HOW CAN AIR TRAVEL CONTRIBUTE TO THE COSTS OF ADAPTING TO CLIMATE CHANGE?

The feasibility of the International Air Passenger Adaptation Levy (IAPAL) as a market governance mechanism

Antonia Custance Baker – 2011

iied

SHAPING SUSTAINABLE MARKETS

First published by International Institute for Environment and Development (UK) in 2011

ISBN: 978-1-84369-790-9

For further information please contact: International Institute for Environment and Development (IIED), 3 Endsleigh Street, London WC1H 0DD, United Kingdom. newbooks@iied.org, www.iied.org/pubs

Citation: Baker, A. (2011) How can air travel contribute to the costs of adapting to climate change? The feasibility of the International Air Passenger Adaptation Levy (IAPAL) as a market governance mechanism. International Institute for Environment and Development. London.

Photos
p12 Climate Change Group at IIED
p22 Jess Ayers at IIED
p27 OneWorld UK

Designed by
SteersMcGillanEves
01225 465546

Printed by
Printed by Park Communications, UK.
FSC certified.

Edited by
Nina Behrman

Series editor
Emma Blackmore

Please recycle

Shaping Sustainable Markets is the new flagship research project for the Sustainable Markets Group at IIED.

Can markets be 'governed' to better benefit people and planet? This project explores the individual and combined impact of market governance mechanisms on sustainable development to find out what works, where and why. Some of these mechanisms are well established. Others are innovative ideas yet to be tested in the real world.

We want to improve and broaden understanding of how market governance mechanisms can be designed and used to secure livelihoods and protect environments. Find out more about our work at http://shapingsustainablemarkets.iied.org

We welcome your comments on this publication or other aspects of Shaping Sustainable Markets. Please contact series editor, emma.blackmore@iied.org

Disclaimer: This paper represents the view of the author and not necessarily of IIED.

Acknowledgements
The author would like to thank Emma Blackmore, Muyeye Chambwera, Sabine Minniger and Tom Birch for their review of this paper and their many contributions and insights.

IIED is grateful for the support from its Joint Framework donors DFID, DGIS, Danida, SIDA, NORAD and Irish Aid.

About the author
Antonia Custance Baker studied Economics at Cambridge followed by an MSc in Political Economy of Development at the School of Oriental and African Studies. Antonia spent two years in Namibia as part of the Overseas Development Institution Fellowship working for the Department of Environment and Tourism and the Namibian Nature Foundation. Antonia can be contacted on antoniacustancebaker@gmail.com

ACRONYMS AND ABBREVIATIONS

ABTA	Association of British Travel Agents
APD	Air Passenger Duty (UK)
CDM	Clean Development Mechanism
CEC	Commission of the European Communities
CO_2	Carbon dioxide
COP	Conference of Parties
EACC	Economics of Adaptation to Climate Change (World Bank)
EU ETS	European Union Emission Trading Scheme (EU)
GEF	Global Environmental Facility
GHG	Greenhouse Gas
GIACC	Group on International Aviation and Climate Change
IAPAL	International Air Passenger Adaptation Levy
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
IMO	International Maritime Organisation
IPCC	Intergovernmental Panel on Climate Change
IATAL	International Air Travel Adaptation Levy
LDC	Least Developed Country
MGM	Market Governance Mechanism
NAPA	National Adaptation Programmes of Action
NEF	New Economics Foundation
NGO	Nongovernmental Organisation
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNTWO	United Nations World Tourism Organization
WEF	World Economic Forum
WMO	World Meteorological Organization
WTTC	World Travel & Tourism Council

HOW CAN AIR TRAVEL CONTRIBUTE TO THE COSTS OF ADAPTING TO CLIMATE CHANGE?

The feasibility of the International Air Passenger Adaptation Levy (IAPAL) as a market governance mechanism

Antonia Custance Baker – 2011

SUMMARY

By 2050, the costs of adapting to climate change in developing countries could reach US$100 billion per year, according to estimates from UNDP and the World Bank. Despite international pledges of financial support to developing countries for adaptation (and mitigation), it is unclear where this funding will come from. New and additional sources of funding for adaptation are desperately needed.

The International Air Passenger Adaptation Levy (IAPAL) is a proposed new purchase tax on air tickets, the proceeds of which would be dedicated to investment in adaptation to climate change. IAPAL would not mitigate the effects of climate change because it does not aim to reduce flight numbers and therefore aviation's contribution to climate change. IAPAL could immediately raise up to US$10 billion annually for adaptation, and considerably more in the longer term.

Aviation is a sector with a relatively low price-elasticity of demand, meaning that price increases do not greatly reduce the demand for most flights. This makes taxation an unsuitable method of reducing demand but indicates that it could be suitable for raising revenue. It also suggests that it could raise a considerable amount of revenue. This paper revisits the key assumptions made in the original paper proposing this scheme (by Müller and Hepburn in 2006), while also offering fresh thinking.

This paper analyses current international agreements, to determine the feasibility of introducing IAPAL. The International Civil Aviation Organization (ICAO) is the UN agency with global responsibility for establishing standards, recommended practices and guidance on various aspects of international aviation, including environmental protection. Despite ICAO's current focus on the mitigation aspects of aviation, the evidence suggests no likely contradiction in including a levy for adaptation purposes. This is providing that the purpose of IAPAL – adaptation rather than mitigation – is clear and that IAPAL is not introduced at the expense of an effective mitigation policy.

The application of the European Union Emissions Trading Scheme (EU ETS) does not preclude the use of revenue-raising instruments such as IAPAL. Air Passenger Duty (APD) continues to be implemented in the UK, for example, as does the International Solidarity Levy in France. Using the UK as a case study, this paper explores the possible administration of IAPAL, and possible methods of revenue collection. The APD demonstrates how a simple, single levy can produce high revenues with very low administration costs. It also demonstrates a political obstacle that IAPAL may face – governments prefer taxes paid within their countries to be returned as national revenue rather than to an international fund.

For the IAPAL scheme to be feasible, it must be accepted by several stakeholder groups with considerable influence and lobbying power at both national and international levels. The major opposition to IAPAL is likely to come from the aviation industry, particularly as there may be some reduction in demand for flights. Budget airlines supplying short-haul leisure flights are likely to be most affected and most resistant to the implementation of IAPAL.

The potential benefits of IAPAL for countries reliant on tourism are likely to outweigh the costs of slightly reduced tourist numbers. However, tourism should be borne in mind when setting an appropriate price level for IAPAL. NGO and environmental lobby groups may criticise IAPAL for not focusing on mitigation efforts, and because the levy is applied per passenger rather than by emissions – which means it does not focus on cleaner technologies and fuller planes. However, recognition of the need for adaptation funding is growing among this stakeholder group.

The general public in developed countries shows more explicit support for mitigation than for adaptation. Nevertheless, the public also seems willing to set aside revenue for other purposes, and appears to be willing to pay higher ticket prices. More research is needed to understand the opinions of developing-country stakeholders regarding IAPAL.

IAPAL is fair because it charges those who are able to pay, and who contribute to climate change through air travel. The evidence overall shows that the benefits of IAPAL undoubtedly outweigh the costs. Although IAPAL has not been high on the political agenda at national or international negotiation levels, strong support is likely if the idea is reintroduced. This paper suggests that IAPAL is a mechanism that is technically relatively straightforward to implement, and could be implemented quickly. IAPAL, deserves urgent support as a tool to raise revenue for adaptation.

IAPAL COULD RAISE UP TO US$10 BILLION ANNUALLY FOR ADAPTATION, AND CONSIDERABLY MORE IN THE LONGER TERM

FOREWORD

Globalisation's expanding frontier has seen markets become the overriding mechanism for facilitating the exchange of goods and services, with increasing implications for public goods. The contribution of markets to sustainable development remains uncertain because of market failure, because benefits and losses accrue to different players differently, and because sustainable development objectives have not yet become integral to market governance. For instance, increased demand for biofuels may lead to increased incomes for some people, but may also affect the price and availability of food for others as land is reallocated from food production to cash crops.

Increasingly, however, to deliver specific sustainable development goals, such as safe use of natural resources or disposal of waste, market governance mechanisms are being developed and applied. IIED defines a market governance mechanism (MGM) as a set of formal or informal rules that has been consciously designed to change behaviour (of individuals, businesses, organisations or governments) in order to improve the sustainable development outcomes of markets (Blackmore, 2011). There is a variety of market governance mechanisms, including:

- economic – where behaviour is primarily affected by changing price incentives
- regulatory – where certain behaviours are required or prohibited under law
- cooperative – where changes to behaviour are voluntarily entered into
- informational – where the provision of certain types of information aims to alter the behaviour of market participants, particularly consumers and investors, but also producers (Blackmore, 2011).

For example, the emission of greenhouse gases (GHGs) could be addressed through at least six MGMs: carbon trading, taxes on carbon, a carbon levy, carbon labelling to encourage consumers to buy less carbon-intensive products, legislation concerning limits on the emission of GHGs by particular industries, or subsidies to promote renewable energy development.

The critical question is whether, and to what extent, such MGMs can shape markets to support rather than undermine sustainable development outcomes. Each mechanism will operate in a different way, will face a different series of trade-offs between sustainable development objectives, and will have different overall effects. Mechanisms will differ in their efficiency, effectiveness, equity and transparency. In addition, MGMs will also need to work within specific economic, social and political contexts and alongside particular pre-existing mechanisms. Some MGMs may be better suited to some contexts than others. There may be significant external barriers that make the implementation of an otherwise ideal mechanism extremely difficult. Successful implementation of a mechanism is likely to involve trial and error and its future adaptation to changing circumstances. Hence the need for research on how established MGMs have worked in practice.

IAPAL IS TECHNICALLY RELATIVELY STRAIGHTFORWARD TO IMPLEMENT AND COULD BE IMPLEMENTED QUICKLY

MGMs for sustainable development are evolving quickly, aiming to address gaps and opportunities. One such opportunity is to encourage major sectors to contribute to the huge costs of adapting to climate change. This paper analyses a specific proposal for raising funds for adapting to climate change through a levy on international air travellers – the International Air Passenger Adaptation Levy (IAPAL). In essence: air travellers, while contributing to international aviation emissions, also have the 'capability' to pay the levy; IAPAL then allocates the revenues to the the communities affected by climate change, who have least contributed to the problem and have limited resources to respond and adapt.

IAPAL aims to implement the principle of 'common but differentiated responsibility', adhered to by the United Nations Framework Convention on Climate Change (UNFCCC, 2011a) – ensuring that those who pay the costs for adaptation are those who have contributed most to climate change, rather than those who have contributed least. Nonetheless, the practical challenges of balancing the needs and wants of of these highly diverse stakeholders – air travellers, the victims of climate change, and the aviation industry – in a way that supports rather than undermines sustainable development is inherently difficult. Any impact on aviation, no matter how small, has ramifications for the livelihoods of people employed in various sectors (tourism and aviation, for example) and for the health of certain businesses and national economies. This paper therefore analyses IAPAL as an MGM from the point of view of multiple stakeholder interests and concerns. Multi-stakeholder consensus and buy-in is vital to make IAPAL a success and avoid any unintended consequences.

IAPAL belongs to the economic category of MGMs, but it will operate in an environment in which other market governance mechanisms are also exerting their influence. It will be important to improve coherence and complementarity between mechanisms, and seek to avoid adverse interactions – notably between those that seek to address mitigation and those that aim at adaptation: IAPAL depends upon passengers flying, but mitigation mechanisms will seek to reduce the level of flying.

This paper suggests that IAPAL is a mechanism that is technically relatively straightforward to implement and one that could be implemented quickly. Even as an interim solution to adaptation funding needs, IAPAL could prove highly valuable, as the level of funding being made available through other sources is woefully inadequate for the massive and urgent task of adaptation.

