

Is the sky the limit for carbon offsetting?
**Corporate responsibility, consumer sovereignty and
commitment in the airline industry**

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1 Abstract

Air travel has significant impacts on global climate with few options for reducing those impacts at present. Carbon offsetting is a service offered by certain airlines in order to allow passengers to compensate for the carbon emissions generated by their flight thereby cancelling out negative impacts on climate. An increasing number of consumers are now booking their flights directly on-line rather than for example, through a tour operator. This has created an opportunity for passengers to take greater responsibility for their carbon footprint. A review of the literature found a significant research gap in that studies on carbon offsetting focused primarily on either retail carbon offset providers or passenger attitudes towards carbon offsetting. This dissertation views carbon offsetting from the perspective of airlines along the core themes of corporate responsibility, consumer sovereignty and commitment. Carbon offsetting performance is assessed by a comparative analysis of airline websites and compared with a survey of airline attitudes and opinions towards offsetting. This study recommends that airlines benchmark their carbon offsetting schemes using key performance indicators similar to those developed here in order to drive improvement towards best practice. A theoretical framework is also put forward to explain how key themes are interconnected depending on the desired end goal.

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3 Introduction

“Can I fly with a clear environmental conscience?”

This is a question I asked myself many times being a frequent air traveller, long-haul enthusiast and Catholic which later became the inspiration behind this study. It seems that I wasn't the only one considering the dilemma of whether I should minimize my carbon footprint and take greater responsibility for my actions. Mats Jansson, President and CEO of the airline SAS Group AB (until 2010), introduced a company report of the same title as my opening question to which his Director for Environment and Sustainability answered with an emphatic, “Yes. In addition, customers can buy carbon offsets for their travel” (SAS, 2009).

The aim of this study is not to debate the perceived morality of seeking absolution for “sins of emission” (*The Economist*, 2006) but rather concerns itself with whether airlines mean what they say and if they are acting in a responsible manner to allow consumers to make free and informed decisions on purchasing good quality carbon offsets. In summary, just how committed are airlines to the concept of offsetting which has been endorsed at the highest level by both their U.N. and industry-wide representatives?

Air travel is the single-most carbon intensive activity that an individual is likely to participate in (House of Commons, 2007, p.42). Aviation has therefore been the focus of much attention with regards to its environmental impacts. A typical economy-class return flight from London Heathrow to New York's JFK Airport generates approximately 1 tonne CO₂ (carbon dioxide) emissions per passenger¹ compared with for example, a total annual figure of 10 tonnes CO₂ emitted by the average person in the UK. A *carbon offset* is a form of credit earned by reducing or avoiding greenhouse gas (GHG) emissions that can then be sold to a company or individual that wishes to compensate for their own emissions, generated by flying (for example). Put another way, the consumer is buying back the CO₂ they emitted and thereby cancelling out its negative impacts. Hooper et al (2008) point out that there is currently no alternative to aviation when it comes to long distance and low carbon travel. Carbon offsetting can therefore be seen as an immediate, direct and pragmatic means to encourage action to limit climate change impacts at least in the short term.

The Intergovernmental Panel on Climate Change 4th Assessment Report estimated that aviation generated 2% of global anthropogenic CO₂ emissions in 2000 (IPCC, 2007a). However, the overall impact of aviation is considerably greater due to “non-CO₂” effects such as ozone generation at cruise altitudes from nitrogen oxides (NO_x) and the formation of contrails, which are condensation trails made up of ice-crystals that form behind aircraft.

¹ British Airways website as of 30/07/2011

In 2009, the global aviation industry produced 628 million tonnes of CO₂ (ATAG, 2010). More and more of us are travelling by air – partly due to the success of low cost carriers – which has given rise to the phenomenon of “hypermobile” travellers (Gossling et al, 2009). The world’s airlines already carry around 2.3 billion passengers annually and this figure is expected to grow at an average rate of 4.8% per year up to 2036 (ICAO, 2010). The situation in the UK is even more striking. The aviation sector currently accounts for around 5.5 per cent of the UK’s total CO₂ emissions but this could rise to as much as 24% by 2050 (House of Commons, 2007, p.41). Technological advances in fuel efficiency and the supply of sustainable biofuels cannot keep pace with this projected growth in passenger numbers. This has forced the hand of airlines to show a greater commitment to decouple emissions from growth and reduce its climate change impacts.

Kerosene (jet fuel) is exempt from tax on international air travel under the Chicago Convention (ICAO, 2007). Despite 1kg of kerosene emitting 3.15kg of CO₂, the environmental costs are externalized and therefore not paid by the industry which is responsible for them. Command-and-control measures such as fuel or emission taxes and air passenger duty (APD) are vigorously opposed by the airline industry, which by implication, leaves the door open for voluntary measures. Carbon offsetting is one such measure.

The International Air Transport Association (IATA) is the main industry body representing 230 airlines across 118 countries and coordinates the sector’s approach to climate change. IATA formally launched an ambitious set of goals for a global sectoral approach to carbon emissions in the build-up to Climate Change negotiations at Copenhagen in 2009. The industry already recognises the need for carbon offsetting as one of the mechanisms to achieve carbon neutrality. An estimated 90 million tonnes of CO₂ will need to be offset by 2025 through the carbon markets to maintain a cap at 2020 levels costing an additional \$7 billion per year to achieve (IATA, 2009a).

In the more immediate term, IATA has created a set of guidelines and toolkit for carbon offsetting (IATA, 2008) which provided a key part of the framework for this study and which will be discussed in more detail in subsequent sections. Significantly, the U.N. body representing the aviation industry, the International Civil Aviation Organization (ICAO), formally endorsed carbon offsetting at its 37th Assembly last year (ICAO, 2010, p.8).

Carbon markets for offsets can be classified as either regulatory/compliance or voluntary. In theory, carbon markets allow for reductions in emissions more efficiently and at a lower cost than other financial instruments such as taxes or subsidies. The main regulatory vehicle is the Kyoto Protocol of the United Nations Convention on Climate Change (UNFCCC) which has set carbon emission targets for developed countries (Annex 1) over

the period 2008-2012. It is worth pointing out that carbon emissions from international aviation are specifically *excluded* from the targets agreed under the Kyoto Protocol.

This study is concerned with the *voluntary* carbon market as this is the mechanism through which airlines and their passengers currently operate (at least until aviation is included in the EU Emissions Trading Scheme in 2012). Currently the voluntary market does not have a single industry-wide standard that can guarantee the quality of carbon offsets. However, the UK Government Quality Assurance Scheme fulfils part of this need and this formed a useful reference point for this study.

The total value of the global carbon market in 2010 was \$142 billion of which the voluntary market was worth just \$393.5 million in 2010 or 0.3% of the total (World Bank, 2011, p.54). Based on these volumes, it is clear that voluntary carbon offsetting does not offer the solution to addressing climate change on its own. Gossling et al (2007) estimated that voluntary carbon offsetting in the aviation sector would need to grow by a factor of 400 just to achieve a 10% reduction of GHG emissions. Corporations account for 80% of the voluntary offset market globally with individuals making up just a small percentage (Ecosystem Marketplace, 2010, p.91). Nevertheless, voluntary carbon offsetting serves a number of important roles according to the UK Government Environmental Audit Committee such as educating passengers on how to reduce their carbon footprint, building awareness of aviation impacts on climate as well as helping to deploy new technologies and contributing to sustainable development (House of Commons, 2007, p.12).

This study focuses on purely voluntary offsetting by *commercial* passengers as opposed to offsets purchased by corporations for corporate social responsibility (CSR) or pre-compliance purposes. Airline attitudes will be assessed through a survey whilst a comparative analysis of airline websites will allow performance of carbon offsetting schemes to be measured.

Carbon offsetting may have its critics but it raises important questions on the survival of an industry with few alternatives to achieving sustainable growth in the short term, a travelling public that is unwilling to forgo the convenience of air travel and the increasing likelihood of climate change legislation.

Research question 1

How responsible is the airline industry both in raising awareness and making available a high quality carbon offsetting service to its passengers?

<u>Macro-theme</u>	Corporate responsibility
<u>Sub-themes</u>	Education, credibility

<u>Methodology</u>	Comparative analysis (and survey)
<u>Inspiration</u>	<p><i>“Environmental responsibility is a top priority for airlines, alongside safety and security... As with every other area of our business we owe it to our customer to offer the highest standards of services and voluntary offset programmes are no exception”</i></p> <p>Giovanni Bisignani – IATA Director General and CEO (IATA, 2008)</p>

Research question 2

Are consumers empowered by airlines to make informed and timely decisions on whether to purchase carbon offsets based on good quality and easily accessible information?

<u>Macro-theme</u>	Consumer sovereignty
<u>Sub-themes</u>	Transparency, accessibility
<u>Methodology</u>	Comparative analysis
<u>Inspiration</u>	<p><i>“One of the ways individuals can reduce the impact of aviation emissions is to buy carbon offsets every time they fly. Around \$25 can offset the amount of carbon released per passenger during a London to New York roundtrip. But most people don't know how carbon offsets work or how to purchase them”</i></p> <p>Brad Pitt - Hollywood actor and celebrity (FastCompany.com, 2008)</p>

Research question 3

What are the attitudes of airlines towards carbon offsetting and do their actions match their words?

<u>Macro-theme</u>	Commitment
<u>Sub-themes</u>	Authenticity, attitudes
<u>Methodology</u>	Survey (and comparative analysis)
<u>Inspiration</u>	<p><i>“We take climate change with the utmost seriousness...We want you to be able to fly with us with a clear conscience...”</i></p> <p>Mats Jansson - President and CEO of the airline SAS Group AB (SAS, 2009)</p>

4 Literature Review

4.1 Introduction

This literature review identifies a significant research gap in that only two studies have specifically addressed carbon offsetting performance through a review of airline websites. Frew and Winter (2008) found that airlines did not promote their schemes effectively nor did they act responsibly to encourage customers to change their travel behaviour and think about the longer term challenges of climate change. However, their study was limited by the fact that only *four* airlines (out of 59) in Australia offered a carbon offsetting service. An ICAO (2009) study of 16 airlines in relation to carbon offsetting concluded that information was difficult to find on websites, uptake low and transparency lacking with regard to verification. Several peer-reviewed papers looked at the performance of carbon offset *providers* within the context of aviation but did not review the airlines directly. Gossling et al (2007) approached the topic from the point of view of aviation and tourism impacts on climate change whereas Hooper et al (2007) additionally looked at attitudes of passengers towards carbon offsetting. No evidence could be found of a dedicated study of *airline* attitudes towards carbon offsetting which provided another opportunity for this study to undertake original research.

This literature review initially focuses on the challenges that aviation poses for climate change and it explores the response of airline industry to the main drivers forcing the aviation industry to accept greater responsibility for its carbon footprint. This will set the scene for carbon offsetting as one mechanism used by airlines to address challenges to its future growth and expansion. The business case for voluntary carbon offsetting by passengers will be put forward followed by its criticisms – both technical and ethical. Lastly, carbon offsetting will be discussed in greater depth highlighting the three key themes which form the basis of this study's research questions – corporate responsibility, consumer sovereignty and commitment.

4.2 Airline impacts on climate and how the industry is responding

The scientific community is in consensus that climate change is real and that increasing greenhouse gas emissions in the atmosphere are “very likely” to have caused most of the increase in global average temperatures since the mid-20th century (IPCC, 2007, p.39). The year 2010 was one of the two warmest years on record based on average global surface temperature (NOAA, 2010, p.2). Aviation is widely quoted to be responsible for approximately 2% of global CO₂ emissions (IATA, 2008). Results from Lee et al (2009) indicate that a truer representation that includes non-CO₂ effects is a 3.5% share of total radiative forcing in 2005 or a 4.9% share including aircraft-induced cloudiness. The IPCC points out the significance of mitigating these non-CO₂ effects if future environmental policies for aviation are to be effective (IPCC, 2007b, p.49).

