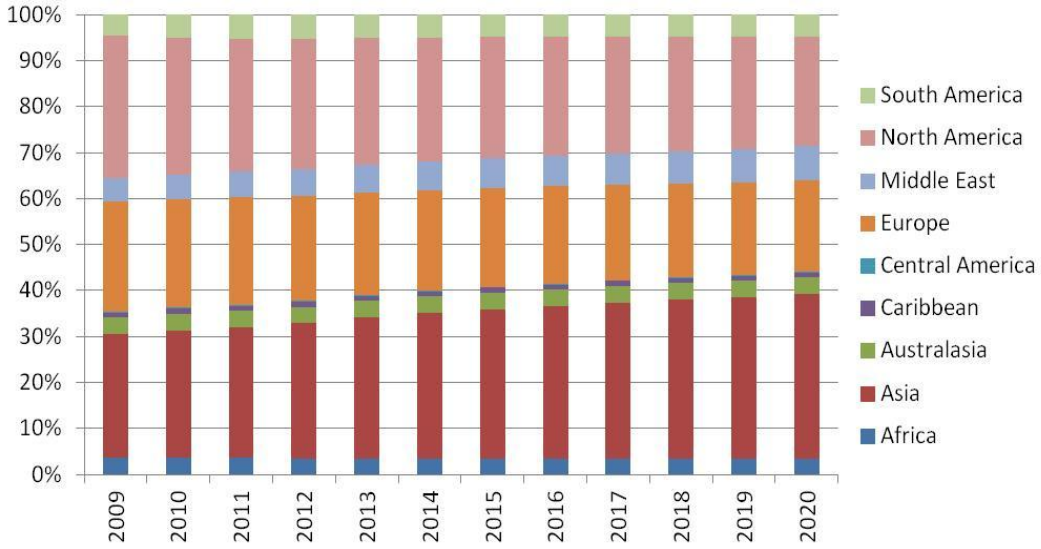
This opens the following scenarios:

- ICAO makes progress on an MBM to apply from 2020. If this is compatible with the EU ETS without amendment, the EU ETS reverts to full scope. If this is not compatible with the EU ETS, the EC may propose amending the ETS accordingly.

[4] Directive 2008/101/EC

[5] Assembly 38 Resolution 18 (A38-18)
[6] Regulation 421/2014, 16 April 2014

***Figure 2**. Forecast share of global emissions from aviation, by continent*



Source: Capstats / RDC Aviation

- ICAO does not make satisfactory progress. In that case, the EU will then have to decide whether the aviation ETS should revert to full scope in 2017, or extend the 'intra-EEA only' scope either for a fixed period or indefinitely.

In both scenarios, it is clear that the treatment of aviation under the EU ETS is set for further uncertainty from 2017 – not least as the regulation does not define 'satisfactory progress', or what a reasonable response to an MBM would be.

The main concern here is the environmental effectiveness of the scheme, given the retraction in scope. The scheme has gone from covering approximately 31% of global emissions from aviation in 2013, to an 8% share based on 2012 data. The share will shrink further with time as aviation in developing countries increases.

Now that the EU has retreated on its own legislation on the aviation ETS, it is hard to envisage the EU ETS reverting to full scope, unless there is a change at ICAO level such that a global MBM is adopted that can accommodate the EU ETS.

It is also clear that the EU ETS for aviation has become inextricably linked to the outcome of the ICAO assembly in 2016. In turn, ICAO is linked to the 2015 Conference of the Parties to the UNFCCC in Paris.

ICAO Scheme on the Drawing Board

In January 2012, the ICAO Council – which acts for the Assembly between assembly meetings – set up an Ad-Hoc Working Group (AWG) to proceed with work on MBMs. The AWG consisted of one member from each region plus industry, represented by the International Air Transport Association (IATA). The AWG defined six options for an MBM. The first two – a global departure levy, and a global carbon levy – were fiscal rather than market-based; they were dropped from the list during discussions. Two other options involved those levies combined with offsetting, and were also dropped.

The two remaining options involved mandatory global offsetting and a global cap-and-trade scheme. The AWG also agreed to the principles on which these options should be evaluated.