Emma Blackmore, Series Editor
Shaping Sustainable Markets, IIED

INTRODUCTION

Aviation has been the focus of much environmental debate, and currently contributes 3.5 per cent of total anthropogenic emissions of carbon dioxide (CO_2) (or 4.9 per cent when air-induced cloudiness[1] is included) (Lee *et al.*, 2009). This exceeds the total CO_2 emissions of France or Australia. Aviation is one of the highest growth sectors, and global emissions of CO_2 from air transport grew by 96 per cent between 1999 and 2005, reaching an estimated 673 million tonnes in 2007. The Intergovernmental Panel on Climate Change (IPCC) has estimated that CO_2 emissions from the aviation sector will be 1.6 to 10 times greater in 2050 than they were in 1992 (IPCC,1999).

During the 2008 United Nations Framework Convention on Climate Change (UNFCCC) Conference of Parties, the Maldives, on behalf of the Group of Least Developed Countries (LDCs), put forward a proposal to raise funding for financing adaptation to climate change through an International Air Passenger Adaptation Levy (IAPAL). The levy would be charged on every individual international passenger, and collected at the point of ticket sale. The proposal conforms with the idea of common but differentiated responsibilities, and capabilities at individual rather than at country level. This is based on the thinking that individuals who chose to fly internationally both contribute to climate change and are capable of paying the costs of it.

If applied to all members of the International Transport Association, IAPAL would cover 93 per cent of international scheduled air traffic. The exact amount of the levy has not yet been specified, but could be based on the French solidarity levy introduced to raise money to combat HIV/AIDS. This levy currently stands at US$6 (€4) per economy trip, and US$62 (€40) per business- or first-class trip (Müller, 2008). The proposed IAPAL revenues could be used for new and additional funding for the UNFCCC's Adaptation Fund (UNFCCC, 2011b).[2] The Board of the Adaptation Fund would coordinate operation of the collection mechanism, in consultation with the relevant international aviation bodies. The possible near-term revenue from IAPAL is estimated to be approximately US$8–10 billion per year (Müller, 2008).

It is clear that new sources of funding for adaptation are desperately needed. Current pledged funding would be enough to cover only up to 1 per cent of required resources for adaptation, according to higher estimates of those resources, and only around 10 per cent even at lower estimates. Nevertheless, there are several issues to consider in introducing a new levy within international agreements. The present negotiations seem to focus more on mitigation than adaptation, and concentrate on the benefits of a cap-and-trade[3] system in supporting mitigation aims. In Europe for example, the European Union's Emissions Trading System (EU ETS)[4] represents the formal adoption of trading in aviation emissions (DECC, 2011a). Nevertheless, a clear distinction between mitigation and adaptation needs and objectives is necessary. Even if mitigation needs are satisfied in the long term, short-term needs for adaptation will continue to be significant. This drives the need for new and additional sources of funding for adaptation, irrespective of mitigation achievements.

Aviation emissions are increasing rapidly and are likely to continue to do so without major policy changes. Much of the campaigning focus of nongovernmental organisations (NGOs) on aviation, as a potential key contributor to climate change, has focused on finding methods to reduce flights and resulting greenhouse gas emissions. However, the aviation industry has campaigned to let flight numbers continue to grow, while reducing per-flight emissions – which it refers to as 'sustainable growth'.

There are several policies that could reduce aviation's contribution to climate change. These include:

- a levy on plane tickets (to increase the price, and potentially reduce demand)
- taxing fuel (to increase the price, and potentially reduce demand)
- a cap-and-trade scheme, aiming to limit emissions (and which would therefore effectively raise the cost of flights).

To date, a cap-and-trade scheme has had greater support for mitigation purposes, as a levy may prove to be ineffective at reducing global demand, which is projected to continue to rise as a result of increasing incomes and the development of more globalised business and leisure. A fuel tax would also be a more effective mitigation measure, compared to a passenger levy, as it pushes airlines to adopt increased fuel efficiency.

IAPAL is not a mitigation measure, because its primary aim is not to reduce greenhouse gases. It is designed as an instrument to raise revenue from aviation globally for adaptation to climate change in the poorest and most vulnerable countries. Any mitigation effect of IAPAL – through the reduction of emissions – is a by-product rather than the objective. Indeed, the inelastic[5] nature of demand for flights indicates that a levy would be relatively ineffective as a mitigation tool. However, this same inelasticity makes levies on flights better suited to revenue-raising, which could serve adaptation funding needs. Hence the IAPAL idea, which was originally proposed in 2006 as an International Air Travel Adaptation Levy (IATAL) by Benito Müller and Cameron Hepburn (2006), who concluded that a revenue-raising levy on aviation was the most efficient short- to mid-term way to address the impacts of climate change attributed to aviation.

Section 1 of this paper provides updates of the key assumptions of the original Müller and Hepburn study. Section 2 first summarises the current 'state of play' in international agreements within relevant international processes and institutions. This is to determine the feasibility of introducing IAPAL as a legally binding international agreement in the short-to-medium term, within the context of current negotiation processes. Section 2 then presents an up-to-date case study of the EU Emission Trading System, both as an example of a cap-and-trade scheme, and also to test the feasibility of adding IAPAL on top of the currently accepted European agreements. In addition, the section explores the case study of the UK's aviation system in preparing for a cap on flights as well as a per-person levy in the form of an Air Passenger Duty (APD) – a similar levy to IAPAL that offers important lessons regarding its feasibility.

Section 3 discusses the viewpoints of various stakeholders: airline companies, tourist enterprises, environmental NGOs and lobby groups, and the general public in developed countries. This section aims to examine the political feasibility of, and potential obstacles to, the acceptance and adoption of a new form of taxation at both national and international levels. This is relevant because these groups will have an input into negotiations, and their approval may be necessary for IAPAL's political viability.

IT IS CLEAR THAT NEW SOURCES OF FUNDING FOR ADAPTATION ARE DESPERATELY NEEDED

ONE.
KEY ASSUMPTIONS

The key assumptions of the Müller and Hepburn (2006) proposals for an International Air Travel Adaptation Levy (2006) are as follows:

- The expected cost of adaptation exceeds the pledged sources of funding available – therefore new sources of funding are required.
- The global demand for flights is not significantly affected by small price increases and therefore an additional tax would not dramatically reduce demand. This would therefore avoid reducing the amount of revenue available and would not have a serious negative impact on the industry.
- The revenue raised would be high enough to make a significant contribution to global adaptation funds.

In this section, we examine each of these assumptions in turn to see if they, and therefore the arguments in favour of the IAPAL initiative, still hold true. This will help to inform the feasibility of IAPAL.

EXPECTED COSTS OF ADAPTATION

From the outset, the Kyoto Protocol explained that all parties were to 'formulate, implement, publish and regularly update national and, where appropriate, regional programmes containing measures to mitigate climate change and measures to facilitate adequate adaptation to climate change' (UNFCCC, 1992). Adaptation according to the IPCC refers to the 'adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities' (Müller and Hepburn, 2006), and should be seen as one of the tools that reduce the potential severity of the impacts of climate change.

Estimating the total amount of revenue needed to fund adaptation is a difficult task. The amount depends on expected trends of temperature increases, population growth and whether 'top-down' or 'bottom-up' modelling systems are used. The annual amount needed will also vary between the short term, say to 2015, and the medium term, say between 2030 and 2050. The World Bank estimates are created using 'top-down' modelling, based on estimates of the annual investment needed in developing countries, which provides the very broad estimated range of US$9–41 billion annually. These figures are used in the original Müller and Hepburn (2006) paper, along with their own estimates of adaptation costs based on extrapolations of the submitted National Adaptation Programmes of Action (NAPAs), giving estimates of US$5.4–9.2 billion (Müller and Hepburn, 2006).

The Stern Review gives a similar, but slightly more optimistic range of US$4–37billion (Stern, 2007). The United Nations Development Programme (UNDP) follows the same method as the World Bank but adds estimates taken from aggregating the expected costs from individual countries' NAPAs (41 of which have been submitted as part of the 2009 Copenhagen Accord). These programmes of action are to identify urgent and immediate adaptation actions needed in each country and to provide a priority list of adaptation projects. Including these estimates, total adaptation and expected NGO projects (that serve adaptation) increases total adaptation costs to US$83–105 billion a year[6] (World Bank, 2010).

Taking a longer-term view, the United Nations Framework Convention on Climate Change (UNFCCC) uses a sectoral approach to calculate the aggregate cost of adapting to climate change in agriculture, forestry, water, health, coastal protection, and infrastructure, giving a single-year snapshot estimate for 2030 of US$28–$67 billion (UNFCCC, 2007).

The World Bank's Economics of Adaptation to Climate Change (EACC) Study (World Bank, 2007) takes the average annual adaptation costs from 2010 to 2050 and also includes impacts on health, ecosystem services, and the effects of extreme weather events, increasing the estimate to a substantial US$75–100 billion.

TABLE 1.1 ESTIMATED ANNUAL ADAPTATION FUNDING NEEDED IN DEVELOPING COUNTRIES (US$ BILLION)

SOURCE	2010–15	2030	INCLUDED MEASURES
SHORT TERM			
World Bank	9–41		Cost of climate-proofing development assistance, foreign and domestic investment
Stern Review	4–37		Cost of climate-proofing development assistance, foreign and domestic investment
United Nations Development Programme	83–105		Same as World Bank, plus cost of National Adaptation Plans of Action and NGO projects
MEDIUM TERM			
United Nations Framework Convention on Climate Change (UNFCCC)		28–67	Cost in agriculture, forestry, water, health, coastal protection, and infrastructure
Project Catalyst		15–37	Cost for capacity building, research, disaster management and the UNFCCC sectors (most vulnerable countries and public sector only)
World Bank (EACC)		75–100	Average annual adaptation costs from 2010 to 2050 in the agriculture, forestry, fisheries, infrastructure, water resource management, and coastal zone sectors, including impacts on health, ecosystem services, and the effects of extreme weather events.

Source: World Bank, 2010

ONE.
KEY ASSUMPTIONS CONTINUED

In summary therefore, as shown in Table 1.1, the more recent studies of predictions of adaptation costs give higher estimates of the costs of adaptation than the US$9.2 billion estimated by Müller and Hepburn (2006). In the case of the most recent World Bank study, the estimate of the annual cost of adaptation is over 10 times higher than Hepburn and Müller's, at up to US$100 billion. It is clear, therefore, that sources of funding for adaptation are urgently needed.

EXPECTED SOURCES OF ADAPTATION FUNDING

As part of the principle of common but differentiated responsibility of current international agreements, developing countries cannot be asked to be responsible for the full scale of the adaptation costs they face, and do not have the financial means to respond adequately. Developing countries will largely be dependent on financial inflows from developed countries who can afford to offer funding and have a much greater historical responsibility for human-made emissions and thus the costly impacts of climate change. Müller and Hepburn use Huq's (2006) estimates for current multilateral funds of US$179.8 million, of which only US$95.8 million was pledged, with a further US$160–950 million estimated by the UNFCCC as hoped-for receipts from the 2 per cent private-sector levy on Clean Development Mechanism (CDM) projects.

Following the international agreements of the Bali Action Plan and the Copenhagen Accord, however, funding for adaptation has begun to show some positive increases. The main source of adaptation funding is international donors, channelled either through bilateral agencies or through multilateral institutions like the Global Environment Facility (GEF) and the World Bank (World Bank, 2010). But, this is still only a small fraction of what is needed.

The Adaptation Fund was established in December 2007 as an additional funding mechanism with its own independent source of finance, based on the 2 per cent levy on CDM projects. More recent estimates describe this as having the potential to raise between US$300 million and US$600 million a year, depending on the carbon price. According to a World Bank (2007) study excluding private finance, US$2.2–2.5 billion is projected to be raised to 2012 (depending on the success of CDM and the Adaptation Fund) but less than US$1 billion is currently available. This means that, despite the improvements in political goodwill and growing recognition of the threat of climate change and the need for urgent action, current funding is less than 1 per cent[7] of what might be needed (World Bank, 2010).

The Copenhagen Accord proposal for a climate fund was formalised at COP16 in Cancun through the creation of the Climate Green Fund. This is a pledge by member states to offer US$30 billion a year in financial support to poor countries, with balanced allocation between mitigation and adaptation, growing to US$100 billion a year to 2020. However, it is unclear where the funding will come from to meet this pledge. As the estimates for pledged adaptation funding have not improved in terms of closing the funding gap (Table 1.2), there is clearly still a need both to scale up existing efforts and to diversify funding sources.