Air travel demand at UK airports is forecast to almost double from 241 million passengers in 2007 to 465 million by 2030 with CO₂ emissions from UK aviation growing from 37.5 MtCO₂ in 2005 to 58.4 MtCO₂ in 2030 (Department for Transport, 2009). Increasing passenger numbers implies an overall increase in environmental impacts since technological and operational advances cannot keep pace with overall growth. ICAO (2009) has set a goal of 2% improvement in annual fuel efficiency up to 2050. However, the IPCC (2007b, p.49) predicts a net increase in aviation emissions of at least 3% per year as efficiency gains cannot keep pace with a 5% annual increase in global air traffic.

IATA (2009a) formally launched an ambitious set of goals for a global sectoral approach to carbon emissions in the build-up to the UNFCCC climate change negotiations at Copenhagen in 2009. This commits the airline industry to –

- achieve carbon-neutral growth by 2020;
- improve fuel efficiency by 1.5% annually up to the same year and
- reduce carbon emissions by 50% by 2050 compared to 2005 levels

Figure 1 summarizes how airlines intend to reach these goals up to 2020. IATA estimates the capital cost of committing to carbon neutral growth from 2020 to be \$1.7 trillion. The vast majority of this figure (\$1.5 trillion) is due to replacing 27% of the global aircraft fleet with more efficient models.

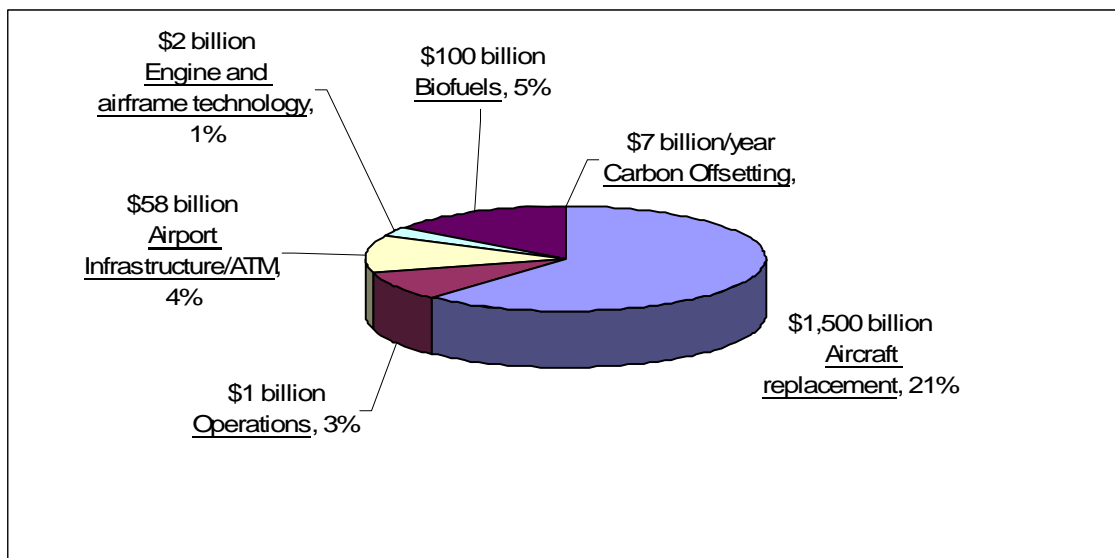


Figure 1: Proposed costs and measures to reduce CO₂ by 2020

Source: Adapted from IATA (2009a)

This pre-emptive action by the airline industry was largely driven by the threat of regulation. Airlines such as SAS have publicly acknowledged that a positive environmental image puts them in a stronger position when it comes to negotiating with regulators (Lynes and Dredge, 2006). Emission taxes on kerosene are precluded

under the Chicago Convention (ICAO, 2007). However, governments are free to apply air passenger duty (APD) to flights – an option which is vigorously opposed by the airline industry (IATA 2009b). In the case of the UK, APD was increased in the 2007 budget report to raise an estimated £2.2bn in 2010/11 but funds are not ring-fenced for aviation (Seely, 2011). The EU Emissions Trading Scheme (ETS) is another command-and-control instrument driving change more of which will be discussed further below.

4.3 Introduction to carbon markets

The Kyoto Protocol allows Annex 1 countries (developed country signatories with the notable exception of the U.S.A.) to engage in carbon trading alongside the Clean Development Mechanism (CDM) and Joint Implementation (JI). CDM projects generate a type of carbon offset called a Certified Emission Reduction (CER) which is equivalent to 1 tonne CO₂ that is either removed from the atmosphere or avoided by investing in approved projects in developing countries (Annex 2). Since international aviation is not covered by the Kyoto Protocol, it means that airlines cannot surrender CERs and claim credit for their actions. However, they can and do offer CERs to their passengers as part of a voluntary carbon offsetting initiative.

The voluntary market exists alongside the compliance market to supply carbon credits to corporations who want to enhance their green credentials or individuals such as airline passengers who want to compensate for their personal carbon footprint. VERs (Verified Emission Reductions) are similar to CERs but are not governed by the CDM and therefore use a multitude of other standards. As stated above, CERs can also be bought and sold in the voluntary market.

The largest carbon trading scheme is the EU ETS which is a cap-and-trade mechanism where emission allowances known as EUAs (EU Emissions Allowances) are traded. Aviation is set to become part of the EU ETS in 2012 when emissions will be capped at 95% based on average emissions over the period 2004-6 with 15% of allowances auctioned from 2013. Ares (2011) expects that the majority of emission cuts will be met by airlines purchasing CERs rather than buying EUAs to cover any shortfall in permits or indeed reducing their own emissions. An industry source commented that carbon offset providers are considering abandoning the voluntary sector and switching instead to supplying compliance credits to the EU ETS. This leads to concerns as to whether airlines will hoard all the CERs they can acquire to meet future obligations under the EU ETS rather than offer them to their passengers as voluntary carbon offsets.

4.4 A brief history of carbon offsetting

The first carbon offset project was established in the U.S in 1989 when Applied Energy Services committed to plant 50 million trees in Guatemala in return for permission to build a coal-fired power station (Smith, 2007, p.14). However, it was not until almost a decade later that the carbon offsetting retail sector became established with the founding of dedicated carbon offset providers such as ClimateCare and the CarbonNeutral Company in 1998 in the UK.

In 2004, NatureAir (2011) laid claim to be the world's first carbon neutral airline by investing directly in the conservation of tropical rainforests in Costa Rica. The following year British Airways became the first airline to make carbon offsetting available to its passengers and soon after the phrase "carbon neutral" became firmly established in the mainstream when it was awarded "Word of the Year" by the New Oxford American Dictionary (OUP, 2006).

The airline industry's main representative body, IATA, came on-board in 2008 with the publication of their guidelines and toolkit for Aviation Carbon Offset Programmes and the launch of their own carbon offsetting service for airlines (IATA, 2008). Today there are 228 carbon offset providers (retailers, wholesalers, project developers, brokers and consultants) according to the ENDS (2011). However, just 25 airlines offer a carbon offsetting service (IATA, 2008).

4.5 The business case for carbon offsetting

"The strength of the voluntary carbon offsets market is its ability to support a diversity of projects: including those that are small; those that bring additional sustainable development benefits; and those found in countries which are currently under-represented in compliance market projects" (House of Commons, 2007, p.27).

The International Carbon Reduction and Offset Alliance have developed their own Code of Best Practice to which its ten carbon offset providers adhere (ICROA, 2009). ICROA argues that high quality voluntary offset standards are more innovative, more cost effective and provide invaluable co-benefits.

The voluntary carbon offsetting market supports a diversity of projects which the compliance markets do not cover. These are often small projects located in least developed countries and with additional sustainable development benefits. These projects are governed by standards established by non-governmental organization

(NGO) partnerships such as the Climate Change and Biodiversity Alliance (CCBA, 2011) which focuses on sustainable development and conservation of biodiversity. Perhaps the best known is the Gold Standard (2011) which is supported by over sixty NGOs and founded by WWF in 2003 supplying premium offsets under the CDM and Voluntary Carbon Standard (VCS) largely to the voluntary market. A study by MacKerron et al (2009) found that projects which have co-benefits may encourage uptake of carbon offsets especially where those co-benefits are emphasized to consumers. Consumers were also found to be willing to pay the increased transaction costs associated with such co-benefits.

Airlines would arguably have a stronger platform on which to fight the inclusion of aviation in the EU ETS if they actively demonstrated support for voluntary carbon offsetting and encouraged uptake amongst their passengers. Legal challenges to the inclusion of aviation in the EU ETS from 2012 throw uncertainty on the prospects for managing carbon emissions through the compliance markets. By default, this increases the need for voluntary action, at least in the short-to-medium term until consensus can be reached on an international regulatory framework.

A study by Brouwer et al (2008) concluded that the carbon offset market could be worth \$23 billion per annum based on 2004 estimates of 1.3 billion tonnes CO₂ emitted by passenger airlines each year. Offsetting, when done well, has the potential to encourage behavioural change by increasing environmental awareness thus countering the argument that offsets allow consumers to continue polluting without changing their behaviour. However, Eijgelaar (2009) points out that although there may be a willingness to offset or even change travel behaviour, this does not translate into actual offset and travel behaviour.

The ICAO (2009) report mentions that due to the lack of alternative fuels and relatively high capital costs, emission reductions cost more for aviation compared to other sectors. Based on the figures stated above (2.3 billion passengers emitting 628 million tonnes of CO₂ in 2010) and assuming a cost of \$20/tonne CO₂, the average cost per passenger would be a meagre \$5.50 to offset all aviation emissions.

4.6 Challenges and ethical concerns

Criticisms of carbon offsetting fall into two broad categories - technical/scientific and ethical (Lovell et al, 2009). Table 1 summarizes the technical challenges to overcome in order to realize a high quality carbon offsetting product and some of the measures that can be taken to mitigate.

Table 1: Summary of challenges to carbon offsetting

Source: Author

Challenge	Description	Mitigation measure
Additionality	Establishing a hypothetical baseline and proving that project finance is essential	CDM Additionality tool
Permanence	Emissions not permanently removed; e.g. where trees die due to fire or disease	Monitoring over the entire project life-cycle; insuring against loss
Leakage	Avoided/reduced emissions are simply displaced outside the project area	Allow for contingency offsets
Verification	Independently assuring methodology and procedures	Third party verification by an external auditor
Timing	Avoiding claims not yet realized – future vintages	Discounting to allow for future emission reductions
Double-counting	Failing to retire an offset and then reselling or counting a voluntary reduction that is also part of the Kyoto Protocol	Registry to track and record offsets retired
Calculating carbon footprint	Accurately measuring personal emissions attributed to an individual’s flight	Carbon calculator uses actual airline fuel data and emission factors



Additionality is perhaps the most controversial aspect of carbon offsetting since a project needs to measure a hypothetical reality which cannot be proven. The emissions that *would* have occurred if the offset project did not exist (the baseline) need to be estimated in order to calculate the quantity of emission reductions that the project achieves. The key question that needs to be answered is whether the project would have happened in the absence of any carbon finance. The CDM has developed its own additionality tool which certifies projects that overcome financial, technical or skilled-labour barriers although it is still likely that a substantial number of registered projects are not truly additional (Kollmuss et al, 2008).