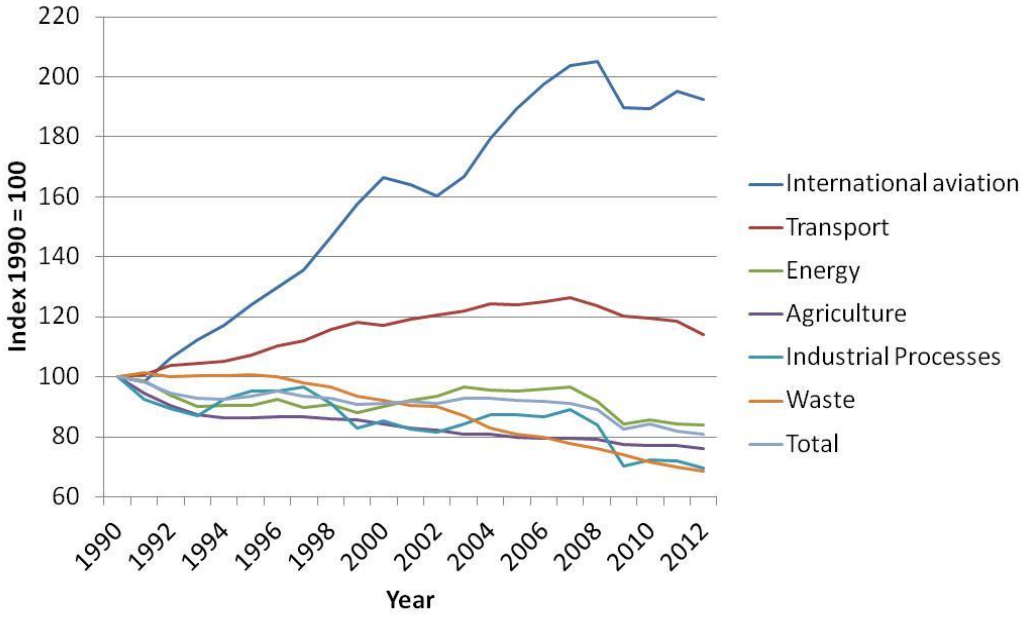
The global offsetting approach was expanded to include a new option that combines offsetting with a revenue-generating mechanism. This mechanism would raise funds through a transaction fee on the use of offsets. The funds would be used for efforts to reduce emissions from the sector further, and for 'assistance to States'.[7]

Aviation has already been identified in work conducted under the UNFCCC as a possible source of revenue for climate financing. In 2010, the UN High-Level Advisory Group on Climate Finance (AGF) examined possible revenues from the international maritime and aviation sectors. The AGF found that up to USD 6 billion could be raised from aviation by 2020, at a carbon price of USD 25/tCO_2, of which up to half could be used directly for climate finance.

The ICAO Council in December 2013 endorsed a proposal that originated with BRIC states to establish an Environmental Advisory Group made up of 17 Parties plus industry (the latter in the form of IATA). It has taken the option of the offsetting scheme and is working through a straw-man process to explore policy choices. The 'straw man' is for an offsetting scheme, possibly starting in 2020, which would make possible the target of emission-neutral growth

[7] ICAO Council Working Paper C-WP/13828

***Figure 3**. EU-27 GHG emissions by sector using 1990 levels as index*



Source: European Environment Agency
(www.eea.europa.eu/data-and-maps/daviz/change-of-co2-eq-emissions#tab-dashboard-01)

from 2020 for the sector. There would also be provisions for a *de minimis* threshold based on a percentage of global aviation emissions as well as a provision for rapid growth in aviation and for early-movers on mitigating emissions. The fact that this process originated with the BRIC states gives rise to cautious optimism that a solution may be forthcoming this time around.

There are a host of other questions which must be answered in the design of an offsetting scheme, including for example how growth in the sector should be taken into account. Operators experiencing rapid growth are often new entrants; they would be competitively disadvantaged compared to incumbent operators in a mature market. One proposal being discussed at the Environmental Advisory Group is to include growth in the sector as well as growth by the operator, so that a new entrant in a mature market would not be disadvantaged.

Another issue to be resolved is whether the point of regulation should be the country of departure, or the operator's country of registration.

Once the straw man for the offsetting-only option is complete, work can get underway on straw men for the 'offsetting plus revenue-generating mechanism' option and for the 'cap-and-trade' option.