Possible measures to increase funding sources include:

- harnessing new sources of revenue to support adaptation and mitigation by national governments, international organisations and dedicated financing mechanism like the Adaptation Fund or bunker finance (EED and Germanwatch, 2010)
- increasing the efficiency of carbon markets by reforming the CDM as a key vehicle to promote private mitigation funding
- expanding performance-based incentives to land use, land-use change and forestry, to change the balance between private and public funding in this important area
- leveraging private-sector funding for adaptation (World Bank, 2007).

POTENTIAL REVENUE FROM IAPAL

The IAPAL levy is one possible measure for raising revenue for adaptation and is reported to have the potential to raise up to US$10 billion annually. This is estimated using the French Solidarity Levy for HIV/AIDS as a starting point: US$6 per economy passenger and US$62 per premium (business- and first-class) passenger (Chambwera and Müller, 2008). Projected over a period of six years, the revenue would rise from US$7.8 billion in the first year, increasing annually to about US$10 billion in the sixth year as a result of growth in the number of international passengers. A higher levy of US$20 for economy and US$100 for premium-class passengers could increase the revenue to around US$25 billion by year six, assuming high levels of compliance by airlines and efficiency in the collection of the levies at the point of ticket sales.

TABLE 1.2 NEW BILATERAL AND MULTILATERAL CLIMATE FUNDS

FUND	TOTAL AMOUNT (US$ MILLION) (A ADAPTATION, M MITIGATION)	PERIOD
FUNDING UNDER UNFCCC		
Strategic Priority on Adaptation	50 (A)	GEF 3–GEF4
Least Developed Country Fund	172 (A)	As of October 2008
Special Climate Change Fund	172 (A)	As of October 2008
Adaptation Fund	300–600 (A)	2008–12
BILATERAL INITIATIVES		
Cool Earth Partnership (Japan)	10,000 (A+M)	2008–12
ETF-IW (United Kingdom)	1,182 (A+M)	2008–12
Climate and Forest Initiative (Norway)	2,250	No date given
UNDP-Spain MDG Achievement Fund	22(A) / 92 (M)	2007–2010
GCCA (European Commission)	84(A) / 7(M)	2008–10
International Climate Initiative (Germany)	200(A) / 564 (M)	2008–10
IFCI (Germany)	160 (M)	2007–12
MULTILATERAL INITIATIVES		
GFDRR	15 (A) (of $83 million pledged)	2001–08
UN-REDD	35 (M)	
Carbon Investment Funds, including:	6,200 (A+M)	2009–12
Clean Technology Fund	4,800 (M)	
Strategic Climate Fund, including:	1,400 (A+M)	
Forest Investment Programme	350 (M)	
Scaling up renewable energy	200 (M)	
Pilot Program for Climate Resilience	600 (A)	

Source: World Bank, 2010

A PASSENGER LEVY ESSENTIALLY REPRESENTS A PRICE INCREASE AND, IN THEORY, IS EXPECTED TO AFFECT DEMAND

A passenger levy essentially represents a price increase and, in theory, is expected to affect demand. The price-elasticity for flights is crucial for determining the effects of a levy. The more elastic the demand, the more demand will fall for a given price increase. An elasticity with an absolute value of greater than one reflects elastic or price-sensitive demand. In other words, the proportional change in quantity demanded will be greater than the proportional change in price. In the case of IAPAL, where the purpose is to raise revenue, an inelastic demand (less than 1) is preferred as this does not lead to a substantial reduction in demand. Reduced demand would reduce the number of tickets purchased and so also the revenue raised.

By contrast, an aviation levy designed to reduce demand for aviation transport and therefore to mitigate climate change, rather than raise funds for adaptation, is more effective when demand is elastic. In this case, a relatively small levy would cause a relatively large decrease in demand. However, as the evidence below suggests, a mechanism designed to raise funds rather than reduce flights may be more effective when considering current estimates of elasticity values for flights. Müller and Hepburn (2006) use the meta-analysis by Gillen, *et al.*, (2002) as an estimate of the price-elasticity of demand for air travel (Table 3.1).

TABLE 1.3 PRICE-ELASTICITY OF DEMAND FOR FLIGHTS

MARKET SEGMENT	AVERAGE PRICE-ELASTICITY OF DEMAND	HIGHEST ESTIMATE	LOWEST ESTIMATE	POTENTIAL TO RAISE REVENUE THROUGH IAPAL
Long-haul international business	–0.265	–0.475	–0.198	High
Long-haul international leisure	–1.04	–1.7	–0.56	Medium
Long-haul domestic business	–1.15	–1.428	–0.836	Medium
Long-haul domestic leisure	–1.104	–1.228	–0.787	Medium
Short-haul business	–0.7	–0.783	–0.595	High
Short-haul leisure	–1.520	–1.743	–1.288	Low

Source: Gillen, *et al.*, 2002

IMPOSING A LEVY ON FLIGHTS WOULD BE EFFECTIVE AT RAISING REVENUE FOR ADAPTATION – BUT NOT FOR MITIGATION

Based on this figures, only the demand for short- and long-haul business flights is inelastic, and can therefore expect relatively little fall in demand in return for high revenue collection. Short-haul leisure is the only highly elastic average, and also the only market segment whose lowest estimate is still above –1. This would imply that this segment, which involves mainly low-cost leisure flights, would be most affected by an aviation levy.

The proposal for the International Air Passenger Adaptation Levy, presented at the Bali Conference of Parties in 2008, explained that the average price-elasticities of passenger demand were –0.66 and –0.6 for short- and long-haul demand, respectively. Consequently, an average price increase of 0.8 per cent – the equivalent of US$6 on an economy class ticket costing US$750 – would result in a drop in demand of 0.52 per cent and 0.47 per cent for short- and long-haul flights, respectively. This is a reasonably low impact compared to the expected growth of air travel (estimated at 5.1 per cent per annum) (GLDC, 2008). As a result, any losses in demand due to the implementation of a levy are likely to be offset by overall increases in the demand for air travel.

A more recent study by the International Air Transport Association (IATA) (2007) provides similar elasticity estimates for the US (Table 1.4), with an average Route Level (increasing a tax on a particular route where competition between airlines is high) of –1.4, a very high elasticity. National and supra-national levels are on average very low, at –0.8 and –0.6, respectively. Long-haul travel shows consistently smaller elasticities than short-haul, reflecting the lack of good substitutes for long journeys compared to short journeys that can be replaced by car, train or boat.

A breakdown of elasticities into geographical areas shows that, while there is a great deal of variation in elasticities in different countries, all supra-national flights have levels of elasticity of below –1. These values should not be used for calculating the full cost of IAPAL to the tourism sector, as a levy that covered all geographical locations and airlines simultaneously will differ in its effects from a levy applied to a particular area (if other areas avoided the levy).

The inelastic demand for international flights means that increased taxation would be ineffective as a deterrent to flying (and therefore as a mitigation measure). However, it does suggest that imposing a levy on flights would be effective at raising revenue for adaptation. In other words, low elasticities indicate that a levy would be effective in raising revenue because customers would pay it, with little fall in overall demand.

TABLE 1.4 IATA GEOGRAPHIC MARKET ANALYSIS: ESTIMATED PRICE-ELASTICITY MULTIPLIERS

	ROUTE/MARKET LEVEL		NATIONAL LEVEL		SUPRA-NATIONAL LEVEL	
	SH	LH	SH	LH	SH	LH
Intra North America	–1.5	–1.4	–0.9	–0.8	–0.7	–0.6
Intra Europe	–2.0	–2.0	–1.2	–1.1	–0.9	–0.8
Intra Asia	–1.5	–1.3	–0.8	–0.8	–0.6	–0.6
Intra sub-Saharan Africa	–0.9	–0.8	–0.5	–0.5	–0.4	–0.4
Intra South America	–1.9	–1.8	–1.1	–1.0	–0.8	–0.8
Trans-Atlantic	–1.9	–1.7	–1.1	–1.0	–0.8	–0.7
Trans-Pacific	–0.9	–0.8	–0.5	–0.5	–0.4	–0.4
Europe–Asia	–1.4	–1.3	–0.8	–0.7	–0.6	–0.5

Source: IATA, 2007 Key: SH = Short Haul LH = Long Haul

TWO. CURRENT INTERNATIONAL AGREEMENTS

This section looks at the current status of international agreements. It covers the UNFCCC negotiations, the role of the International Civil Aviation Organization (ICAO), the European Union Emission Trading Scheme (EU ETS) and a case study of a UK per-passenger levy – the Air Passenger Duty (APD). The aim is to test whether the introduction of IAPAL is feasible given the current structure of existing market governance mechanisms, and the political, social and economic contexts in which it would operate. The UK was chosen as a case study to follow on from the original Müller and Hepburn (2006) paper and Chambwera and Müller (2008), and to give an example of some of the political difficulties of introducing a levy and keeping the revenues set aside for adaptation purposes.

CURRENT AGREEMENTS AND THE ICAO

The proposal for the International Air Passenger Adaptation Levy (IAPAL) has been officially adopted by the Group of Least Developed Countries (LDCs). Its inclusion was proposed within the framework of the Bali Action Plan in 2008, when it was discussed but not adopted. It was not included in the Copenhagen Accord. It is, however, identified by the UN Secretary-General's High Level Advisory Group on Climate Change Finance as one of the potential sources of climate-change finance (UNSG AGF, 2010).

There are no mentions of the IAPAL scheme in most individual country submissions delivered in April 2010, designed to give countries a further say on their particular standpoint or what they would like to see in a final binding agreement. The few countries that do mention IAPAL vary in their emphasis:

- Argentina reiterates that developed countries shall pursue limitation or reduction of emissions of greenhouse gases from aviation bunker fuels, working through the International Civil Aviation Organization as originally agreed in Article 2.2 in the Kyoto Protocol (AWG-LCA, 2010).
- The USA repeats this statement but for all Parties rather than just developed Parties (AWG-LCA, 2010).
- Bolivia asks that, on the subject of policy approaches and measures to limit and reduce greenhouse gas emissions from aviation and marine bunker fuels, 'actions by developed country Parties shall not be taken to deal with environmental challenges including taxation or imposing levies on developing country Parties services or sectors (e.g. aviation/maritime) or environmental measures addressing trans-boundary or global environmental problems unless such measures have been agreed to by international consensus and are in coherence with the principles and provisions of the Convention' (AWG-LCA, 2010). This could imply that there are concerns about the impact of a taxation/levy system but suggests that there would be support for an international one such as IAPAL.
- Botswana asks 'that the amount of finance or climate change adaptation be opened to benefit from international tax on bunkers including air-transport.' The Chair of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention (AWG-LCA) notes that this had been previously proposed by several countries and that 'This position had won sympathy from the International Maritime Organisation (IMO) and ICAO' (AWG-LCA, 2010: 40).

It seems, therefore, that there is no reason why IAPAL should not be included in future years, if there continues to be strong support from all stakeholders. However, it is unlikely to be part of any internationally binding agreement within the next year.

Aviation is a sector already subject to complicated international treaties. From the beginning of international climate change negotiations, aviation has been dealt with through the existing structure of the International Civil Aviation Organization (ICAO) rather than directly through any binding agreement reached through the UNFCCC. As a result, it is impossible to separate completely the role of the ICAO and the role of the Conference of Parties when discussing the feasibility of any new climate-related international agreement on aviation.

The ICAO is the UN specialised agency with global responsibility for the establishment of standards, recommended practices and guidance on various aspects of international civil aviation, including environmental protection. It operates according to the principle of non-discrimination, meaning that all countries should be treated equally. Because the ICAO currently has proposed responsibility for including aviation emissions in international climate change agreements, this raises two questions. First, does the IAPAL scheme represent a contradiction to the current system of delegating binding international aviation agreements to the existing structure and jurisdiction of ICAO? Second, does the IAPAL scheme have enough elements in common with ICAO's current proposals to make it likely to be considered seriously as a proposal in the short- to mid-term future? We aim to answer these questions in the following paragraphs.