The fact that there are multiple carbon offsetting standards and a lack of regulation means that there is no consensus on what constitutes a good quality product or how to enforce this. Self-regulation has stepped in to replace the void created by the absence of regulation in the voluntary market. Dhanda and Hartman (2011) recommend that the multitude of standards themselves need to be standardized. Kollmuss et al (2008) compared eight different standards across a similar number of criteria and concluded that, due to the complexity of carbon offsetting, no single offsetting standard will ever be able to address all concerns effectively.

Figure 2: “Offsetting should never be the first choice option”

Source: http://www.decc.gov.uk/en/content/cms/emissions/co2_offsetting/co2_offsetting.aspx

However, some governments are showing greater involvement in this space. The UK Government's Quality Assurance Scheme was established to increase consumer confidence by providing assurance on what they are purchasing, increasing price transparency, improving understanding of offsetting and tackling additionality (DECC, 2009). A similar initiative was recently established in Australia with the National Carbon Offsetting Standard (NCOS, 2010) to address some of the concerns in Table 1.

Critics on the ethics of carbon offsetting often draw parallels with the sale of indulgences by the Catholic Church as described in Chaucer's *The Pardoner's Tale* (Smith, 2007, p.5). One recurring theme is the perceived morality of seeking absolution for climate sins. *The Economist* (2006) likened offsetting to "sins of emission". Friends of the Earth (2009, p.3) goes as far as recommending that offsets should be prohibited and coins terms such as "junk" or "sub-prime" carbon to draw clear parallels with recent events in the broader financial markets triggered in 2007.

Smith (2007, p.6) argues that what is really needed is a profound change in consumption patterns, which in the case of airlines means travelling less. It is highly unlikely that airlines are going to openly accept this argument. His Carbon Trade Watch report uses the phrase "carbon colonialism" to describe how the Global South is being used as a means of cleaning up the waste produced by the developed countries in the North. The existence of offset schemes allows the travelling public to take a "business as usual" attitude to the threat of climate change. This study does not seek to address the ethical debate from the point of the consumer. However it is concerned about the *business* ethics of carbon offsetting insofar as airlines are acting in a responsible manner to allow consumers to make free and informed decisions on purchasing a good quality carbon offset product.

4.7 Airline commitment

As already discussed, IATA has shown a commitment to mitigate the impacts of the airline industry on climate change by setting itself ambitious targets. The airline industry also recognises the need for carbon offsetting as one of the mechanisms to achieve carbon neutrality (IATA 2009a; ICAO, 2010). IATA has set up its own carbon offsetting service for airlines taking advantage of economies of scale and the potential for greater impact through a common approach towards for example, promotion and marketing. This is also a useful reference for airlines that do not necessarily want to partner with IATA but already have or intend to start a carbon offsetting scheme. Seven airlines were due to introduce an offsetting scheme in June or July 2010 (IATA 2009a) and Reuters separately reported that ten airlines were expected to join the IATA scheme during 2011 (Reuters, 2011). However, actual commitment is low with only two airlines actively offering a carbon offsetting service more than two years after the launch of the IATA programme.

A key measure to achieving carbon neutral growth from 2020 is to develop more fuel efficient aircraft, although this can be argued to be an economic necessity for airlines due to concerns about peak oil and price volatility rather than any desire to be more environmentally friendly. Lynes and Dredge (2006) studied the motivations behind environmental commitment at SAS and found financial gain through eco-efficiencies to be a driving force along with regulatory, CSR, airline image and stakeholder pressure. Investment in fleet renewal and technology can be partly recouped by promoting environmental credentials in order to generate good-will with passengers and strengthen the value of the airline's brand. Motivations behind why some airlines are embracing carbon offsetting are important in order to understand how committed they really are to environmental concerns. My study gathered attitudes and compared what airlines say they do with what they actually do in practice in order to get a feel for how committed they are to carbon offsetting.

Lynes and Dredge (2006) also found that SAS values industry benchmarking highly and recognises the need to be able to compare airlines consistently in order to improve environmental performance. However, the authors were unsure about whether other airlines are committed in a similar way. My study will attempt to put this to the test by benchmarking airlines with regards to carbon offsetting and making this information freely available.

4.8 Airline corporate responsibility

Corporate responsibility (CR) can be defined broadly as the efforts corporations make above and beyond regulation to balance the social and environmental needs of stakeholders with the need to make a profit. Stakeholders can vary from employees to investors to governments but the focus of this study is on consumers, or more specifically, *environmental* responsibility involving *passengers*. Currently, aviation is in the privileged position of not being bound by regulation to accept accountability for the environmental damage caused by its carbon footprint. This is largely due to effective lobbying of governments and difficulties in adopting a global sectoral approach that addresses legitimate concerns such as fair competition. Corporate responsibility through voluntary actions such as carbon offsetting is all the more important in such an absence of regulation or where regulation is either weak or not enforced.

IATA (2008) states that carbon offsetting schemes should become an integral part of an airline's approach to corporate responsibility. A well-organised carbon offset scheme demonstrates a carbon conscious and environmentally responsible attitude of an airline. A comparative analysis of airline websites in this study attempted to determine if airlines' actions match their words with regards to responsibility.

'Greenwash' is the use of green public relations (PR) or marketing in order to promote a misleading perception that a company's policies or products are environmentally friendly. Polonsky et al (2010) describe carbon offsets as the "next green marketing frontier" and warn against carbon offsetting schemes that potentially

mislead consumers. Airlines also need to make it clear to their passengers what is *not* covered by the carbon offsetting they are purchasing, such as carbon associated with its ground operations. Carbon offsets investing in forestry projects should take even greater care that the consumer is made aware of the possible downsides. For instance, if a forest does not reach maturity, is the airline (or its carbon offset provider) insured against loss and do they have plans to invest in an alternative project under advice to the consumer?

Airlines should act responsibly to make it clear to passengers that offsetting is a *short-term* solution only since offsets do not directly reduce aviation emissions on their own (Gossling et al, 2007). Airlines also need to demonstrate responsibility by encouraging passengers to change behaviour as this is likely to be even more significant than technological change. Such changes in behaviour rely on allowing passengers to purchase offsets based on meaningful environmental information in order to choose the least harmful alternative.

Hooper et al (2008) surveyed almost 500 passengers at Manchester Airport in the UK and found that 90% did not offset their flight. A majority of these passengers (60%) either did not know it was possible or did not know how to do so. Many passengers also believed that *airlines* were more responsible than they actually are for addressing the impacts of climate change. These findings indicate that airlines could be and should be doing more to act as responsible corporate citizens.

4.9 Consumer sovereignty and passengers

Consumer sovereignty theorizes that consumers drive the market under conditions of perfect competition. Smith (1995) developed the consumer sovereignty test (CST) which measures this theory by looking at three factors – *consumer capability* (how free consumers are to make rational decisions), *information* (its availability and quality) and *choice* (how easy it is to switch to a competitor). Are airlines acting as good corporate citizens by acting in a responsible way to protect consumers' rights on these three points?

The UK Government Quality Assurance Scheme (DECC, 2009) has a focus on protecting the consumer through education, enabling choice, increasing consumer confidence and setting a benchmark for offset providers to follow. Choice for airline passengers could apply to project type, location or price within a portfolio of carbon offsets offered directly or through its carbon offset provider.

McKercher et al (2009) assessed attitudes of the travelling public in Hong Kong and found that those who travel the most were best informed about climate change yet were least likely to express a desire to change their travelling behaviour. They concluded that passengers need to be convinced that their personal actions can make a real contribution in order to convert education and awareness of aviation impacts on climate into real action.

Airlines have an important role to convince their passengers that they can make a difference by demonstrating qualities of transparency, credibility and authenticity to support the passenger in their decision making.

Dhanda and Hartman (2011) debated the ethics of carbon neutrality and concluded that awareness-raising of the impacts of climate change on human development is the key to the success of carbon offsetting. Consumers can only act responsibly if they understand the wider consequences of purchasing a carbon offset which in turn depends on airlines facilitating passengers to make informed decisions. Developing targeted promotional campaigns for carbon offsetting schemes to meet diverse perspectives and knowledge on climate change was found to be important in a study by Becken (2004) which identified five different categories of tourist. For instance, emotion and appealing to aesthetic values play an important role in the decision of certain tourists to support offsetting by tree-planting.

The costs of compliance for aviation in the EU ETS are likely to be passed on to consumers through higher fares (Boon et al, 2006). This begs the question of whether passengers even know that they could be effectively paying a second time if they also decide to buy voluntary carbon offsets. Airlines should look to avoid any double-counting or allegations of double-charging and make passengers aware of such a possibility if they are unable to put controls in place.

In summary, many airlines have expressed a public commitment to carbon offsetting based on external pressure to take greater responsibility for their carbon footprint. Carbon offsetting has an established business case but faces numerous challenges both technical and ethical. Numerous studies have highlighted that airlines should act in a responsible manner to meet the diverse needs of their passengers so that they can make an informed choice when purchasing an offset.

5 Methodology

5.1 Mixed methods research design

This study has adopted a mixed methods approach using two complementary research methods in order to cross-check results, identify discrepancies, generate new leads and validate findings through triangulation of the data. This mixed methods approach to research design lends itself well to my pragmatic philosophical viewpoint. Cherryholmes (1992) states that pragmatists are interested in paying “more attention to the ways of life we are choosing and living when we ask the questions we ask”. Pragmatists also look to the “what” and “how” to research, which is reflected in the research questions in my study. Air travel is a lifestyle choice for many and my study is interested in finding a practical solution to the problem of climate change impacts by reviewing one potential approach (carbon offsetting).

An overall concurrent triangulation design was adopted as described in Creswell (2009, p.210) which allowed me to gather quantitative and qualitative data and then analyze at the same time in order to provide a more comprehensive analysis. Additionally, preliminary findings of each research method provided guidance on how to improve the other and thus target specific themes in greater detail. For instance, the comparative analysis of airline websites using the IATA toolkit and guidelines generated questions for the survey. The survey findings in turn prompted a more detailed examination of the ways airlines promote their offsetting schemes through the comparative analysis. This approach led to a more robust set of findings overall and allowed for a direct comparison between thoughts (survey) and actions (comparative analysis) to determine if airlines are consistent in what they say and what they do.

Survey data was collected by means of a web-based questionnaire whilst a benchmarking methodology was employed in order to critically assess carbon offsetting on airline websites. The weight assigned to each research method was broadly equal although data analysis was largely qualitative. Data was analyzed and interpreted concurrently and findings were consolidated along established themes as discussed below. The overall research design and how it relates to my research questions is shown in Figure 3.