Separately, ICAO's Committee on Aviation Environmental Protection (CAEP) has established a Global MBM Taskforce (GMTF) to proceed with technical work on the options. There are two sub-groups, one on monitoring, reporting and verification (MRV) and the other on the nature of emissions units. The GMTF is currently comparing existing MBMs, and will use that comparison to determine which elements are best for aviation. They are examining several national ETS (including Kazakhstan and New Zealand), as well as the sub-national voluntary scheme in Tokyo, Reduced Emissions from Deforestation and Degradation, etc.

These two work-streams have a deadline of the first half of 2016, so that the outcome can be presented by the ICAO Council to the Assembly in September/October 2016. ICAO also plans wider industry consultation in 2015 through the Global Aviation Dialogues.

The path to defining an MBM by consensus is technically feasible and involves known policy choices. However, political resistance from many Parties as regards adopting a global MBM for aviation remains a real barrier. Resolving the technical questions and making policy choices is not enough to override this high-level political resistance. ICAO has specified in various resolutions and decisions that the UNFCCC timetable should be taken into account. According to Resolution A38-18 of General Assembly 38, which calls for the work on defining an MBM by 2016, 'this Resolution does not set a precedent for or prejudge the outcome of negotiations under the UNFCCC and its Kyoto Protocol nor represent the position of the Parties to the UNFCCC and its Kyoto Protocol.'

The Resolution also provides for the differing capabilities of different countries, with their state of development to be taken into account,

thereby effectively ensuring that the principle of Common but Differentiated Responsibility (CBDR) is included in an ICAO MBM.

With the conclusion of a global MBM for aviation linked to general progress at the UNFCCC summit in 2015, it is clear that the outcome of the Paris summit will have a major influence on whether there can be a political breakthrough at ICAO in 2016. The EC is then to review the EU ETS for aviation in the light of progress at ICAO in 2016. Thus, both ICAO's work on a global MBM and the EU ETS for aviation will be affected by the outcome at Paris.

Whether a firm outcome of the Paris summit, one which could establish a global framework for emissions reductions from 2020, would be enough to open the way for a global MBM for aviation is an important consideration. Certainly, failure of the 2015 Paris summit to achieve its mandate would hamper a clear and consensual decision at ICAO on such an MBM.

Recommendations for ICAO

The current ICAO process should establish support for adopting an MBM as the correct instrument for achieving its goals on emissions. Economic measures should allow aviation to pay other sectors to reduce emissions at lower cost until other alternatives for aviation are available.

Secondly, a key issue in the policy decisions for any aviation-specific MBM is the treatment of developing countries. The concept behind CBDR, that industrialized countries should take the lead in emissions reductions, has been reflected for aviation by ICAO. By working through how to deal with flights to and from developing countries, to the satisfaction of Parties at the ICAO negotiating table, trust may be built that can then be transferred to the UNFCCC negotiations in Paris.

Moreover, support from the Group of 77 developing countries would be a contributing factor for ICAO to establish an MBM in 2016, to apply from 2020.

In view of the resistance from many industrialized countries to the EU ETS being made applicable to 'their' airlines, the EAG has taken the practical approach of starting by examining a 'straw man' offsetting scheme, which can be extended to the 'offsetting with revenue mechanism' and the ETS options. The EAG should consider applying differential treatment to categories of routes, based on economic development or maturity of the particular flight sector, to help resolve the issue of CBDR in international aviation. A further adjustment will be needed for parties whose economies are reliant on international aviation. It is important to avoid a situation where developing countries demand soft targets and industrialized countries demand equal treatment, resulting in an environmentally ineffective global scheme.

Another aspect is the minimal threshold currently under consideration by ICAO. A starting point would be to exclude parties who represent less than 1% of international aviation in terms of CO_2 emissions.[8] While an approach based on this threshold is workable and would allow for countries to 'upgrade' when they grow beyond threshold, it is not sufficient to account for the specific circumstances of individual countries; nor does it distinguish cleanly between developed and developing countries, with smaller, industrialized Parties dropping below the eligibility threshold whereas larger, developing Parties would be eligible.