The exact role of the ICAO is still under negotiation but the UNFCCC has agreed to work in tandem with the ICAO, stating in Article 2.2 of the 1997 Kyoto Protocol that 'the Parties included in Annex I shall pursue limitation or reduction of emissions of greenhouse gases… from aviation… bunker fuels, working through the ICAO…' (UNFCCC, 2000: 113). Following COP 15, a further Annex of the negotiation text detailing policy approaches and measures to limit and reduce greenhouse gas emissions from aviation and marine bunker fuels was drawn up. In this it was suggested 'that the limitation and reduction of emissions of greenhouse gases not controlled by the Montreal Protocol from aviation and marine bunker fuels should be pursued, working through the International Civil Aviation Organization and the International Maritime Organisation, respectively' (UNFCCC 2010c: 23). These organisations would report to the Conference of the Parties and its subsidiary bodies at regular intervals on their relevant activities, policy approaches and measures under development, emission estimates and achievements. There are several suggested additions, which have yet to be fully agreed on, including that:

- ICAO should take into account the principles and provisions of the Convention
- the ICAO's plans should be on a scale consistent with the long-term global goal defined in the Shared Vision.

IAPAL IS IDENTIFIED BY THE UN SECRETARY-GENERAL'S HIGH LEVEL ADVISORY GROUP ON CLIMATE CHANGE FINANCE AS A POTENTIAL SOURCE OF FINANCE

In the Copenhagen (2009) version of the negotiating text there is also the proposal that the Ad Hoc Working Group on Long-term Cooperative Action, the Conference of Parties 'Agrees that the limitation of… emissions of greenhouse gasses from… international aviation and maritime transport should be pursued working through the International Civil Aviation Organization and the International Maritime Organisation, respectively'. This version, however, also includes suggested options that the Conference of Parties includes a cooperative sectoral approach in the international transport sector (UNFCCC 2010b:11). Another suggestion is that 'any measures taken by developed country Parties through ICAO and IMO to reduce emissions from those sectors shall be taken on the basis of mutual consent of all Parties involved' (UNFCCC 2010c: 24).

In answer to the first of the two questions raised above, therefore, there is no reason why additional agreements by national parties should not be held alongside the international agreements under the ICAO. It is still unclear whether any specific emission reduction targets agreed at the UNFCCC should act as 'guidelines for' or should supersede any decisions made by the ICAO and IMO.

Having established that it would be possible, if it were necessary, to allow an international agreement to be established alongside ICAO, we can now consider whether it is feasible for IAPAL to be established through ICAO, or at least without contradicting ICAO policies. Given the current international significance of the ICAO, and its close relationship with the UNFCCC, if IAPAL were found to be in contradiction to the aims of ICAO it is unlikely that the UNFCCC would agree to adopt it, and vice versa. In order to answer the second question, therefore, we have to examine the ICAO's current support for climate-related agreements.

The ICAO requested in 1999 that the Intergovernmental Panel on Climate Change (IPCC) produced a Special Report on Aviation and the Global Atmosphere. The main conclusions of this report were that:

- aircraft emit gases and particles which alter the atmospheric concentration of greenhouse gases, trigger the formation of condensation trails and may increase cirrus cloudiness, all of which contribute to climate change
- aircraft are estimated to contribute about 3.5 per cent of the total radiative forcing (a measure of change in climate) by all human activities, and this percentage, which excludes the effects of possible changes in cirrus clouds, is projected to grow (ICAO, 1999 in European Commission, 2005).

In 2004 the ICAO adopted three major environmental goals (ICAO, 2004; 2011): to limit or reduce the number of people affected by significant aircraft noise; impact of aviation emissions on local air quality; and impact of aviation greenhouse gas emissions on the global climate (ICAO, 2011).

The 2007 ICAO Assembly recognised 'the critical importance of providing continuous leadership to international civil aviation in limiting or reducing its emissions that contribute to global climate change' (ICAO, 2007 in UNFCCC, 2009: 1) and established the Group on International Aviation and Climate Change (GIACC). GIACC consists of 15 senior government officials reflecting equitable participation from developed and developing states, to develop a Programme of Action on International Aviation and Climate Change (Box 2.1). The resulting programme was fully accepted by the ICAO in 2009. Areas for further work were also identified, including more ambitious medium- and long-term goals, the development of a CO_2 standard, a framework for market-based measures, and exploring approaches to provide technical assistance in the reporting process for developing states (UNFCCC, 2009).

BOX 2.1 SUMMARY OF PROGRAMME OF ACTION ON INTERNATIONAL AVIATION AND CLIMATE CHANGE

GLOBAL GOALS

1 Achieve improvement on global annual fuel efficiency[7] of 2 per cent up to 2050.

2 Further explore the feasibility of more ambitious goals, including carbon-neutral growth and emissions reductions, for consideration by the 37th ICAO Assembly in September 2010.

BASKET OF MEASURES

3 Develop a global CO2 standard for aircraft.

4 Facilitate the development and deployment of sustainable alternative fuels for aviation.

5 Facilitate the implementation of operational changes and the improvement of air traffic management and airport systems.

6 Develop a framework for market-based measures in international aviation.

7 Elaborate on measures to assist developing states as well as facilitate access to financial resources, technology transfer and capacity building.

PROGRESS MONITORING

8 To monitor progress towards reaching the goals, states are encouraged to submit their action plans, outlining their respective policies and actions, and annual reporting on international aviation CO2 emissions to ICAO.

9 ICAO will regularly report CO2 emissions from international aviation to the UNFCCC, as part of its contribution to assessing progress made in implementing actions in the sector.

Source: Tanaka, 2010

In 2010, following COP 15, a further Annex of the negotiation text detailing policy approaches and measures to limit and reduce greenhouse gas emissions from aviation and marine bunker fuels was drawn up, describing potential demands to be made of ICAO by the UNFCCC. These demands include the following (UNFCCC, 2010b):

- To establish sufficiently ambitious mid-term and long-term global goals for the mitigation of greenhouse gas emissions from aviation and marine bunker fuels to be achieved through the application of their policy approaches and measures, of 10 per cent and 20 per cent, respectively, below 2005 levels by 2020.
- To take fully into consideration all the relevant principles and provisions of the Convention, in particular the principle of common but differentiated responsibility and respective capabilities and the promotion of a supportive and open international economic system, and the special economic, geographical and social conditions of developing countries, recognising that such policy approaches and technical and operational measures should be taken on the basis of mutual consent of all Parties involved and should not constitute a means of arbitrary and unjustifiable discrimination or a disguised restriction on international trade.
- To ensure that such policy approaches and measures to do not lead to competitive distortions or carbon leakage.
- To ensure that revenue from the implementation of such policy approaches and measures shall be made available to support climate change adaptation and mitigation in developing countries.
- To promote cooperation in research, development, application and diffusion, including transfer of technologies, practices, processes, and methodologies in international aviation and maritime transport.

The request for setting aside revenue for adaptation and mitigation purposes is repeated as a suggested addition in the August 2010 version of the negotiation text. In this, the Conference of Parties, the ICAO and IMO requested that the majority of these types of revenues should be 'made available to support climate change adaptation and mitigation… in developing countries, in particular small island developing states and least developed countries' (UNFCCC, 2010c:24). Although there are clearly still concerns about the economic impacts of such a tax, there is the suggestion that, if enough revenue is raised, some should be 'made available to support the respective aeronautical and maritime sectors in developing countries, so as to offset impacts on trade following for [sic] the transfer of levies to those sectors' (UNFCCC, 2010c:24).

Three market-based measures to mitigate climate change are also being researched by the ICAO: voluntary measures, levies, and emissions trading. However, the current focus of ICAO's work in market-based measures to address aviation emissions is emissions trading. The 2008 ICAO Assembly agreed on 'the importance of emissions trading as a major tool' (ICAO, 2008:15), together with the reduction of emissions at source and operational measures for controlling the impact of aviation emissions on the environment. A main point of discussion was how to reconcile the concept of common but differentiated responsibilities contained in the Framework Convention with the concept of non-discrimination contained in the Convention on International Civil Aviation (commonly known as the Chicago Convention).

At present, participation in an emissions trading scheme is being considered only on the basis of mutual consent between states (ICAO, 2008). This preference for a market-based mechanism is supported in the recent negotiation text, in which one of the options on the paragraph concerning aviation targets suggests that market-based mechanisms may contribute towards achieving these targets so long as 'activities, policy approaches and measures established by the ICAO and the IMO should neither lead to competitive distortions nor carbon leakage' (UNFCC, 2010c: 24). This implies that, in general, cap-and-trade is likely to be the preferred option for meeting climate-related targets, rather than the introduction of a levy. However, this does not mean that a further mechanism, one based on raising revenue for adaptation rather than reducing CO_2 emissions for mitigation, and based on a levy system rather than a cap-and-trade system, must be excluded. A mechanism such as IAPAL could well be introduced as a complementary measure, either at the UNFCCC level or as part of the ICAO.

The conclusions from ICAO's own reports, and the requests from the UNFCCC made in the negotiation texts, make it clear that ICAO recognises climate change as a serious concern and is willing to introduce changes in international policy and regimes to help combat it. So far, however, the concern has been focused on the mitigation aspects of aviation, but there would be no contradiction in including a levy for adaptation purposes. This is providing that: a) this purpose was made clear to all concerned, otherwise it might be dismissed as ineffective if it were thought to be just for mitigation purposes; and b) this levy was not introduced at the expense of an effective mitigation policy, such as through cap and trade.

EU EMISSION TRADING SYSTEM

The European Union Greenhouse Gas Emission Trading System (EU ETS) is the scheme by which member states of the European Union can trade their agreed emissions allowances as they make efforts to mitigate their greenhouse gas emissions. The scheme is based on Directive 2003/87/EC, which entered into force on 25 October 2003 (Box 2.2). It began operation as the world's largest multi-country, multi-sector Greenhouse Gas Emission Trading System in January 2005. The aviation sector was not included in Phase 1 of the ETS. However, the European Union's 6th Environment Action Programme (January 2001) did call for specific action to reduce greenhouse gas emissions from aviation as a priority if no action was agreed within ICAO by 2002 (House of Lords EU Committee, 2006). The ICAO, as discussed above, has reached no specific plan of action; therefore, the European Commission, Directorate General Environment, produced a background study on the inclusion of the aviation sector in the EU ETS.

This report discusses the suitability of amending the current EU Emission Trading Scheme to 'address the full climate change impact of aviation through emissions trading' (House of Lords EU Committee, 2006:12). The Delft report (CE Delft, 2005) concluded that it would be possible to introduce CO_2 emissions trading for the aviation sector, without serious obstacles and that it would be possible to amend the structure of the EU ETS in a way that kept open the option for including non-CO_2 impacts in the future.

In September 2005, the European Commission published Reducing the Climate Change Impact of Aviation, which had an accompanying impact assessment examining in detail 12 policy instruments to tackle aviation emissions. The communication concluded that the most effective way forward was the inclusion of aviation in the EU ETS, combined with other measures such as research into cleaner air transport, better air traffic management and the removal of legal barriers to taxing aircraft fuel.

EU ETS PROVIDES AN EXAMPLE OF HOW MITIGATION EFFORTS CAN BE HELD ALONGSIDE REVENUE-RAISING EFFORTS

BOX 2.2 SUMMARY OF THE AVIATION DIRECTIVE

FINAL AGREEMENT (OCTOBER 2008)

TIMING

2012: inclusion of all flights arriving at and departing from EU airports.

LEVEL OF EMISSIONS CAP

2012: 97 per cent of average 2004–06 emissions.
2013: 95 per cent of 2004–06 emissions.

AUCTIONING

2012: harmonised level of 15 per cent auctioning.
2013: auctioning level for 2013 onwards to be negotiated in the wider EU ETS review negotiations.
No legally binding hypothecation clause.

FREE ALLOCATION CRITERIA

Great circle distance plus 95km (fixed). Operators may choose to apply (i) actual weight (ii) standard weight or (iii) default passenger weight of 100kg.