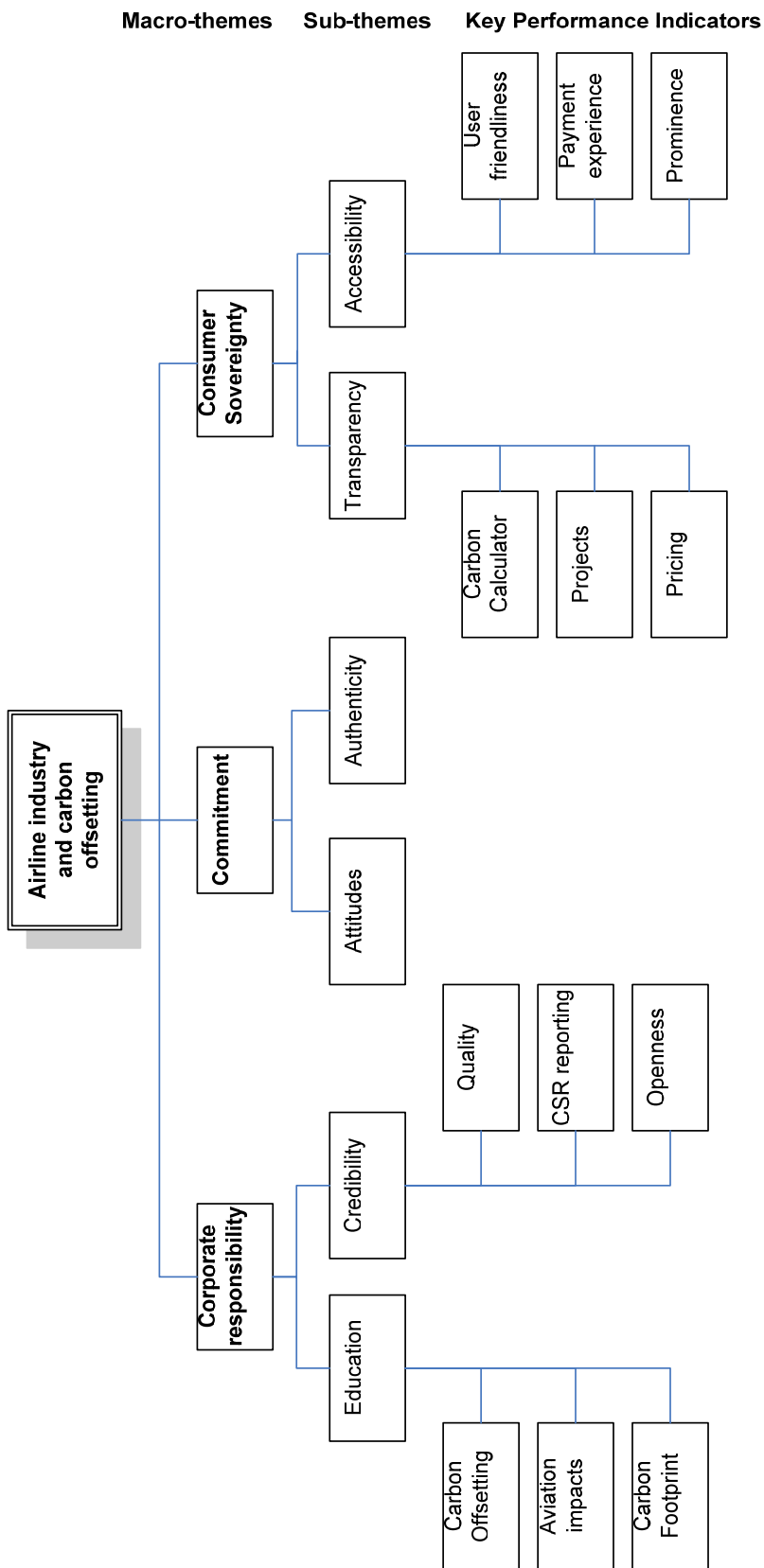


Figure 3: Research design hierarchy
 Source: Author

5.2 Airline survey

Data was collected by means of a web-based questionnaire to gather attitudes, identify patterns between variables and cross-reference with the comparative analysis of airline websites. This study focused specifically on IATA member airlines for several reasons -

- IATA is the main industry body for airlines and represents 230 airlines globally.
- IATA published its own guidelines and toolkit for carbon offsetting and has assisted several airlines in setting up their own offsetting schemes. This document acted as a useful blueprint on which to judge the performance of all airlines against the recommendations of their official industry representative.
- Finally, IATA was willing to support the design and distribution of the survey. Without their support, it would not have been possible to target the appropriate contacts across so many airlines.

A face-to-face meeting was held with IATA in their executive offices in Geneva, Switzerland in February 2011 to discuss how we could work together effectively, in particular with regards to the survey. A Memorandum of Understanding was exchanged between both parties and further discussions were held by conference call.

Defining and sampling the population

The target population for this survey are those airlines *with* a carbon offsetting scheme wherever they may be located. A previous study by ICAO (2009) analyzed carbon offsetting at just 16 airlines and IATA (2009a) identified 27 such airlines though these were not named. For very small populations (50 or less), almost the entire population needs to be sampled in order to achieve a high level of accuracy (Morris, 2008). In the case of my study, a population size of 32 airlines was identified meaning that in order to attain a confidence level of 95% based on an actual sample size of 10 airlines (as is the case), then the margin of error is +/- 25% approx. If we want to increase accuracy to +/- 10%, then we need to increase our sample size to 24. These calculations are based on the sample size formula available in Babbie (1990, p.69) and an online calculator (Survey System, 2011). Airlines *without* a carbon offsetting were also surveyed in order to collect attitudes across the entire industry and to compare between both groups of airlines. In this case, the population size was significantly larger considering that there are 230 airline members of IATA alone.

In both cases, it was not possible to select a random sample of the entire population of airlines globally primarily due to limitations of securing access to the appropriate contacts. Therefore convenience sampling was employed by limiting the survey to IATA member airlines only, and more specifically those airlines that

appeared in the IATA environmental contact database. It should also be noted that some airlines do not have a dedicated contact for environmental issues increasing the difficulty of locating the most qualified contact to participate in the survey.

Survey design and implementation

The survey was designed and responses collected using a reputable online survey company (surveygizmo.com). Survey design guidance, such as increasing the reliability of responses, was taken by referring to Fowler (2002). Question wording was agreed in collaboration with IATA to ensure that questions were clear and concise and to ensure consistency in the use of terms and the style and phrasing of questions. Bias was minimized through the careful selection of possible answers where multiple choices existed. Complex terms or abbreviations were explained to account for varying levels of knowledge amongst airlines. This was particularly relevant for those airlines without a carbon offsetting scheme and also smaller airlines that may not have a dedicated environment manager.

Three closed-ended question types were used throughout the survey in order to facilitate the analysis and presentation of findings -

- Rankings
- 5-point Likert scales to judge level of agreement with a particular statement
- Multiple choice selections

A greater response rate to the survey was encouraged by branding the survey with the IATA logo and making use of their corporate colours. The aim was to reinforce the fact that although the survey is independent, it has the approval of their main industry representative. Key questions and structure of the survey were explained on the front page of the survey to aid respondents (Appendix 1 shows survey screenshots). A pilot survey was conducted with IATA contacts to establish content validity and some questions were changed in order to achieve more meaningful and useful responses. Anonymity and confidentiality were guaranteed to all potential respondents as part of the study's code of ethics. This also had the potential advantage of increasing the response rate by allowing airlines to respond more freely.

A link to the survey and cover letter was sent out by email on the 8th April 2011 to all airlines in the IATA contact database with a reminder email 10 days later. The vast majority of responses were collected by the survey deadline date of 22nd April 2011 (Appendix 2 contains a copy of the cover letter).

Data analysis

Response rates were calculated for airlines with carbon offsetting and those without, as shown below. Actual responses to each question were formatted to display results in tables or pie-charts to facilitate analysis and spot trends. Appendix 3 contains the complete set of responses. No evidence of response bias was found using wave analysis (Leslie, 1972). This was checked by determining if responses changed significantly between those who participated in the survey at the start versus those airlines that only responded after a reminder was sent out.

Survey design provides a quantitative or numeric description of trends, attitudes or opinions of a population by studying a specific sample and then generalizing results to the entire population (Creswell, 2009, p.145). Appendix 4 shows the approach taken to deciding upon which statistical tests to use. Due to the small population size already discussed and the margin of error with the sample size obtained, statistical analysis was deemed to be unlikely to allow generalizations to be made to the broader population of airlines. An overall *qualitative* approach incorporating textual descriptions and observations of numeric data was deemed to be best suited to describe the data and answer the research questions posed.

5.3 Comparative analysis of airline websites

A critical review of airline websites was undertaken to help determine the outcome to the key research questions posed in this study. The aim of the comparative analysis was to benchmark the carbon offsetting performance of airlines against a set of best practice criteria developed in this study from:

- IATA guidelines and toolkit for carbon offsetting
- UK Government Quality Assurance (QA) Scheme for carbon offsetting
- Comprehensive literature review

A critical review of the literature followed the procedure described in Bell (2005, pp.99-111). Tables 2 and 3 summarize the requirements and guidelines of the two key documents above which helped generate a set of best practices against which airlines were judged.

Table 2: UK Government Quality Assurance Scheme best practice*Source: Adapted from DECC (2009)*

Requirement	Theme	Equivalent theme in my study
Accurate calculation of emissions to be offset	Calculating emissions	Transparency
Clear and transparent pricing of the offset	Calculating emissions	Transparency
Use of good quality carbon credits, i.e. Kyoto compliant	Environmental integrity	Credibility
Cancellation of carbon credits within a year of the consumer's purchase	Environmental integrity	Credibility
Provision of information about the role of offsetting in climate change and advice on how to reduce one's carbon footprint	Consumer information	Education

Table 3: IATA guidelines for carbon offsetting*Source: Adapted from IATA (2008)*

Guidelines	Theme	Equivalent theme in my study
Ticket and offset purchase should be offered in a combined transaction	Customer proposition	Accessibility
Easy access through appropriate links to information on how footprint is calculated, project location and co-benefits	Customer interface	Transparency/Accessibility
Ensure adequate processes are in place for verification, additionality and to avoid double-counting	Management responsibilities	Credibility
Carbon calculator to follow ICAO methodology with own fuel data preferable	Carbon calculator	Transparency/Credibility
An external audit should be published within 2 years of launch. The programme should be reviewed and modified in light of customer feedback	Monitoring progress and improvements	Commitment

Benchmarking is the process of comparing one's business processes and performance metrics to best practice within that industry or by comparison to other industries. A report by Fry et al (2005) found that benchmarking was the most used performance improvement technique for airlines. However, accurate benchmarking of environmental performance is difficult due to the lack of any standardised Key Performance Indicators (KPIs) within aviation (Hooper et al, 2004). The same study also found that information provided in CSR reports does not allow the performance of airlines to be compared effectively. My study addressed this need for benchmarking and the lack of performance measures by developing a set of KPIs which airlines could apply to their own organizations to improve business practices in their carbon offsetting service. Figure 4 shows the methodology designed to benchmark the carbon offsetting performance of airline websites.