The global MBM should also consider the changing contours of international aviation, to take account of the growing share of emissions from flights in Asia and the Middle East. With Asia, particularly China and India, undergoing a surge in growth in international aviation, which in turn forms part of their economic development, an MBM must have the support of the ICAO Parties in those regions, and its coverage should capture that growth without the need for further decision-making.

It must also take account of the dependence of some nations on aviation – one example being the Maldives, where tourism stands for 18% of GDP and 60% of foreign exchange receipts.

Thirdly, a revenue-raising mechanism has the potential to develop a fund that may be invested in research, design and deployment in technologies to mitigate emissions from aviation. However, imposing an ambitious target that creates real demand for carbon credits, whether allowances or offsets, would do more to boost the flow of climate financing than a weak target with a separate revenue-raising mechanism. Establishing a suitable target for aviation that is in line with global 2050 targets must be the starting point for regulating GHGs from aviation.

Fourthly, a global MBM should be designed to be compatible with regional or national ETS that cover aviation, such as the EU ETS, while ensuring that it avoids double regulation at points of departure and arrival. Given the possibility of differing ETS or other carbon constraints on aviation in different regions or countries, with differing levels of environmental ambition, the ICAO MBM should be flexible, or should explicitly allow Parties to implement different systems for domestic or intra-regional flights. Applying a global mandatory offsetting scheme at the point of departure, unless there is an existing national or regional ETS already covering departures only,

[8] Para. 16, Resolution 18, 38th General Assembly of ICAO (2013)

would be an example of this. Those flights covered by a regional ETS would be excluded from the global scheme, to avoid duplication. In the case of the EU ETS, this would require an amendment to the relevant Directive.

Likewise, the global MBM should be compatible with the potential outcomes of the Paris summit. The question of which offsets may be used should be left flexible at this stage, to avoid drawing up any positive or negative list prior to the Paris COP in 2015. The critical aspect of any offsetting mechanism must be the environmental integrity of the offsets produced.[9] They should also be internationally recognized, e.g. as UN-regulated offsets.

Lessons from the EU ETS Applicable to a Global MBM

Viewing the existing EU ETS as a case study, we may note some important lessons to inform the process of designing a global MBM for aviation. Today's EU ETS provides a functional monitoring, reporting and verification system which calculates CO_2 emissions from the measurement of fuel burn. This provides a reasonably simple and accurate basis for a common set of MRV standards to be elaborated by the ICAO working group.

The EU ETS has raised the minimal threshold for airline operators, just as it has in the stationary sectors in the ETS. It has also simplified the administrative process for reporting emissions for small operators. This affects a large number of small emitters covered by the aviation ETS, helping operators to avoid a heavy regulatory burden with limited environmental gains. This is a point to consider at international level, where a minimal threshold for ICAO Parties should be elaborated to include a threshold based on CO_2 emissions for operators, possibly staggered so that very small emitters would be exempted and small emitters would have a simple compliance procedure.

A cap-and-trade scheme requires a distribution method for tradable allowances. For the allocation of allowances the EU ETS uses a complicated grandfathering system, based on revenue-tonne-kilometres as a proxy for measuring market share. If ICAO were to implement an international ETS, it would be far simpler and more equitable to distribute allowances by auctioning, thereby providing a price signal and a revenue stream that could contribute to climate financing.

This should take into account the developing country issue: in the case of an ETS, varying target stringency according to whether flights are to and/or from industrialised countries, rapidly developing countries or other developing countries. Targets should also take into consideration the role that the aviation sector plays in a country's economy, as with tourism in small island states.

Finally, if the period up to 2015 is to be devoted to winning acceptance for, as well as examining design aspects of, a global aviation MBM, policymakers will need to engage various sectors of industry. Currently, only IATA is a participant in the Environmental Advisory Group, giving great influence to an association that represents the largest airlines, to the exclusion of many new, fast-growing airlines. Also the regional airlines and dedicated cargo and low-cost sectors should be consulted at this stage of the ICAO process, before and during the wider consultations planned to start from 2015.

About the authors

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[9] *Increasing Demand and Reducing Supply – A Rescue for the CDM?* Martin Stadelmann, Ken Newcombe and Axel Michaelowa. FNI Climate Policy Perspectives, 11 June 2013.

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