SPECIAL RESERVE

Creation of a reserve for new entrants and fast-growing airlines from within the cap: 3 per cent of the total capped allowances for that phase. Allocated to new operators and those whose activity data show an increase of more than 18 per cent per annum.

OPEN TRADING SCHEME. ACCESS TO CERTIFIED EMISSIONS REDUCTIONS (CERS) & EMISSION REDUCTION UNITS (ERUS)

Open trading scheme but with the removal of the clause that allows convertibility between Assigned Amounts (AAs) and EU Allowance Units (EUAs).
2012: 15 per cent access to CERs and ERUs.
2012+: to be confirmed as part of ETS review negotiations.

Source: DECC, 2011b

The majority of CO_2 allowances for 2012 will be given to aircraft operators free of charge, but 15 per cent will auctioned. The European Commission has estimated that, at a 95 per cent cap, aviation carbon reductions across Europe will be 133Mt CO_2 per annum in 2015 and 194Mt CO_2 per annum in 2020 (HMRC, 2009)[8]. There is no obligation to set aside any of the revenue (which goes to national governments rather than the EU) raised from auctioning these allowances for adaptation purposes. The European Parliament finally made the announcement in July 2008 that aviation would definitely be included in the EU ETS from 2012 onwards. This means that all flights starting and landing in the EU will be subject to a cap on their emissions, and all aircraft operators will be required to monitor emissions from 1 January 2010 (Department of Transport, 2009).

The application of EU ETS does not preclude other taxes. In the UK, for example, Air Passenger Duty continues to be implemented, as does the International Solidarity Levy in France. EU ETS therefore provides an example of not only how aviation is now recognised as an important threat to climate change (and therefore in need of control) but also how mitigation efforts, in this case a cap-and-trade scheme, can be held alongside revenue-raising efforts. This is a positive sign for the future role of IAPAL, as it shows that such a scheme is technically possible, even in the presence of strong support for cap-and-trade measures from the ICAO as well as other member Parties of the UNFCCC.

CASE STUDY: THE UNITED KINGDOM

At present, aviation contributes a significant proportion of the UK's greenhouse gas emissions. In 2006, the sector accounted for around 6 per cent of the UK's CO_2 emissions. This share is forecast to grow to around 10 per cent by 2020; by 2050, it is estimated that the sector will account for 35 per cent of the UK's CO_2 emissions (European Commission, 2005)[9]. The UK government has stated its commitment to tackling climate change. The Climate Change Bill puts in place a long-term, credible and legally binding framework that will drive private-sector investment in energy-saving and low-carbon technology, and the UK has adopted the EU ambition of a cut of 80 per cent in greenhouse gas emissions by 2050.

In the UK, this European Union aviation-emissions trading scheme will be regulated by the Environment Agency, the Scottish Environment Protection Agency, and the Chief Inspector for Northern Ireland. The Environment Agency will regulate all operators apart from those with offices registered in Scotland and Northern Ireland. From 17 September 2009, all 891 aircraft operators under the UK's jurisdiction (the majority of which are based in the US) must be registered and submit an emissions plan (Department of Transport, 2009). Aircraft operators who do not comply will face financial penalties and may eventually be banned from flying into the EU. These aircraft operators will be allowed to apply for a share of the free carbon allowances available under the System if they submit an application for a benchmarking plan. A benchmarking plan sets out how the operator would monitor their tonne-kilometre data in the benchmark year of 2010.

Air Passenger Duty

In addition to the trading scheme, the UK government will continue to apply Air Passenger Duty (APD). APD is an excise duty charged on the carriage, from a UK airport, of chargeable passengers on chargeable aircraft. It was first introduced in the UK in 2008. Until 31 October 2009, there were four rates of duty. Standard rates were £20 for specified European destinations, and £80 for all other destinations. Reduced rates (i.e. those for the lowest class of travel) were £10 for specified European destinations and £40 for all other destinations.

This was then altered by grouping flights into four distinct bands based on distance of travel (Table 2.1). This was intended to improve the match between the cost of the levy and the environmental cost associated with the flight. Use of the four bands came into force in November 2009.

Under the UK coalition government elected in 2010, the possibility of a duty 'per plane' rather than 'per passenger' was explored. This was intended to encourage fuller planes and potentially fewer flights. Proposals for taxing flights according to emissions, take-off weight and distance were also considered. For the present, however, it has been decided to continue with the Air Passenger Levy because (in some part) it is simple, has low costs of collection, sends a message about environmental protection to passengers as well as the aviation industry, and is stable as a source of tax income (HRMC, 2009). These three advantages would also exist with an IAPAL system.

TABLE 2.1 THE UK AIR PASSENGER LEVY, ACCORDING TO DISTANCE TRAVELLED

DISTANCE BAND	NOVEMBER 2009 TO OCTOBER 2010, REDUCED RATE (£)	NOVEMBER 2009 TO OCTOBER 2010, STANDARD RATE (£)
Band A (0–2000 miles)	11.00	22.00
Band B (2001–4000 miles)	45.00	90.00
Band C (4001–6000 miles)	50.00	100.00
Band D (over 6000 miles)	55.00	110.00

Source: HMRC (2009)

APD provides the UK government with a valuable source of income (Table 2.2), and can be considered a progressive taxation as people travelling by plane tend to have higher income levels. However, at present, the tax earned is returned to the government's central budget and is not ring-fenced for a specific purpose. Given the large government deficit, not only in the UK but in many developed countries following the recent financial crisis, it may be difficult to release this income for adaptation purposes. If the UK APD continues to operate when other mitigation measures are put in place, this will provide an interesting case study of how revenue-raising measures can be placed alongside mitigation measures.

APD is very similar in terms of administration and collection of revenue to the proposed IAPAL tax, showing how a simple, single levy can produce high revenues in return for very low administration costs. It also acts as a pilot scheme for a national, rather than international, levy which may be copied by other governments – as Germany has just done (starting January 2011) and Austria (planned for April 2011) is likely to do – in need of increasing national income. This demonstrates one of the political obstacles IAPAL may face – that governments may prefer taxes paid within their countries to be returned as national revenue rather than to the international adaptation fund.

TABLE 2.2 CURRENT AND FORECAST RECEIPTS FROM AIR PASSENGER DUTY

	2008–09	2009–10	2010–11	2011–12
Air Passenger Duty (£ billion)	1.9	1.9	2.3	2.9
Total HMRC (£ billion)	439.1	409.1	441.7	474.4
Percentage of total flight costs	0.43	0.46	0.52	0.61

	2012–13	2013–14	2014–15	2015–16
Air Passenger Duty (£ billion)	3.0	3.3	3.5	3.8
Total HMRC (£ billion)	501.8	535.5	568.2	599.6
Percentage of total flight costs	0.60	0.62	0.62	0.6

Source: HM Treasury, 2010

THE UK'S APD SHOWS HOW A SIMPLE, SINGLE LEVY CAN PRODUCE HIGH REVENUES IN RETURN FOR VERY LOW ADMINISTRATION COSTS

THREE.
MAJOR STAKEHOLDERS

For the IAPAL scheme to be feasible, it must be accepted by several stakeholder groups with considerable influence and lobbying power at both national and international levels. Opposition from these groups could seriously hinder the acceptance of IAPAL as part of an international binding agreement. This section looks in turn at the interests and influence of four groups: airline companies, the tourism sector, environmental groups, and the public in developed countries.

AIRLINE COMPANIES

Unsurprisingly, many airlines are opposed to increased taxation on air flights. Airlines and manufacturers objected explicitly to fuel taxation and explained that they already had an incentive to minimise fuel consumption. Airlines and airports both considered emissions charges to be more acceptable, and some of these organisations suggested using such charges to address the non-CO_2 effects of aviation on the climate and to support research (CEC, 2005). They highlighted that the current contribution of aviation to net global emissions is comparatively low and that there are already incentives for members of the industry to adopt the most fuel- efficient technologies and practices. Arguably, this ignores the predicted expansion of aviation, which would offset any fuel-efficiency gains, and blurs the distinction between relative and absolute emissions reductions.

Airlines make a significant contribution to the economy and job creation. In the UK, for example, the aviation industry employs around 200,000 people (HM Treasury, 2008), with over 520,000 jobs dependent on that aviation industry (Oxford Economic Forecasting, 2006), and contributes at least £11.4 billion to national GDP (HM Treasury, 2008). It is further estimated that the aviation industry employs over 500,000 people in the supply chain. As a result, the Air Transport White Paper of 2003 set out the UK government's support for the sustainable growth of aviation.

According to the European Commission (2005) public consultation survey, many airlines and manufacturers believe that any further increases in taxation, or other measures such as cap-and-trade schemes, should be implemented under International Civil Aviation Organization (ICAO) guidance and in accordance with ICAO's existing policies. Some believe that no further incentives to reduce emissions are necessary. One aircraft manufacturer stated:

Additional economic measures applied to civil aviation would have little additional impact on reducing fuel consumption, which is already a central concern for this sector. The injudicious use of economic measures would only serve to restrict growth in this key economic sector, which is recognised as a major facilitator for driving growth through increased mobility and transport of goods. Moreover such additional economic measures could even prevent airlines from replacing their existing aircraft by more fuel-efficient aircraft.

(European Commission, 2005:20).

The Flying Matters coalition and Responsible Air Travel Alliance both argue against further taxation of air transport. The Association of British Travel Agents (ABTA), while accepting that aviation should pay its proper environmental cost, has declared support for the airline lobby in the view that emissions trading is the most appropriate solution and should eventually replace APD. On the possibility of a 'per flight' duty, ABTA was in favour in that it would benefit those airlines operating full aircraft (ABTA, 2011). However, the proposed duty would provide no incentive to airlines to invest in more efficient aircraft.

In the UK, the budget airlines have spoken out strongly against the proposed increases in Air Passenger Duty, which would add up to £4 to the cost of a short-haul flight and up to £90 to the cost of a long-haul flight (Telegraph, 2009) – slightly above the proposed IAPAL and French Solidarity levy. This demonstrates how IAPAL could be subject to political lobbying unacceptable in many European countries, as the budget short-haul flights are the most price-sensitive, and therefore the most likely to suffer a fall in demand as a result of increased taxation.

A report by the travel insurance specialist InsureandGo (Telegraph, 2009) shows that between August 2008 and August 2009 more than a thousand weekly flights to and from British airports were cancelled because of falling passenger numbers and increasing costs. In particular, small local airports may be affected. For example, easyJet has proposed 20 per cent fewer flights from Luton Airport, and the closure of its base at East Midlands Airport. Ryanair has stopped operating from Doncaster's Robin Hood Airport, and cancelled dozens of routes from Dublin and Stansted. British Airways and BMI have also reduced their capacity in 2009 (Telegraph, 2009). A reduction in the demand for aviation is of course one of the primary aims of an aviation tax. However, if the primary aim is adaptation rather than mitigation, the potential welfare cost due to fewer people flying and associated job losses is a serious cost factor that should be compared to the potential benefits from revenue raised.

THE TOURISM SECTOR

One of the key arguments put forward against any increase in taxation of travel is the harm it would do the tourism industry, particularly in developing countries where tourism can constitute an important source of livelihoods and revenue. Tourism is a sector that both contributes to climate change and is highly vulnerable to its effects. There are three main routes through which climate change can damage the aggregate demand for tourism (particularly in developing countries):

1 Changing temperatures (increasing warmth in northern states) removes the need to escape cold winters and disappointing summers for exotic holidays in the sun.

2 Increased temperatures and effects of climate change are damaging to holiday destinations. For example, increased temperatures in sub-Saharan Africa lead to increased risk of malaria and other diseases as well loss of the biodiversity and wildlife responsible for attracting much of the tourist trade.

3 The 'demonisation of travel', where travel is considered wasteful and unethical due to its impact on environment and its carbon footprint (Davidson, 2009).

Tourism is seen by many as a non-essential luxury enjoyed by the rich minority – less than 3 per cent of the world's population currently undertakes long-haul trips by air (Icarus Foundation, 2008) – that is damaging to the climate and the poor. Tourism contributes over 26,400 million tonnes of CO_2 per year, contributing roughly 5 per cent of total global annual carbon emissions, almost 40 per cent of which comes from aviation (UNWTO, 2008a).