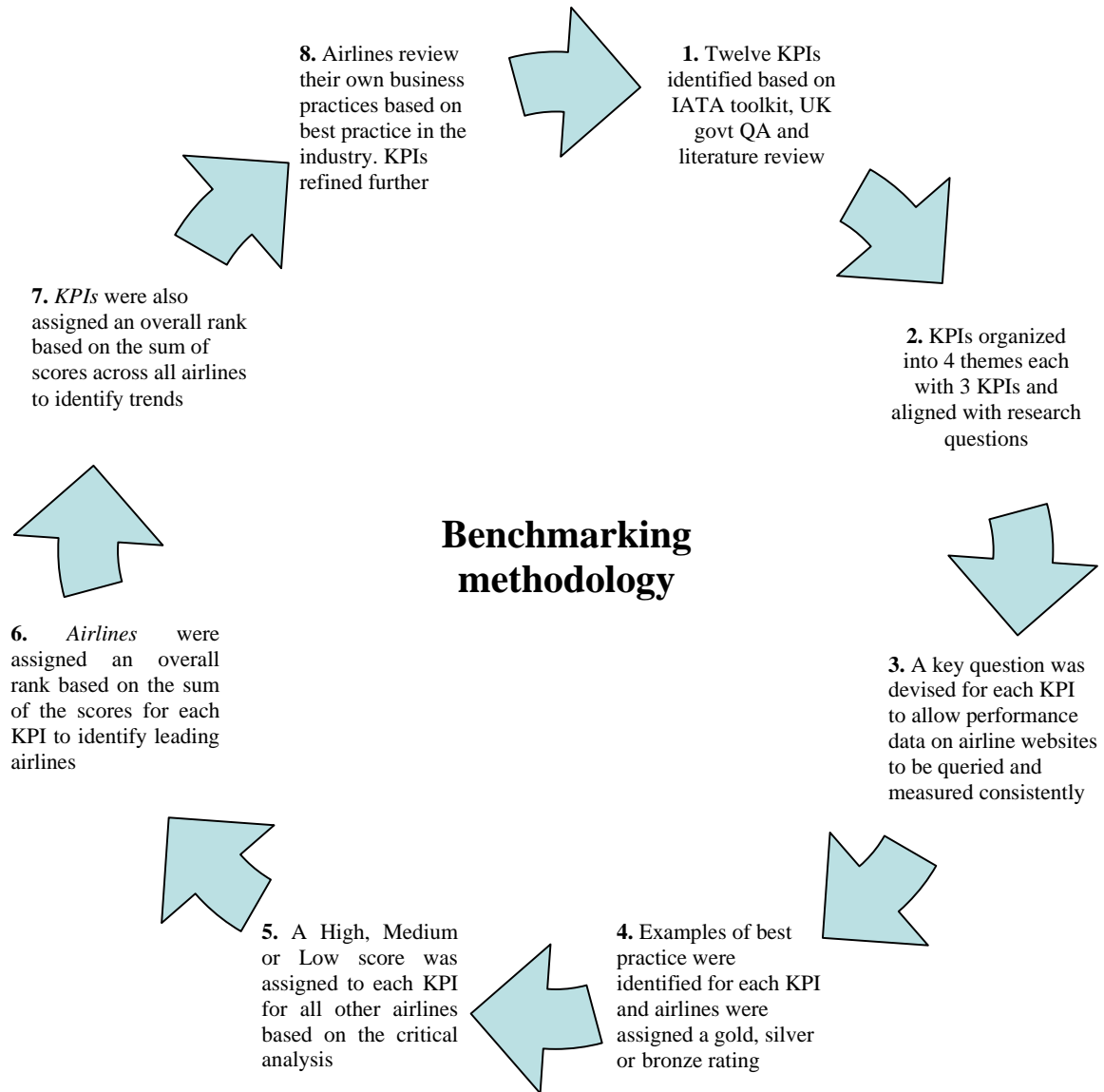


Figure 4: Research design for benchmarking of airline performance

Source: Author

Data collection and recording

An extensive on-line search was conducted using textual analysis to arrive at a comprehensive list of all airlines that mentioned carbon offsetting in some form on their websites. Since the survey was only open to IATA member airlines, the comparative analysis focused on these same airlines in order to cross-reference findings etc. However, the performance of non-IATA member airlines, in particular smaller specialist airlines, was also reviewed as they provided examples of best practice and raised some interesting questions. Airline websites provided the primary source of data to be collected which allowed themes such as corporate responsibility and consumer sovereignty to be tied directly to the airlines themselves. However, links to partner websites and/or documents such as verification reports for projects or carbon calculators were also assessed where appropriate. An inductive approach was followed in order to generate themes and sub-themes in line with the study's research questions. Each theme was further split into KPIs which were used to judge the performance of an airline carbon offsetting scheme (see Figure 5). A set of questions was devised to provide a practical way of querying the information available on airlines websites objectively and converting into a score (in certain cases, additional factors impacted on the score for a KPI).

Data analysis

Data analysis followed the procedure described in Creswell (2009, pp.183-190). An observational protocol was developed to record data. This took the form of a large spreadsheet with a list of airlines in rows and a series of columns to record data for each attribute observed. Textual analysis was conducted on the three sources already mentioned to arrive at a list of KPIs which were coded. These codes were applied to the observations of airline websites and data reorganized for each KPI. In this way, a summary grid for airline website performance was generated as shown in the Results section. The concurrent triangulation strategy adopted in my study meant that qualitative and quantitative data were analyzed together in order to easily compare both using *qualitative* analyses as described by Creswell (2009, p.213). This data transformation approach meant that quantitative statistical analysis was not needed or indeed deemed suitable.

Comparative analysis of airline websites			
Themes	Transparency	Education	Credibility
Key Performance Indicators (KPIs)	Review of carbon calculator	Explanation of carbon offsetting	Quality
	Detail provided on projects	Impacts of aviation on climate change	CSR reporting
	Pricing transparency	How to reduce one's carbon footprint	Openness
Key questions	Does the airline clearly explain how carbon emissions are calculated per passenger including any assumptions?	Does the airline allow the consumer to clearly understand carbon offsetting in a way that has meaning to them?	Does the airline make it easy to judge quality through high standards, quality assurance and verification reports?
	Are projects explained in detail including no. of offsets generated and links to supporting documentation?	Does the airline increase awareness of the broader issues of climate change and sustainable aviation?	Does the airline discuss their offsetting scheme as part of CSR reporting?
	How transparent is pricing to the consumer and are all charges clearly explained?	Does the airline educate the consumer on alternative ways to reduce their carbon footprint?	Does the airline disclose uptake volumes and discuss achievements/challenges with its customers?
			Accessibility
			User-friendliness
			Payment experience
			Prominence
			Is the consumer encouraged to find out more about the airline's carbon offsetting through interactive content, animation etc?
			How easily can consumers book carbon offsets online to facilitate uptake?
			How prominent is the airline's carbon offsetting scheme and does it have a link or logo on their homepage?

Figure 5: Research design for comparative analysis of airline websites
Source: Author

6 Results

6.1 Comparative analysis of airline websites

An increasing number of consumers are booking their flights directly on-line rather than for example, through a tour operator. A critical review of airline websites was therefore undertaken to help determine the outcome to the key research questions posed in this study. A full list of airline websites is shown in Appendix 5. An extensive on-line search was performed which identified 32 airlines as having an active carbon offsetting service based on the information available on their websites. IATA member airlines (25) with active carbon offsetting schemes are the core population for this study but data on non-IATA airlines (7) that have active schemes was also collected in order to allow for comparison between both groups (see Table 2). As can be seen, there are many different carbon offset partners, a fact which partly explains the wide variety in performance found in the comparative analysis.

Table 4: Airlines included in comparative analysis

Source: Author

IATA member airlines		
Airline	Region	Offset provider or partner
Air Canada	North & South America	zerofootprint.com
Air France	Europe	actioncarbone.org
Air New Zealand	Oceania	In House
All Nippon Airways	Asia	moretrees.org
Austrian Airlines	Europe	Climate Austria
British Airways	Europe	Morgan Stanley
Brussels Airlines	Europe	CO2 logic
Cathay Pacific	Asia	In House
Cebu Pacific Air	Asia	WWF Philippines
Continental Airlines	North & South America	Sustainable Travel International
EI AL	Middle East & Africa	Jewish National Fund
Icelandair	Europe	Kolviður - Iceland Carbon Fund
Japan Airlines	Asia	CarbonNeutral Company & Recycle One Inc
Jetstar	Oceania	ClimateFriendly
Kenya Airways	Middle East & Africa	IATA
KLM	Europe	CO2 Zero and WWF
Lufthansa	Europe	myclimate.org
Malaysia Airlines	Asia	Forest Research Institute Malaysia/Ministry of Environment
Qantas	Oceania	ClimateFriendly
SAS	Europe	CarbonNeutralCompany
Swiss	Europe	myclimate.org
TAP	Europe	IATA
United Airlines	North & South America	Sustainable Travel International
Virgin Atlantic	Europe	myclimate.org
Virgin Australia	Oceania	N/A
Non-IATA member airlines		

Easyjet	Europe	In House
Harbour Air	North & South America	Offsetters
Monarch	Europe	jpmorganclimatecare.com
NatureAir	North & South America	National Forestry Financing Fund (FONAFIFO)
NetJets Europe	Europe	EcoSecurities (3Degrees in US)
Thomas Cook	Europe	TICOS and The Travel Foundation
Thomson Airways	Europe	jpmorganclimatecare.com and The Travel Foundation

The comparative analysis involved collecting 384 individual pieces of data by querying airline websites using the key questions shown in Figure 5 above. The results were summarized in a grid to allow for consistent and easy comparison across airlines and also to spot trends across KPIs (see Figure 6). This approach allowed for data to be analyzed in three ways:

- (i) Identify examples of best practice for each of the twelve KPIs across the airline industry as indicated by the Gold, Silver and Bronze ratings.
- (ii) Assess the overall performance of a given airline based on the number of each type of rating and assign an overall rank to compare across the entire industry
- (iii) Identify specific KPIs which were particularly weak when compared across all airlines

By comparison, the ICAO reviewed exactly *half* the number of airline websites as my study and without the same level of standardization that facilitates effective benchmarking across the industry (ICAO, 2009).

Airline	Transparency			Education			Credibility			Accessibility			Ranking
	Carbon calculator	Project details	Pricing transparency	Carbon offsetting	Climate change & Aviation	Reducing carbon footprint	Quality	CSR reporting	Openness	User-friendliness	Payment experience	Prominence	
Air Canada	Low	Medium	Medium	Medium	Low	Low	Low	Low	Low	Low	Medium	Medium	
Air France	Silver	Medium	Low	Low	Low	Low	Medium	Medium	Low	Low	Low	Low	17
Air New Zealand	Medium	Low	Low	Low	Low	Low	Low	Low	Medium	Medium	Medium	Medium	
All Nippon Airways	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Medium	
Austrian Airlines	Low	Medium	Low	Medium	Low	Low	Medium	Medium	High	Low	Medium	Low	
British Airways	High	Bronze	Low	Medium	Low	Low	Bronze	Silver	Gold	Medium	Medium	Medium	3
Brussels Airlines	Low	Medium	Low	Gold	Low	Low	Silver	Low	Low	Medium	Bronze	Bronze	4
Cathay Pacific	High	Medium	Low	Medium	Bronze	Low	Medium	Silver	Bronze	Medium	Medium	Silver	14
Cebu Pacific Air	Low	Low	Low	Low	Low	Medium	Low	Low	Low	High	Medium	Medium	
Continental Airlines	Low	Low	Gold	Low	Medium	Low	Medium	Medium	Low	Low	Medium	Low	6
EasyJet	Medium	Medium	Medium	Low	Low	Low	High	Low	Medium	High	High	High	
El AL	N/A	Low	Low	Low	Low	Low	Low	Low	Low	Medium	N/A	High	
Harbour Air	N/A	Medium	Low	Medium	Low	Low	Medium	Low	Low	Medium	N/A	High	6
Icelandair	Low	Low	Low	Medium	Low	Low	Low	Low	Low	Medium	Low	Low	
Japan Airlines	Low	Low	Low	Medium	Low	Low	Low	Low	Low	Medium	Low	Medium	
Jetstar	Low	Gold	Low	Low	Medium	Low	High	Medium	High	Medium	Medium	Medium	6
Kenya Airways	Medium	Medium	Medium	Silver	Medium	Low	High	Low	Low	Silver	Medium	Medium	15
KLM	Silver	Medium	Silver	Medium	Low	Medium	Silver	Medium	Low	Low	High	High	13
Lufthansa	Medium	Medium	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	6
Malaysia Airlines	Low	Low	Low	Low	Low	Low	Low	Medium	Low	Low	Low	Medium	
Monarch	High	Silver	Low	Low	Low	Low	Medium	Low	Low	Medium	Low	Low	17
NatureAir	N/A	Low	Low	Medium	Medium	Low	Low	Low	Medium	N/A	N/A	Gold	5
Netjets Europe	N/A	Medium	Bronze	Low	Low	Low	High	High	High	Medium	Medium	Medium	20
Qantas	High	Gold	Low	Low	Medium	Low	High	Medium	Silver	Bronze	Medium	Medium	4
SAS	Medium	Low	Low	Low	Medium	Low	Medium	Medium	Medium	Low	Medium	Medium	
Swiss International Airlines	Medium	Medium	Low	Low	Medium	Low	Gold	Low	Low	High	Low	Low	6
TAP	Bronze	Medium	Medium	Silver	Medium	Medium	Bronze	Gold	Bronze	Low	Silver	Low	2
Thomas Cook	Low	Low	Medium	Low	Silver	Silver	Low	Low	Medium	Medium	Medium	Low	15
Thomson Airways	N/A	Low	Low	Low	Low	Low	Low	Low	High	High	Gold	Low	6
United Airlines	Medium	Low	Gold	Low	Low	Low	Medium	Medium	Low	Medium	Medium	Low	6
Virgin Atlantic	Gold	Medium	Medium	Low	Gold	Gold	High	High	Low	Gold	Medium	Medium	1
Virgin Australia	Medium	Medium	Low	Medium	Medium	Bronze	High	Medium	High	Bronze	High	Low	19

Figure 6: Summary grid for airline website performance

Source: Author

6.2 Survey

155 eligible airlines (n=155) were contacted by email using a database of airline contacts provided by IATA as shown in Appendix 6. A total of 230 airlines were IATA members at the time of the survey (April 2011) meaning that the study sampled 67% of the population. Twenty six airlines responded to the survey in total – ten with a carbon offsetting scheme and sixteen without one. Table 5 explains the discrepancy between the total number of airline members with that contained in the IATA contact database and summarizes representativeness of respondents across regions.

Table 5: Total population sampled in survey according to region and response rate

Source: Author

Geographical region	No. of airlines contacted	No. of respondents	Response rate
Asia	33	4	12%
Europe	59	10	17%
Middle East and Africa	38	6	16%
North and South America	20	5	25%
Oceania	5	1	20%
No longer IATA member ¹	22	N/A	N/A
Airline association (not airline)	2	N/A	N/A
Cargo airlines	7	N/A	N/A
Not in contact database	44	N/A	N/A
Total no. of IATA airlines	230		

¹As of 24th July 2011

The target population for this survey was IATA member airlines *with* a carbon offsetting scheme and in this regard a response rate of 40% (10 out of 25 airlines) was achieved. The response rate for those airlines *without* a carbon offsetting scheme was somewhat lower at 11% (25 out of 230). This group of airlines is of lesser significance as it acted more as a control group to compare attitudes with airlines that have a carbon offsetting scheme. IATA stated that this response rate was broadly in line with response rates to previous surveys that they conducted along environmental themes. In addition, they admitted that carbon offsetting is not a high priority issue for the airline industry and is therefore unlikely to provoke a strong reaction.

Appendix 3 shows all fifty questions that formed part of the survey with detailed responses. Note that Question 3 has two branches depending on whether airlines have a carbon offsetting scheme or not. Those airlines without a scheme only needed to answer a shorter set of 14 questions versus 39 questions for those with carbon offsetting.

6.3 Demographics and representativeness

Figure 7 shows both airline headquarters and carbon offset project distribution according to geographical region based on a comparative analysis of airline websites. The chart shows that airline and project distribution do not coincide. For instance, although Europe leads the way with 11 airlines, it can only lay claim to four projects whereas Asia has a total of 32 projects even though only five airlines are headquartered there. We can therefore conclude that there is a significant inward investment by European airlines (and those in other regions) into Asia which is partly driven by opportunities provided by the CDM. Responses to the survey were also greatest for airlines headquartered in Europe showing a good correlation with the comparative analysis of websites (Q2).

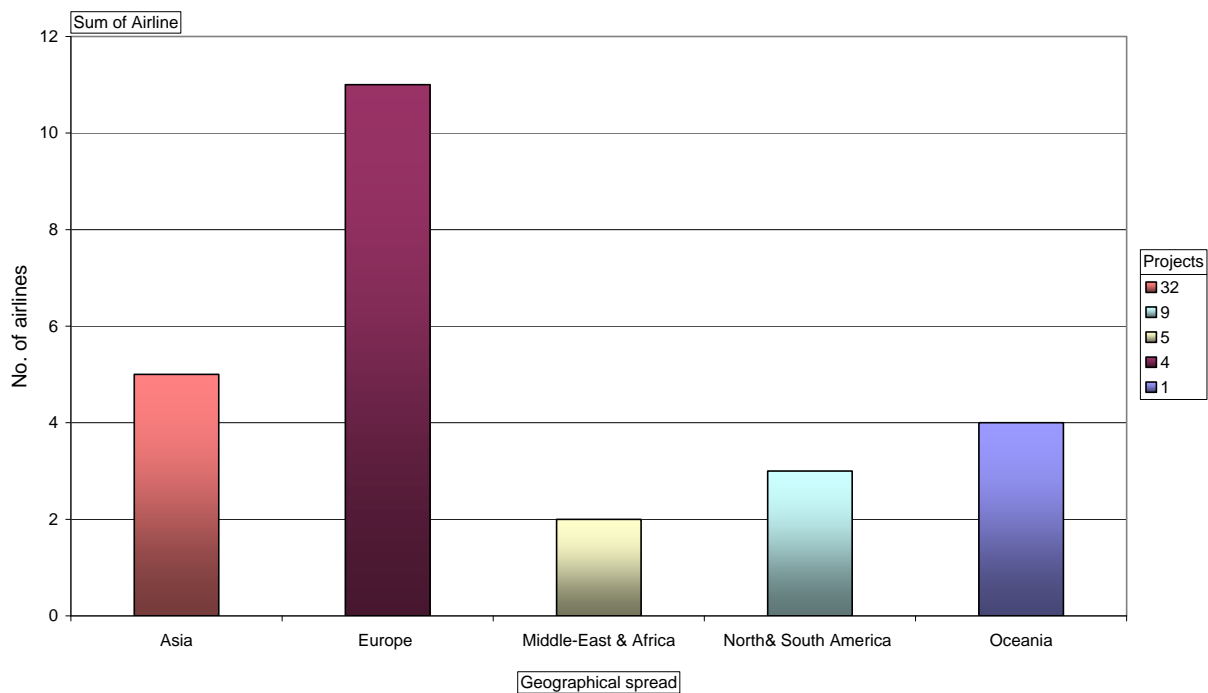


Figure 7: Geographical distribution of airlines and projects

Source: Author

Figure 8 shows that there is a good spread across all airline sizes surveyed with the exception of the over 50 million category. In hindsight, it would have been better to lower the upper threshold considering that only nine airlines carried over 50 million passengers in 2010 (IATA, 2011). Airlines identified as having a carbon offsetting scheme in the comparative analysis were also typically in the range 1-49 million.

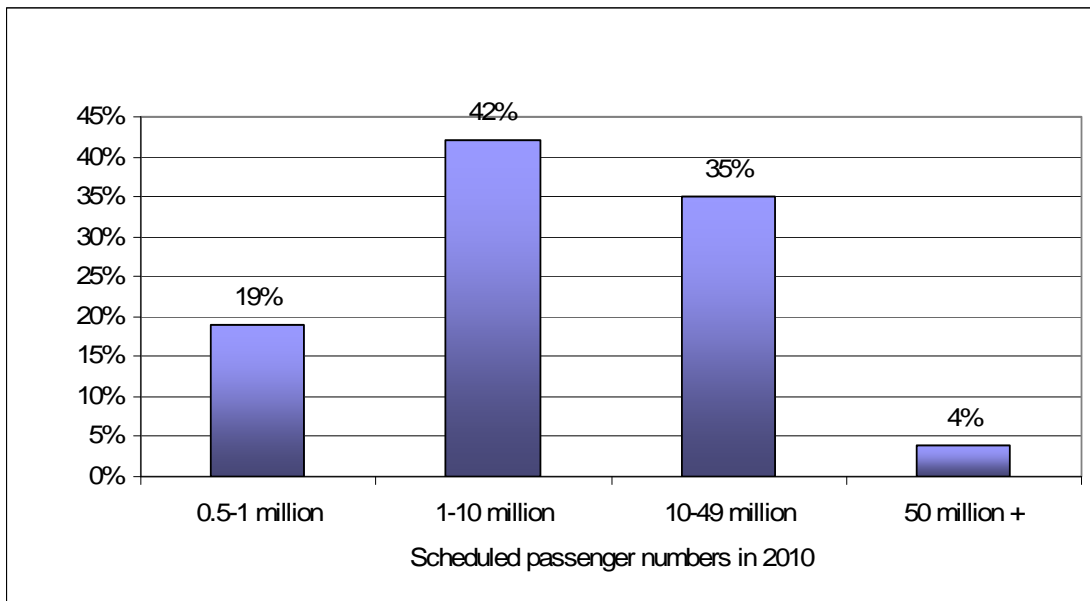


Figure 8: Airline distribution by size in survey

Source: Author

7 Discussion

7.1 Introduction

The main findings of both the comparative analysis of airline websites and the survey are discussed in relation to the research questions and key themes shown in this study's title and summarized in Figure 3. Airlines' commitment and attitudes to carbon offsetting are discussed throughout as both themes arise when discussing issues of corporate responsibility and consumer sovereignty. Performance is assessed according to KPIs and along key themes of transparency, education, credibility and accessibility. Examples of best practice are highlighted where appropriate and compared to the rest of the airline industry. Survey question numbers are referenced in brackets and can be cross-checked with responses in Appendix 3. Finally, the limitations of this study and recommendations for the future are discussed.

7.2 Consumer sovereignty and commitment

Promotion

Prominence and user-friendliness are two KPIs that promote the accessibility of an airline's carbon offsetting scheme to its passengers. The comparative analysis found that less than a quarter of airlines had a presence on their website home-page (see Table 6). This is despite the fact that *all* airlines surveyed agreed that it would improve the visibility of their carbon offsetting scheme to passengers and 60% say they already do this (Q15/18). Findings in this study matched similar observations by Eijgelaar (2009) who concluded that clear and relevant information about offsetting was often missing on websites of carbon offset providers.

Table 6: Prominence on airline home-pages

Source: Author

IATA-member airline	Presence on home-page
Brussels Airlines	discrete link
Cathay Pacific	sizeable logo
EI AI	temporary banner
KLM	logo and link
Malaysian Airlines	discrete link
SAS	discrete link

This wide disparity may be explained by competing interests for prime advertising space on websites and the relative low priority attached to carbon offsetting compared to selling travel insurance, for example. However, a simple link or small logo on the airlines websites can raise the profile of a company's carbon offsetting scheme

hugely and at relatively little cost. Two non-IATA member airlines (NatureAir and Harbour Air) provided best practice in terms of overall prominence on their websites. Airlines typically carry a banner advertisement on their front page when launching a scheme for the first time. However, this is often short-lived as was the case with Kenya Airways which removed its banner within two months of launch date and did not replace it with a link or logo.

70% of airlines thought that promoting their carbon offsetting scheme on board their aircraft would also improve visibility (Q15) and a similar percentage believed that the best way to improve their carbon offsetting scheme is to conduct better PR (Q17). Virgin Atlantic recently launched the first ever on-board carbon offset scheme shortly with Sir Richard Branson quipping “We hope our passengers will be keen to become members of our Gold Standard Mile High Offset Club!” (Sustainable Aviation, 2011). This case is unfortunately one of the few examples of the kind of innovation in PR that airlines could be taking advantage of to promote and increase uptake of carbon offsets.