Aviation can also carry a multiplier which is best estimated at 2.7 (though according to IPCC this multiplier exists somewhere in the range of 1.9 to 4.7) (Icarus Foundation, 2008), if the harmful effects of nitrous oxide, water vapour and other pollutants are fully accounted for. If we include this multiplier then tourism's contribution to global warming (in 2005) was between 5.2 and12.5 per cent, or 8.2 per cent using the best estimate of 2.7 as a multiplier (Icarus Foundation, 2008). Since the number of international tourist trips is expected to double between 2005 and 2020 tourism's contribution could be as high as 16 per cent and possibly more if other sectors achieve their reduction targets (Icarus Foundation, 2008).

TABLE 3.1 EMISSIONS FROM GLOBAL TOURISM IN 2005

SOURCE	CO_2 (MILLION TONNES)	PERCENTAGE OF TOTAL
Air transport	517	39.6
Other transport	468	35.8
Accommodation	274	21.0
Other activities	45	3.4
TOTAL	1,307 [sic]	100
TOTAL WORLD EMISSION	26,400	4.95 (TOURISM)

Source: Table calculated by Sookram (undated)

Reducing air travel can therefore be seen as a progressive method to cut emissions. Affluent customers can forego the pleasure of a single holiday and have a stronger instant impact than if many less wealthy people forego more essential consumption that contributes to climate change, such as using energy for light or heat. This all suggests that a levy on international travel would be borne mostly by those best able to afford it. This applies whether price-elasticity of demand is elastic, reducing the number of people travelling, or inelastic, inducing people to pay more, making IAPAL a fairer, progressive and efficient form of taxation. However, the overall welfare lost from a levy that reduces tourism demand goes far beyond the slight inconvenience to the affluent; it also affects employment and income in tourist destinations.

According to the UN World Tourism Organization (UNWTO), international arrivals in 2010 were predicted to reached 1 billion and to rise to 1.6 billion by 2020 (UNWTO, 2008b). The World Travel & Tourism Council (WTTC, 2008 in Chiesa *et al*., 2009) estimated that in 2008 the travel and tourism sector accounted for 10.9 per cent of global GDP, 12.2 per cent of world exports, and 9.4 per cent of world investment, from direct and indirect activities. Since tourism is an 'export good' it also helps to build foreign currency reserves of destination countries, and has therefore been praised as a driver of development in emerging and developing countries (Respect, 2009). UNWTO (2006, in Respect, 2009) argues that in 2005, emerging and developing economies generated US$205 billion from international tourism, which corresponds to a global share of 30 per cent. The Least Developed Countries accounted for only 1.2 per cent of the revenue generated from international tourism, but tourism in these countries is growing faster than in industrialised countries.

Tourism is labour intensive; it creates jobs, boosts local economies, raises living standards and can contribute to the 'development of regional communities by building partnerships among local residents, organisations, and businesses' (Chiesa *et al*., 2009). In 2009 it was estimated that about 50 Least Developed Countries were largely dependent on travel and tourism for their economic development and job creation and that between one-fifth and one-third of total tourist turnover in these destinations is captured by the poor (Chiesa *et al*., 2009). There are additional, direct social benefits not included in traditional economic measures of tourism. For example, visiting and enjoying different countries can also help to reduce cultural barriers, improve language skills and form bonds between people from various nations – building social capital.

Despite the importance of tourism as a revenue source for many Least Developed Countries, the volume of 'leakage' from these countries, where revenue is lost to other 'external' sources and fails to 'trickle down' to local economies, can often be high. We should therefore not overstate the economic importance of tourism for development. A study by NEF (2008), for example, found that in the case of all-inclusive holidays in Kenya only 15 per cent of the money spent by tourists reached the local communities, while indigenous communities such as the Maasai missed out completely. Although organisations like the UNWTO promote tourism as a development panacea, others argue that the evidence to back up such claims is missing, and are sceptical about the contribution of tourism to poverty alleviation (Respect, 2009). Respect (2009) claims that the economic returns from tourism in developing countries can be far below expectations and that tourism can cause or exacerbate social problems, such as the commercialisation of culture, growing marginalisation of certain communities and exploitation or human rights abuses.

IAPAL's impact on tourism will undoubtedly need to be assessed. But initial calculations suggest that policies to address the climate change impact of aviation will not lead to a significant decrease in tourist numbers – due to the general growth of tourism demand (Respect, 2009). NEF analysed the economic impact of a zero-growth scenario of air travel from the UK to four popular destinations. The study found that, in comparison to the income that could be generated from the predicted increase in British arrivals by 2025, a stagnation of the number of British guests would lead to maximum decreases in turnover of 0.07 per cent of GDP in Kenya, 0.17 per cent in Thailand, 0.39 in the Dominican Republic and 3.42 per cent in the Maldives (NEF, 2008). Pentelow and Scott (2011) demonstrate that the Caribbean region (whose economies are largely tourist-dependent) will not be adversely affected by IAPAL, since tourist numbers will not be significantly affected – and IAPAL would offer a bonus for the Caribbean in terms of the adaptation funding it offers.

Recognising tourism's vulnerability to climate change, its contribution to global emissions (estimated at 5 per cent of global total) and its connection to development, the UNWTO, jointly with the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO), with the support of the World Economic Forum (WEF) and the Swiss government, convened the Second International Conference on Climate Change and Tourism, in Davos, Switzerland, in October 2007. Resulting from this conference, the Davos Declaration (2007) concludes as follows:

- Given tourism's importance in the global challenges of climate change and poverty reduction, there is an urgent need to adopt a range of policies to encourage truly sustainable tourism that reflects a 'quadruple bottom line' of environmental, social, economic and climate responsiveness.
- The tourism sector must rapidly respond to climate change, within the evolving UN framework and progressively reduce its greenhouse gas (GHG) contribution if it is to grow sustainably. This will require action to:
  - mitigate its GHG emissions, derived especially from transport and accommodation activities
  - adapt tourism businesses and destinations to changing climate conditions
  - apply existing and new technology to improve energy efficiency
  - secure financial resources to help poor regions and countries.

WHILE IT IS CLEAR THAT IAPAL COULD HAVE AN IMPACT ON TOURISM, EVIDENCE SUGGESTS THAT THE BENEFITS OF IMPLEMENTING IAPAL OUTWEIGHS THE COSTS

The Davos Declaration also asks that governments and international organisations 'collaborate in international strategies, policies and action plans to reduce GHG emissions in the transport sector (in cooperation with ICAO and other aviation organisations), accommodation and related tourism activities.' It requests that consumers are 'encouraged to consider the climate, economic, societal and environmental impacts of their [travel destinations] and, where possible to reduce their carbon footprint, or offset emissions that cannot be reduced directly' (Davos 2007:3). This is significant as it shows potential support for climate-related international agreements, but again the focus is on mitigation rather than raising funds for adaptation. In addition 'collaborate in international strategies, policies and action plans…(in cooperation with ICAO and other aviation organisations)' (Davos Declaration 2007:3) could be interpreted as a means of avoiding full responsibility for mitigation and relying on other organisations to take on this responsibility. It was made clear at the Davos conference that the emphasis should be on ensuring that tourism adapts to climate change, rather than on mitigation.

While it is clear that IAPAL could, in theory, have an impact on tourism, evidence suggests that the benefits of implementing IAPAL outweigh the costs – particularly for Least Developed Countries – as was recognised by the LDCs' negotiating team, at the 14th Conference of Parties, 2008 (UNFCCC, 2008). This recognition led to the formal inclusion of IAPAL in climate change negotiations. Respect (2009) argues that there are far more effective strategies to improve the contribution of tourism to development, and that these strategies are not dependent on avoiding or weakening mitigation or adaptation measures. Proposed strategies include reducing leakages of tourist revenue, increasing the average duration of stay, and increasing tourists' expenditure in the local value chain (Respect, 2009).

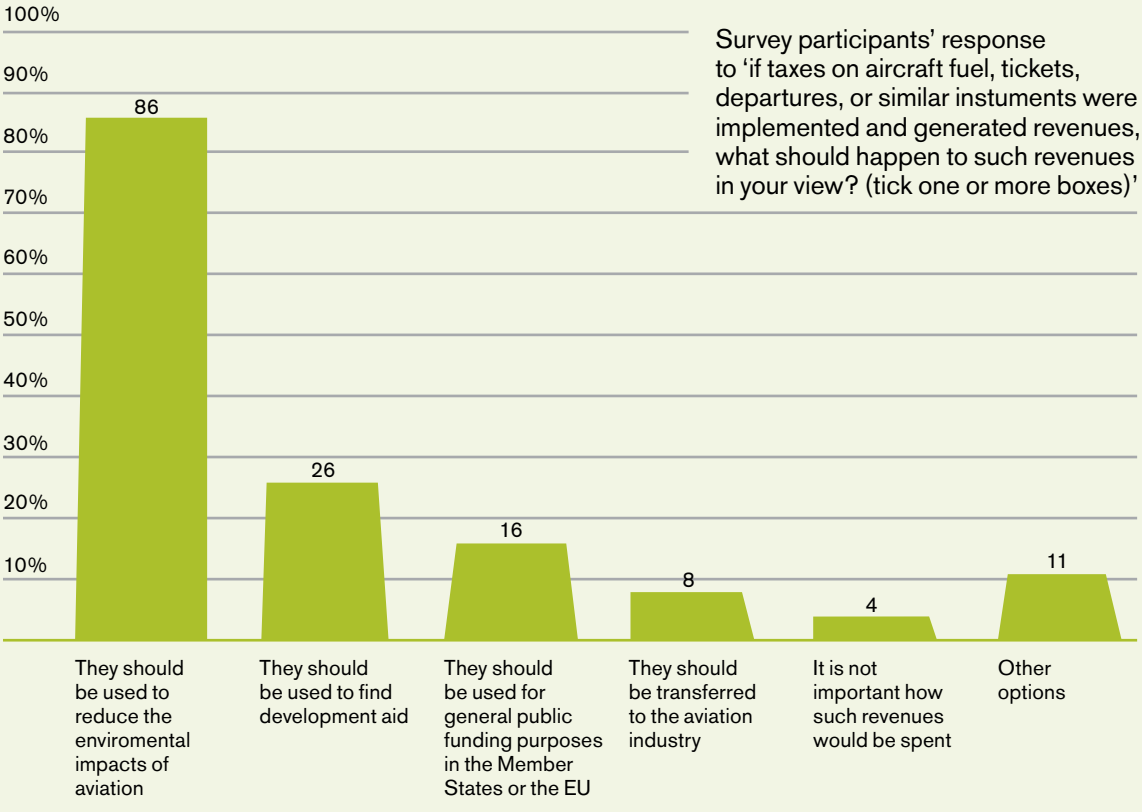
ENVIRONMENTAL NGOS AND LOBBY GROUPS

According to a 2008 UK government survey, environmental nongovernmental organisations (NGOs), academics and individuals were in favour of a relatively high tax on aviation, arguing that aviation already receives a distortionary subsidy through exemption from fuel tax and VAT on air tickets (HM Treasury, 2008). Many environmentalist lobby groups and NGOs are, however, reported as being sceptical of a per-passenger levy as a contribution to mitigation efforts. This type of tax fails to reward airlines that have made efforts to reduce their emissions and does not provide the same incentive to ensure that flights are full.

Friends of the Earth has argued that 'switching to a per-plane tax will help to ensure that planes fly full, but the government must also increase the amount of tax raised in order to help address the national budget deficit' (FOE, 2010). WWF (2011) similarly, in its One Planet Transport campaign, has announced a focus on reducing flying, particularly for business trips (by using more video conferencing, and alternative travel modes such as high-speed rail), rather than taxation and revenue-raising methods. However, WWF has also stated that 'bunker finance could be a valuable, reliable and equitable source of finance, as recommended in the High Level Advisory Group on Climate Change Financing (AGF) report 2010 as an innovative source for climate change financing, potentially securing a double dividend by also unlocking mitigation packages in two sectors that have so far escaped greenhouse gas regulation' (WWF, 2010). In contrast to the focus on emissions reduction, this suggests a recognition of the benefit of viewing airlines as a source of adaptation funding.