Virgin Atlantic scored gold for user-friendliness in the comparative analysis primarily due to the airline’s short engaging video that explains in simple terms how its carbon offsetting scheme works and its well-designed website. Overall, only one quarter of airline websites were found to promote their carbon offsetting scheme in a user-friendly way. Airlines should consider the different attitudes, values and knowledge levels amongst their passengers and promote their carbon offsetting schemes accordingly based on the findings of Becken (2004).

On-line payment facilities

All airlines surveyed agreed that including the option to offset in the flight booking would improve visibility of their carbon offsetting scheme with 80% *strongly* agreeing (Q15). IATA (2008) also recommends an opt-in or opt-out choice for passengers so that offsets can be purchased at the same time as the ticket. However, only 28% of airlines actually offer an integrated payment option ever since British Airways became the first airline to do so in 2008 (see Table 7). In some instances, airline websites display a link to their carbon offset partner after the flight booking to allow for payment although this is not the norm.

Table 7: Summary of online payment facilities

Source: Author

Payment method	Total
Opt-in	7
Opt-out	0
Mandatory ¹	1
Not integrated	17

¹ Offset cost is automatically included in the ticket price

An industry source commented that the IT infrastructure for the global airline industry is controlled by a small number of Global Distribution Systems (GDS), such as Amadeus and SABRE. Airlines need to upgrade to “gold” packages in order to access additional services such as travel insurance and offsetting. Transaction costs are prohibitive meaning that smaller and more cost-conscious airlines are either unable or unwilling to invest in the technology needed to integrate into flight ticketing.

The ease of payment plays a critical part in the uptake of carbon offsets. The UK Department of Environment Food and Rural Affairs (DEFRA) recommended that carbon offsets should be offered as a compulsory choice at the point of sale so that passengers need to explicitly opt-out if they do not wish it to be automatically added to the price of the air ticket (House of Commons, 2007, p.13). However, no IATA member airline currently offers the opt-out payment proposition. Thomson Airways is the only airline identified in this study where passengers automatically donate £1 per adult and 50 pence per child per flight to the World Care Fund unless they specifically choose to opt out. For this reason, it was awarded best practice.

Some airlines give passengers the flexibility to offset a different amount to that displayed in the carbon calculator for their journey. For instance, JAL offers the option to offset 100% or 50% of calculated emissions or a fixed amount of JPY 1,000. Whilst it is commendable that airlines are facilitating consumers to offset on their terms, the downside is that passengers are not encouraged to take full responsibility for their own carbon footprint.

A number of airlines allow passengers to use their Frequent Flyer Air miles to pay for the cost of their carbon emissions. At one level, this may be seen as a positive step that promotes consumer sovereignty. However, it doesn't seem sustainable or indeed ethical that passengers are on the one hand rewarded for flying frequently and then on the other hand, they are allowed to use this reward to offset the emissions of yet more air travel.

Uptake rates

Openness (KPI) was primarily judged according to reporting of uptake rates. IATA (2008) cautions that the credibility of a carbon offsetting scheme will be at risk if uptake is low within a reasonable time from launch. Airlines are also concerned with low uptake of offsets by passengers (Q13) and this is reflected in their decision not to publish figures on carbon offsetting volumes retired. 80% of airlines stated that they monitor and record the tonnes of CO₂ reduced via their offsetting schemes and yet more than half of these decided not to report any figures (Q28/29). This indicates that either:

- Uptake volumes are so low that airlines do not want to attract negative attention from stakeholders by publishing figures; or
- Uptake volumes are not so low but airlines are neglecting to promote the performance of their offsetting schemes and are therefore missing an opportunity to engage stakeholders

Table 8 shows limited data on uptake volumes found either on airline websites or in CSR reports. This represents less than a third of airlines and corresponds closely with the survey results (Q29). However, this data was often out-of-date, not reported regularly and rarely easy to find. When reported, figures were not described in a consistent manner meaning that easy comparison between airlines was not possible.

Table 8: Summary of carbon offset uptake figures

Source: Author

Airline	Uptake	Tonnes CO ₂	Year	Comments
Air Canada	N/A	16, 414	2007-10	Equivalent to CAD 263,042 of carbon offsets
Austrian Airlines	30,000 passengers	N/A	2009	
British Airways	126,474 passengers	45,941	2009	330,000 passengers offset between 2008-10
Cathay Pacific	N/A	3,100	2010	43,300 tonnes offset due to staff travel
Qantas/Jetstar	7.5-9% of passengers	250,000	2009	66,436 tonnes offset due to staff travel & ground operations. 850,000 tCO ₂ between 2007-10
SAS	Less than 1% of passengers	N/A	2010	Business travel offset 4,000-5,000 tCO ₂ (2010)
TAP	N/A	2,508	Q2 2009	Exceeded target of 1,500 tCO ₂
Virgin Australia	1 million passengers	N/A	2007-09	

Significantly, ICAO (2010, p.9) declared its intention to collect information on the volume of carbon offsets purchased in relation to air transport. It will be interesting to see if it goes ahead with this plan and if figures are made public. The House of Commons Environmental Audit Committee (2007, p.46) described uptake for the first two years of British Airways' carbon offsetting programme as "risible". The airline responded by improving the prominence and accessibility of offsetting on its website with a notable increase in uptake rates. This shows that airlines can transform their carbon offsetting scheme when put under pressure by key stakeholders.

Qantas/Jetstar leads the way in terms of transparency on reporting of uptake volumes. More than 772,000 tonnes of carbon have been offset since 2007 which they estimate to correspond to uptake by 7.5-9% of all passengers (Qantas 2010, p.60). One Jetstar route between Sydney and Ballina-Byron Airport even achieved an

uptake rate of 19.2% in 2007-08 by allowing passengers to pay an extra AUD2.50 to be “carbon neutral” (*Northern Star*, 2010).

Thomson (a non-IATA airline) promotes its opt-out scheme as a “winning formula” with its partner TUI UK estimating that donations raised through the World Care Fund should cover 20% of carbon emissions by passengers (Thomson Airways, 2008). Their Holidays Forever website (Appendix 5) claims that they have saved more than 1 million tonnes of CO₂ during 2007-2009 with money being invested in clean energy and energy efficiency projects. This figure dwarves that of any other airline including the larger Qantas/Jetstar and sets a best-practice precedent.

None of the airlines expressed dissatisfaction with the performance of their own carbon offsetting scheme nor did they believe that their *passengers* were dissatisfied (Q21/27). On the other hand, only one airline claimed to be “very satisfied” with its scheme leaving a substantial percentage expressing a neutral opinion. The fact that airlines are not dissatisfied would suggest that they should be more open to the idea of disclosing their uptake figures for carbon offsets than is actually the case.

Pricing transparency

A comparison of pricing (standardized by tonne of CO₂) across a selection of airlines was conducted as of 6th August 2011 and converted into USD using an online currency calculator (Oanda, 2011). Results are summarized in Figure 9. Values are indicative only due to the fact that it was not possible to choose one city pair as airlines fly to a wide variety of different destinations. Overall, pricing transparency scored particularly low as a KPI in the comparative analysis of websites. United Airlines (and Continental) allow passengers to choose between different projects using different standards and therefore varying price. As a result, they were awarded best-practice on the basis of enhancing consumer sovereignty.

A survey by Brouwer et al (2008) found that three quarters of all passengers were willing to pay a “carbon travel tax” and that of this population a further 75% were willing to pay on average €25/tonne CO₂ emitted even though the average price in the market was only €12 at the time. The average price based on data in Figure 9 (omitting outliers from ANA and JAL) is \$19.50 (€13.50) indicating that price should not be a limiting factor when it comes to carbon offset uptake by passengers.

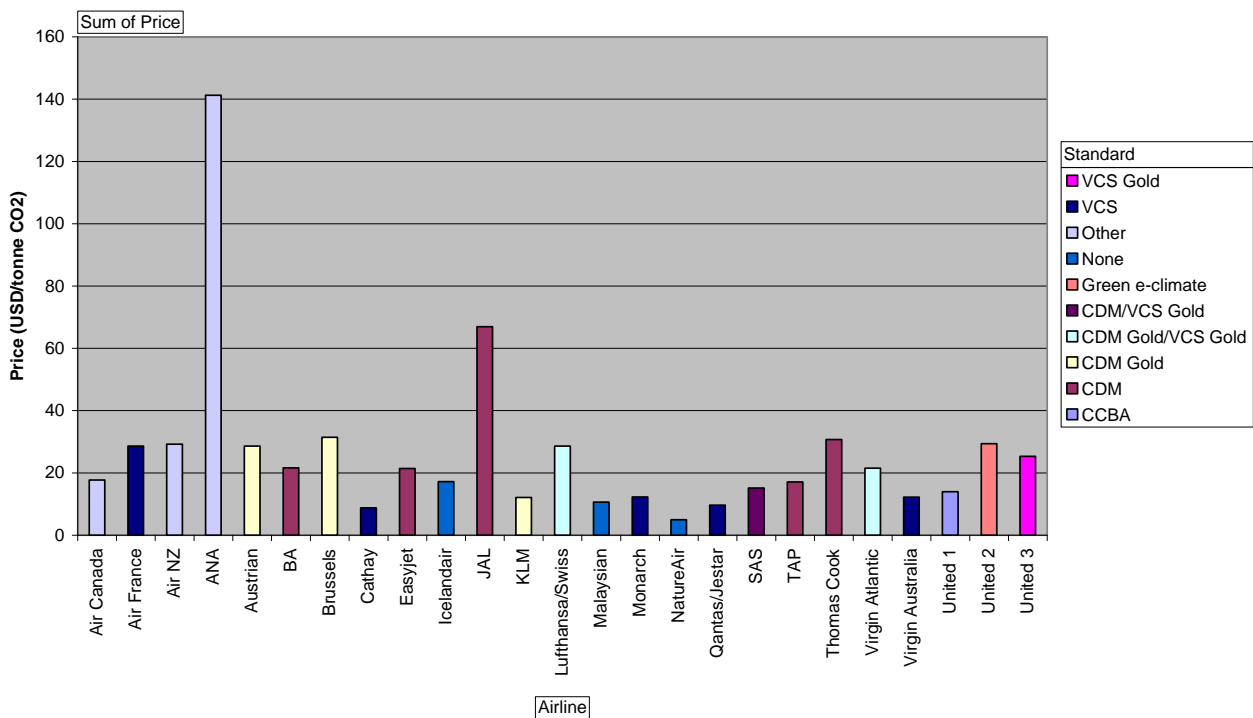


Figure 9: Carbon offset cost by airline

Source: Author

It should be noted that price is not necessarily an indicator of carbon offset *quality* especially where transparency is low. As can be seen from Figure 9, there is a wide variety of standards and combinations thereof. Gossling et al (2007) concluded that price would be more relevant *if* the credibility of all carbon offsets could be clearly established by passengers through a common label or standard. Another factor which can affect the overall price charged to the passenger is the quantity of CO₂ shown by the carbon calculator which can vary significantly according to the inputs and assumptions. ICAO (2009) observed that if airlines fail to explain to passengers why they choose to charge the amount they do, it could lead to mistrust.

Consumers should be able to tell whether the price they are paying to compensate for their carbon emissions is fair. The KLM website (see Appendix 5) promotes its scheme as the “least costly way to fly CO₂ neutral... covering all overhead costs so that 100% of your money can go directly to the development of projects”. Whilst this is certainly admirable, it is unclear how its price can cover the premium that Gold Standard projects normally attract, even when a standard 15% administration charge is waived. Hooper et al (2008) recommended that offset providers need to clearly explain to consumers the reasons why higher costs are justified by higher quality in order to allow the consumer to make an informed decision. Higher quality and lower price puts an even greater focus on full pricing transparency.