A GREAT DEAL OF PROGRESS IS NEEDED TO INCREASE PUBLIC AWARENESS ON CLIMATE CHANGE IN GENERAL AND THE ROLE OF AVIATION IN PARTICULAR

FIGURE 3.1 SURVEY RESULTS ON THE ALLOCATION OF REVENUE FROM TAXES ON AIR TRAVEL



Survey participants' response to 'if taxes on aircraft fuel, tickets, departures, or similar instuments were implemented and generated revenues, what should happen to such revenues in your view? (tick one or more boxes)'

Source: European Commission, 2005

An emissions-based tax or cap-and-trade scheme (such as the EU ETS) may be more effective in theory for mitigation purposes. Yet according to the European Commission's 2005 public consultation report, Reducing the Climate Change Impact of Aviation, 'there was cautious acceptance by some environmental NGOs for emissions trading. However, some doubted that it would be possible to find an agreement that would be effective enough' (European Commission, 2005:5). It was also suggested that more stringent methods like fuel taxation should be included in addition to the cap-and-trade scheme of EU ETS, to address the relatively high impact of aviation on climate change and to raise revenue.

THE PUBLIC IN DEVELOPED COUNTRIES

While there is still a great deal of progress needed to increase public awareness on climate change issues in general, and the role of aviation in particular, there is clear support for including an increase in the price of flights to reflect the harmful contribution of aviation. According to the 2005 public consultation by the EU Commission, of 5564 respondents: 68 per cent fully agreed that the cost of climate change impact should be included in the price of air transport; 82 per cent fully agreed that the EU Commission should include the air transport sector in efforts to mitigate climate change; and 72 per cent agreed that this policy should strengthen economic incentives for air transport operators to reduce their impact on the climate (European Commission, 2005).

In terms of willingness to pay, 86 per cent fully or rather agreed with the opinion 'increasing the price of air transport would be acceptable if it is necessary to reduce aviation's impact on the climate', 79 per cent completely or rather disagreed with the opinion 'increasing the price of air transport should be avoided as it could have an effect on jobs and growth', 79 per cent completely or rather disagreed with the opinion 'increasing the price of air transport should be avoided as fewer people could afford to fly', and 70 per cent fully or rather agreed with the opinion 'increasing the price of air transport would be acceptable since it would affect "frequent flyers" most' (European Commission, 2005:3).

The same survey also found considerable support (86 per cent of respondents) for the idea of setting aside the revenue gained from taxes on aircraft fuel or tickets for reducing the environmental impacts of aviation (Figure 3.1). However, many respondents also specified, when given the opportunity to use their own words, that they would like to see such revenues being used to make railways cheaper than air travel. This suggests that, despite more explicit support for mitigation, members of the public in developed countries are not averse to setting aside revenue for other purposes. An initiative such as IAPAL may therefore be politically acceptable. Nevertheless, it is important to bear in mind the difference that often exists between hypothetical and actual willingness to pay. Research into developing countries' stakeholder views is lacking – and yet is vital given that IAPAL is proposed as an international instrument, targeting travellers from both developed and developing countries.

CONCLUSIONS AND RECOMENDATIONS

This paper has aimed to analyse the IAPAL idea as a potential innovative market governance mechanism. It has done this first by examining the key assumptions laid out in the original analysis by Müller and Hepburn (2006). Comparing required adaptation funding against available and pledged sources of such funding, new and additional sources of funding are very much needed. Aviation is a sector with a relatively low price-elasticity of demand. This makes taxation an unsuitable method of reducing demand (a mitigation strategy), but indicates that it could be a suitable method of raising revenue (an adaptation strategy). It also demonstrates that the potential revenue raised would be of a significant magnitude.

Second, this paper has examined the potential feasibility of introducing an IAPAL scheme, given the current international negotiation plans and the current key role of the International Civil Aviation Organization (ICAO). The IAPAL scheme has not received any more direct attention since its introduction at the Bali Conference of Parties in 2008, and is not referred to directly in the negotiations text. There are, however, elements of the text that lend support to the idea of revenue raised from a tax on aviation to be accrued to adaptation and mitigation. The ICAO, while it has acknowledged the role of aviation as a potential significant contributor to climate change, has again focused on mitigation rather than adaptation schemes, and cap-and-trade rather than taxation. Nevertheless, there is nothing to suggest that ICAO would automatically be against an adaptation-focused taxation scheme.

This paper has provided an updated study of the aviation sector's inclusion in the EU Emission Trading Scheme, to examine whether this existing agreement affects the feasibility of introducing IAPAL. The case study of the UK's Air Passenger Duty was included to demonstrate how a revenue-raising instrument could be used alongside an international mitigation instrument, in a successful, simple and efficient manner. We conclude that the existence of such trading schemes would not preclude the effective use of IAPAL.

Third, this paper has explored the potential responses and attitudes of some of the key stakeholders who may be positively or negatively affected by IAPAL. Airlines, particularly those dependent on short-haul, low-price travel, which is most price-sensitive, are strongly opposed to the idea of any additional taxation. The potential economic and job losses, as well as the mitigation benefits, if IAPAL were set high enough to reduce demand significantly, should be considered when deciding on the appropriate price of IAPAL. The tourist industry is also vulnerable to increases in the price of travel. However, long-haul flights, most used for tourism in developing countries, are less vulnerable to small price increases. NGO and environmental lobby groups may criticise IAPAL for not focusing on mitigation efforts, and by being per passenger rather than based on emissions and so not rewarding efforts for cleaner technologies or encouraging fuller planes.

Finally, this paper looked at a recent survey examining people's willingness to pay for climate change caused by aviation. Results show that, in Europe at least, there was strong public willingness to pay increase ticket prices, to reflect environmental costs, and for the revenues raised to be set aside for adaptation and mitigation purposes. This suggests that, although IAPAL has not been high on the political agenda at national or international negotiation levels, there is likely to be strong support if the idea is reintroduced.

IAPAL is a feasible idea. It has the potential to raise a significant contribution for the desperately needed adaptation funds, of particular value in the short to medium term. However, its purpose of adaptation to the effects of climate change, rather than mitigation, must be clearly explained to environmental groups as well as the public, to generate the full support this idea deserves. Greater engagement with Southern stakeholders about IAPAL is required, as is a closer analysis of the politics of implementing IAPAL.

IAPAL HAS THE POTENTIAL TO MAKE A SIGNIFICANT CONTRIBUTION FOR ADAPTATION

REFERENCES

ABTA (2011) *Air Passenger Duty (APD) & Aviation Taxes*. See www.abta.com/about/lobbying_and_government_affairs/air_passenger_duty (accessed February 2011).

AWG-LCA (Ad Hoc Working Group on Long-term Cooperative Action under the Convention) (2010) *Convention Twelfth Session*, FCCC/AWGLCA/2010/14, August 2010, alternative 1 to paragraph 55. See unfccc.int/resource/docs/2010/awglca12/eng/14.pdf

Blackmore, E. (2011) *Shaping Sustainable Markets: a research prospectus*. See http://shapingsustainablemarkets.iied.org/our-work

CEC (Commission of the European Communities) (2005) *Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions: Reducing the Climate Change Impact of Aviation*. See eur-lex.europa.eu/LexUriServ/site/en/com/2005/com2005_0459en01.pdf

CE Delft (2005) *Giving Wings to Emission Trading: Inclusion of Aviation under the European Emission Trading System (ETS)*. See www.cedelft.eu/publicatie/giving_wings_to_emission_trading/334?PHPSESSID=ad8353cb75ccfdf097561c2fc46a6f6

Chambwera, M. and Müller, B. (2008) *Fairer Flying: An International Air Travel Levy for Adaptation.* IIED. See pubs.iied.org/pdfs/17045IIED.pdf.

Chiesa, T. *et al.* (2009) *Towards a Low Carbon Travel & Tourism Sector*. World Economic Forum. See www.weforum.org/pdf/ip/att/ClimateChangeReportCopenhagen.pdf

Davidson (2009), *Presentation to the Namibian Climate Change Committee*, World Wide Fund for Nature Davos Declaration (2007) Climate Change and Tourism: Responding to Global Challenges. Second International Conference on Climate Change and Tourism. Davos, Switzerland, 3 October. See www.unwto.org/pdf/pr071046.pdf

DECC (2011a) *EU Emissions Trading System*. See www.decc.gov.uk/en/content/cms/what_we_do/change_energy/tackling_clima/emissions/eu_ets/eu_ets.aspx (accessed February 2011).

DECC (2011b) *Aviation in the EU Emissions Trading System from 2012*. See www.decc.gov.uk/en/content/cms/what_we_do/change_energy/tackling_clima/emissions/eu_ets/aviation/aviation.aspx (accessed February 2011).

Department of Transport (2009) *Open Letter from the UK Director General of Civil Aviation to Aircraft Operators on the Important Deadlines for Compliance with the Aviation EU Emissions Trading System*. See webarchive.nationalarchives.gov.uk/+/http:/www.dft.gov.uk/adobepdf/165217/letter.pdf

EED and Germanwatch (2010) *Bunker Finance: Aimed towards the High-Level Advisory Group on Climate Change Financing*. Policy brief. See www.eed.de/…/Bunker%20finance%20towards%20AGF_Tianjin_ October2010.pdf

European Commission (2005) *Climate Action: General Environment Reducing the Climate Change Impact of Aviation, Report on the Public Consultation March–May 2005*. See ec.europa.eu/clima/documentation/transport/aviation/docs/report_publ_cons_en.pdf

European Union (2010) *European Union Fast Start Funding for Developing Countries, 2010 Progress Report*. See www.delnam.ec.europa.eu/pdf/2009/PR-SPF_startfinance_v5.pdf

FOE (Friends of the Earth) (2010) *Press Release: Government to consult on per-plane tax*. See www.foe.co.uk/resource/press_releases/aviation_tax_22062010.html

Gillen, D.W., Morrison, W.G. and Stewart C. (2002) *Air Travel Demand Elasticities: Concepts, Issues and Measurement* Department of Finance, Canada. See http://www.fin.gc.ca/consultresp/airtravel/airtravstdy_-eng.asp

GLDC (Group of Least Developed Countries) (2008) *International Air Passenger Adaptation Levy*. See unfccc.int/files/kyoto_protocol/application/pdf/maldivesadaptation131208.pdf

HMRC (2009) *Summary: Intervention and Options: Changes to Air Passenger Duty*. See www.hmrc.gov.uk/ria/apd-reform-ia.pdf

HM Treasury (2008) *Aviation Duty: Response to Consultation*, 2008. See webarchive.nationalarchives.gov.uk/+/http://www.hmtreasury.gov.uk/d/pbr08_aviationduty_395.pdf

HM Treasury (2010) *Budget: 2010*. See www.hm-treasury.gov.uk/d/junebudget_complete.pdf

House of Lords EU Committee (2006) *21st Report of Session 2005–06, Including the Aviation Sector in the European Union Emissions Trading Scheme*. Report with Evidence. HL Paper 107. See www.publications.parliament.uk/pa/ld200506/ldselect/ldeucom/107/107.pdf

Huq, S. (2006) *Adaptation funding after Montréal*. Tiempo Climate Newswatch. See www.tiempocyberclimate.org/newswatch/report060401.htm

IATA (International Air Transport Association) (2007) *IATA Air Travel Demand Economics Briefing No. 09*. See www.iata.org/SiteCollectionDocuments/air_travel_demand_summary.pdf

ICAO (2004) *Assembly: 36th Session*. See www.icao.int/icao/en/assembl/a36/wp/wp166_en.pdf

ICAO (2008) *Written Submission of International Civil Aviation Organization (ICAO) to the Third Session of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention (AWG-LCA)* (Accra, 21–27 August). See www.icao.int/env/Statements/Accra Ghana_WrittenSubmission.pdf

ICAO (2011) *Air Transport Bureau: Climate*. See www.icao.int/env/climateChange.htm

Icarus Foundation (2008) *The Climate Change Challenge. Implications for the Tourism Industry. A discussion paper.* See www.theicarusfoundation.com/pdf/Icarus_Discussion_Paper%20MAR_08.pdf

IPCC (1999) *Aviation and the Global Atmosphere: Summary for Policy Makers*. See www.grida.no/publications/other/ipcc_sr/?src=/climate/ipcc/aviation/006.htm#spm41

Lee, D.S. *et al.* (2009) Aviation and global climate change in the 21st century. A*tmospheric Environment,* Vol. 43, No. 22–23, July, pp. 3520–3537 See: http://www.tiaca.org/images/tiaca/PDF/IndustryAffairs/2009%20IPCC%20authors%20update.pdf

Müller, B. (2008) *International Air Passenger Adaptation Levy (IAPAL). A proposal by the GROUP OF LEAST DEVELOPED COUNTRIES (LDCs) within the framework of the BALI ACTION PLAN*. Submitted to the UNFCCC AWC-LCA on 12 December with Thirteen Questions and Answers. ecbi policy brief, European Capacity Building Initiative. See http://www.oxfordclimatepolicy.org/publications/documents/ecbiBrief-IAPAL13Q&As.pdf

Müller, B. and Hepburn, C. (2006) IATAL – *An Outline Proposal for an International Air Travel Adaptation Levy.* EV 36. Oxford Institute for Energy Studies, Oxford. See http://www.oxfordenergy.org/pdfs/EV36.pdf

NEF (2008) *Plane Truths: Do the Economic Arguments for Aviation Growth really Fly*? New Economics Foundation, London.

Oxford Economic Forecasting (2006) *The Economic Contribution of the Aviation Industry in the UK*. See www.oef.com/Free/pdfs/Aviation2006Final.pdf

Pentelow, L. and Scott, J.D. (2011) Aviation's inclusion in international climate policy regimes: Implications for the Caribbean tourism industry. *Journal of Air Transport Management 1–7.*

Respect (2009) *Tourism Development in a Changing Climate: Backgrounds and Perspectives on the Role of Tourism in International Climate Politics*. See www.climalptour.eu/…/Tourism%20Development%20in%20a%20Changing%20Climate.pdf

Scott., D., Peeters, P. and Gössling, S. (2009) *Can Tourism 'Seal the Deal' of its Mitigation Commitments? The Challenge of Achieving 'Aspirational' Emissions Reduction Targets*. See www.cstt.nl/images/can%20tourism%20%27seal%20the%20deal%27%20of%20its%20mitigation%20commitments,%20paul.pdf

Sookram, S. (undated) *Energy Efficiency in the Tourism Sector*. See www.eclac.cl/portofspain/noticias/paginas/8/39598/SandraSookram.pdf

Stern, N. (2007) *The Economics of Climate Change* (The Stern Report). Cambridge University Press, Cambridge.

Tanaka, T. (2010) *International Civil Aviation Organization (ICAO)*. Presentation at the 5th ITPU International Seminar (55th Public Policy Seminar), February.

Telegraph (2009) Air tax increase may f orce airlines to scrap routes. First published 11 September 2009. See www.telegraph.co.uk/travel/travelnews/6172805/Air-tax-increase-may-force-airlines-to-scrap-routes.html

UNFCCC (1992) *Kyoto Protocol to the United Nations Framework Convention On Climate Change*. See unfccc.int/resource/docs/convkp/kpeng.html (accessed February 2011).

UNFCCC (2000) *Tracing the Origins of the Kyoto Protocol: An Article-by-Article Textual History.* Technical paper prepared under contract to UNFCCC by Joanna Depledge. See http://unfccc.int/resource/docs/tp/tp0200.pdf

UNFCCC (2007) *Climate Change: Impacts, Vulnerabilities, and Adaptation in Developing Countries*. United Nations Framework Convention on Climate Change Secretariat, Bonn.

UNFCCC (2008) *International Air Passenger Adaptation Levy: A proposal by the Maldives on Behalf of the Group of Least Developed Countries within the Bali Action Plan*. See www.unfccc.int/files/kyoto_protocol/application/pdf/maldivesadaptation131208.pdf

UNFCCC (2009) *Global Framework on International Aviation and Climate Change*. Submission by the International Civil Aviation Organization (ICAO), Thirty-first Session of the UNFCCC Subsidiary Body for Scientific and Technological Advice (SBSTA31), 7 to 18 December, Copenhagen, Denmark. See www.icao.int/icao/en/env/sbsta-31.pdf

UNFCCC (2010a) *Ad Hoc Working Group on Long-Term Cooperative Action Under the Convention*. FCCC/AWGLCA/2010/MISC.2. 30 April. See unfccc.int/resource/docs/2010/awglca10/eng/misc02.pdf.

UNFCCC (2010b) *Work undertaken by the Conference of the Parties at its fifteenth session on the basis of the report of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention*. Conference of the Parties, Sixteenth session, X, 29 November–10 December. Item X of the provisional agenda. First published 11 February 2010. See unfccc.int/resource/docs/2010/cop16/eng/02.pdf

UNFCCC (2010c) *Ad Hoc Working Group on Long-term Cooperative Action under the Convention*. Twelfth session, Tianjin, 4–9 October 2010, Item X of the provisional agenda. First published August 2010. See www.unfccc.int/resource/docs/2010/awglca12/eng/14.pdf

UNFCCC (2011a) *Kyoto Protocol*. See unfccc.int/kyoto_protocol/items/2830.php (accessed February 2011).

UNFCCC (2011b) *Adaptation Fund*. See unfccc.int/cooperation_and_support/financial_mechanism/adaptation_fund/items/3659.php (accessed February 2011).

UNSG AGF (UN Secretary-General's High Level Advisory Group on Climate Change Financing) (2010) *Workstream 2: Paper on Potential Revenues from International Maritime and Aviation Sector Policy Measures*. See www.un.org/wcm/webdav/site/climatechange/shared/Documents/AGF_reports/Workstream_2_International_Trasnsport_Revised.pdf

UNWTO (2008a) *Climate Change and Tourism: Responding to Global Challenges*. See www.unwto.org/sdt/news/en/pdf/climate2008.pdf

UNWTO (2008b) *Tourism Highlights, Edition 2008*. http://www.hotelnewsresource.com/pdf8/UNWTO123008.pdf

World Bank (2007) *The Costs to Developing Countries of Adapting to Climate Change, New Methods and Estimates*. The Global Report of the Economics of Adaptation to Climate Change Study Consultation Draft. See siteresources.worldbank.org/INTCC/Resources/EACCReport0928Final.pdf

World Bank (2010) *World development report 2010: development and climate change*. See http://books.google.co.uk/books?id=MGOJs900Q-MC&pg=PA260&lpg=PA260&dq=Same+as+world+Bank+plus+coal+Adaptation+Plan +of +Section+and+ nongovernmental+organisation +projects&source=bl&ots=rlv92LP7iv&sig=Qzpg9LMAoZGXT0uGGtp9nJv_nio&hl=en&ei=V8aYTaXQOYyZhQfModT8CA&sa=X&oi=book_result&ct=result&resnum= 1&ved=0CBcQ6AEwAA#v=onepage&q&f=false

WWF (2010) *Brief: Finance from Aviation and Maritime sectors*. See wwf.panda.org/about_our_earth/all_publications/?193949/www-panda-org-climate-finance-bunkers

WWF (2011) *One Planet Travel Campaign*. See www.wwf.org.uk/what_we_do/campaigning/one_planet_mobility (accessed February 2011).

NOTES

[1]Flying can lead to increases in the cloudiness of air, which can exacerbate climate warming through the reflexion of incoming solar light and absorption of outgoing long-wave terrestrial radiation.

[2]The Adaptation Fund was established to finance specific adaptation projects and programmes in developing countries party to the Kyoto Protocol and particularly vulnerable to the adverse effects of climate change.

[3]Cap-and-trade is an administrative approach to controllling pollution by providing economic incentives to reduce it. A cap (or limit) is set for maximum permitted emissions for each company. Companies that want to increase their emissions allowance must 'trade' -- buying credits from those who pollute less (Blackmore, 2011:4).

[4]The EU Emissions Trading System (EU ETS) is one of the key policies introduced by the European Union (EU) to help meet its greenhouse gas emissions target of 8 per cent below 1990 levels under the Kyoto Protocol. It is a Europe-wide cap-and-trade scheme that started in 2005, and is the first of its kind. Each EU member state must develop a National Allocation Plan (NAP) approved by the European Commission. This sets an overall cap on the total emissions allowed from all the installations covered by the system. This is converted into allowances (1 allowance equals 1 tonne of CO_2) which are then distributed by EU member states to installations covered by the system.

[5]Elasticity is defined as the ratio of the percentage change in one variable to the percent change in another variable. In this case elasticity refers to how much demand for flights changes in response to price increases. Inelastic demand means that demand for flights does not change as much as the increase in flight prices.

[6]Using the highest estimate of 100 billion by the World Bank 2010.

[7]Calculated on the basis of volume of fuel used per revenue tonne kilometre performed.

[8]These figures are based on the European Commission paper, Impact Assessment of the Inclusion of Aviation Activities in the Scheme for Greenhouse Gas Emission Allowance Trading within the Community. This paper gave an estimate of emissions reductions if the cap were set at 100%. These figures have been adjusted to reflect the agreement reached in July 2008 that the emissions cap for aviation will be 95% of average 2004–06 emissions from 2013 onwards.

[9]These figures are based on UK aviation CO_2 forecasts from the Department for Transport (DfT) and assume the UK domestic target for CO_2 reductions in 2050 is 80 per cent below 1990 levels and that abatement effort to meet the target is predominantly in the rest of the economy. These estimates are based on central emissions forecasts; adopting alternative underlying assumptions to reflect uncertainties in this timeframe would change aviation's estimated share of emissions. DfT is currently updating its forecasts of aviation emissions for all years to 2050 and, these are expected to be published before the end of 2011. The 2050 share of aviation assumes that an illustrative 60 per cent emission reduction target is met by 2050. The figures used do not account for any impacts of radiative forcing.

HOW CAN AIR TRAVEL CONTRIBUTE TO THE COSTS OF ADAPTING TO CLIMATE CHANGE?

THE FEASIBILITY OF THE INTERNATIONAL AIR PASSENGER ADAPTATION LEVY (IAPAL) AS A MARKET GOVERNANCE MECHANISM.

By 2050 the costs of adapting to climate change in developing countries could reach US$100 billion per year, according to estimates from UNDP and the World Bank. New and additional funds for adaptation are desperately needed. The International Air Passenger Adaptation Levy (IAPAL) – a proposed new purchase tax on air tickets – offers a potential source for these funds. In its first year IAPAL could raise up to US$10 billion for adaptation, and considerably more in the longer term.

This paper updates the key assumptions made in the original paper proposing this scheme by Hepburn and Müller in 2006. It analyses the nature of current international agreements to determine the feasibility of introducing IAPAL and explores the views of IAPAL from airline companies, the tourism industry, environmental and other lobby groups, and the public in developed countries.

Findings from the study suggest that IAPAL would not have a significant impact on demand for international flights. The potential benefits of IAPAL for countries reliant on tourism are likely to outweigh the costs. Similar levies operating nationally such as the French Solidarity Levy indicate that IAPAL could be straightforward to implement. It is also fair because it charges those who are able to pay, and who contribute to climate change through air travel. Although there is likely to be opposition to IAPAL from airlines, particularly budget airlines, the study concludes that the benefits of IAPAL undoubtedly outweigh the costs. IAPAL deserves urgent support.

iied

The International Institute for Environment and Development is one of the world's top policy research organisations working in the field of sustainable development. With its broadbased network of partners, IIED is helping to tackle the biggest issues of our times – from climate change and cities to the pressures on natural resources and the forces shaping global markets.

International Institute for Environment and Development
3 Endsleigh Street
London WC1H 0DD
United Kingdom
Tel: 44 (0)20 7388 2117
Fax: 44 (0)20 7388 2826
Email: info@iied.org
www.iied.org