Somewhat discouragingly, the critical analysis found that 60% of IATA-member airlines either charge an administration fee or do not make it clear to their passengers whether there are any charges (see Table 9). This directly conflicts with the response to the survey where 80% of airlines said that they did not apply any charges to offsets (Q34). Consumers need to know not only if a fee is being charged but they should ideally be given a detailed explanation of why it is justified.

Table 9: Summary of charges taken

Source: Author

Charges	Total
Admin fee	9
No charge	6
Not stated	6
VAT/GST applied ¹	4

¹Australia and Canada only

Project transparency

IATA (2008) advises that information should also be provided to customers on achievements through the offset programme in terms of quantities, offset and projects supported. Project transparency was therefore assessed by whether projects were explained in detail including number of offsets generated and links to supporting documentation. Qantas/Jetstar provided best practice with regards to project transparency. Both websites have a useful map of projects with engaging material on project details and co-benefits, links to project documentation and actual carbon offset volumes generated.

Figure 10 cross-references the ranking of carbon offset project types by airlines in the survey (Q7) with results of the comparative analysis of airline websites. Renewable energy projects are consistently the most popular (22 projects and number 1 ranking). The renewable energy split based on the review of airline websites (or partner websites) is shown in Table 10. Of these, wind power (mostly in China) and run-of-river hydroelectric power were by far the most popular on airline websites. However, it is encouraging to see the recent investment in an African project using less conventional technology, such as geothermal power, as is the case with offsets sourced by Kenya Airways.

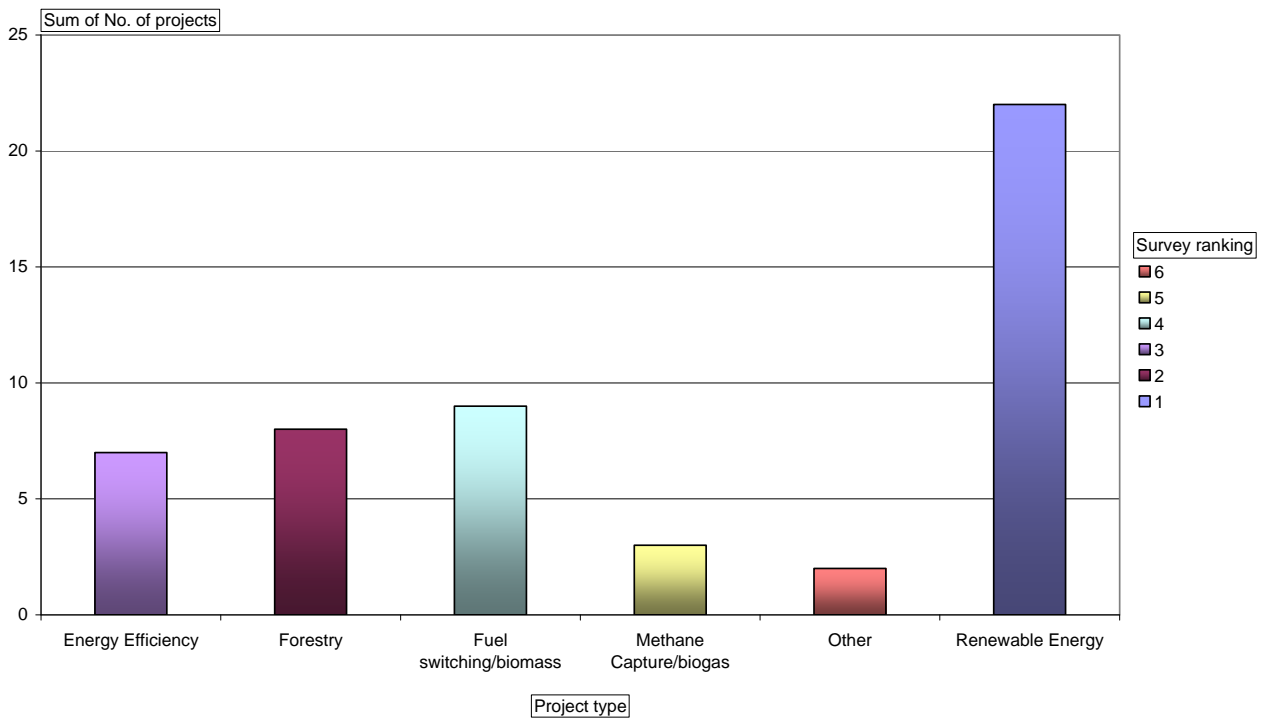


Figure 10: Project Type by website popularity and survey ranking

Source: Author

Table 10: Renewable energy projects

Source: Author

Renewable Energy split	No. of projects
Wind	11
Hydro	9
Geothermal	1
Solar	1

Approximately 15% of airlines invest in forestry projects; these vary from forest management (ANA) to tree-planting (Icelandair). The overall quality was judged to be low with only Continental and United Airlines using a rigorous standard (CCBA) for an avoided deforestation project in Madagascar. ICAO (2009) similarly concluded that forest-specific issues such as permanency of carbon sequestration were not addressed. Boon et al (2006, p.85) calculated that 50% of the area available for afforestation globally would be filled completely by aviation alone in 2050 if all aviation-related climate impacts are compensated for in this way. Clearly planting trees is not going to be enough. However, airlines should consider future carbon offsetting projects through the U.N. REDD+ (Reduced Emissions from Deforestation and Forest Degradation) programme that support

avoided deforestation and sustainable forest management. 40% of airlines surveyed said that they would purchase such forest carbon over and above other project types (Q8).

IATA (2008) advises that consumers should be able to choose from a range of projects to give a sense of empowerment and choice – key components of consumer sovereignty. However, only Continental/United Airlines offered a choice from their portfolio of projects with STI and a separate pricing structure for each.

The comparative review of airline websites found that just over half of all IATA member airlines studied (thirteen) offered at least one project in their home country. This matches the survey response that puts location as the second most important criterion for airlines when selecting a carbon offsetting project (Q6). Passengers may prefer to support local projects as these are more tangible. Greater consumer sovereignty could be achieved by explaining the positives and negatives of both local and developing world projects and then giving passengers the choice to select between them.

Carbon calculator transparency

This study does not seek to determine the *accuracy* of carbon calculators but rather is concerned with whether airlines allow passengers to make informed decisions about their personal carbon emissions based on the quality of information provided. There is no single methodology for the calculation of carbon footprints due to the many determinants such as occupancy rate, travel class, type and age of aircraft, cruise speed/altitude and weather conditions which are not always easy to measure. Virgin Atlantic set best practice on transparency due to its easy-to-read, informative and well-referenced explanation which is independent verified by CICS. TAP also scored highly due to the detail in the Frequently Asked Questions section on IATA's enhanced ICAO methodology and assurance by the UK QA scheme. KLM and Air France provided much detail but this was not easy to read; however, their two-page independent assurance report by KPMG was welcome.

When airlines were asked to rank how important five criteria were to deciding on which carbon calculator to use, their top choice was using fuel data specific to the airline followed by simplicity and transparency (Q10). However, overall transparency by comparative analysis of airlines was low (see Figure 6). Certain airlines, such as Jetstar and Kenya Airways, did not display the distance travelled within their calculator which meant that it was not possible to convert the actual carbon emissions into a tonne/CO₂ value. This is a basic requirement that all carbon calculators should allow for.

Although it is widely acknowledged that non-CO₂ effects exist, there is still much uncertainty and disagreement in their calculation, meaning that the overall environmental impact of aircraft emissions quoted by the airline industry and in the wider media is significantly under-estimated. However, three airlines are exceptions to this

rule. The STI calculator used by United and Continental makes clear an option to pay 2.7 times calculated amount to account for the full RFI (Radiative Forcing Index). Virgin Atlantic also allows non-CO₂ effects to be calculated optionally by applying an RFI factor of 2.0 meaning that 1 tonne CO₂ which costs USD 21.57 rises to USD 43.14. SAS calculates nitrogen oxides (NO_x), sulphur dioxide (SO₂) and other emissions but doesn't explain their significance and doesn't offer the option to offset them. This is missing out on a key opportunity to offer consumer choice to translate awareness of non-CO₂ effects into responsible action.

7.3 Corporate Responsibility and commitment

Mixed messages on accepting responsibility

The comparative review of airline websites also took into account information on provider websites although this was weighted lower when scoring. Airlines are free to choose which provider they partner with and can exert pressure for change even when they have already signed a contract with a given provider. On this basis, airlines are responsible for their carbon offsetting schemes.

Airlines were found to send mixed messages in terms of accepting responsibility for carbon offsetting. When questioned about the potential benefits of their carbon offsetting scheme (Q14), airlines ranked empowering passengers to take responsibility of their carbon footprint and enhancing the corporate responsibility of their airline in first and second place respectively. Furthermore 80% believe that airlines have a responsibility to their passengers to explain the environmental consequences of their choice to fly (Q31). Even airlines *without* a carbon offsetting scheme responded positively to this question overall (Q50). However, airlines could be doing far more to raise awareness of the climate change impacts of aviation and could educate passengers more on how to reduce their carbon footprint.

El Al, the Israeli national airline, recently launched a carbon offsetting scheme that claims to be unlike others as “El Al takes *responsibility* for eradicating your carbon footprint and will not charge you anything in addition to your flight” (El Al, 2011). This only applies to the London-Tel Aviv route which they say emits 0.64 tonnes CO₂ per passenger compared to 1 tonne CO₂ absorbed by a tree over its lifetime. However, it provides little or no information on how to reduce one's carbon footprint and also fails to address issues of permanency and leakage with respect to carbon sequestration by forestry projects.

The IATA carbon offsetting scheme absorbs any administration costs and provides a good example of how airlines can show greater responsibility to share the burden with their passengers. Perhaps airlines need to lead more by example to promote a *shared* responsibility and thereby increase carbon offset uptake. 30% of airlines say that they currently purchase offsets to cover their own corporate emissions (Q39) although it is not clear to

what extent this covers their carbon footprint. An interesting fact is that 40% say they would consider offsetting emissions of employees or match-funding offsets donated by passengers to encourage greater uptake of their schemes (Q19/38). However, evidence of the former could only be found for just four out of 25 airlines (see Table 8).

CSR reporting

CSR reporting of carbon offsetting was one of the lowest scoring of all KPIs. A total of twelve airlines mentioned their carbon offsetting scheme in either their latest CSR or annual report. This is less than half of all IATA-member airlines although reports could not be located on-line for all airlines. Only three airlines dedicated one page to their carbon offsetting scheme (British Airways, Cathay Pacific and TAP) and therefore scored highest for this KPI. Of these airlines, only TAP published a rather modest target for its carbon offsetting scheme (1,500 tonnes CO₂ for Q2 2009) shortly after its launch. Hooper et al (2004) found that information provided in CSR reports does not allow the performance of airlines to be compared effectively. However, 70% of airlines say that they measure performance against set targets to continuously improve their carbon offsetting scheme (Q20). It will be interesting to see if TAP continues to report targets and performance and whether other airlines will follow suit.

SAS is one airline that has showed greater transparency than most airlines by participating in a case study on airlines' commitment towards environmental responsibility (Lynes and Dredge, 2006; Lynes and Andrachuk, 2008). The airline takes its responsibilities seriously and has set itself an ambitious goal to be the "most environment-conscious airline in Europe" (SAS, 2010). However, there is no evidence from its website or CSR reporting that it is applying the same rigour to its carbon offsetting scheme.

Tracking and retiring carbon offsets

One substantial concern identified through the survey is the lack of control over possible double-counting of carbon offsets. 80% of airlines either do not have a control mechanism or simply do not know if one even exists (Q23). ICAO (2009) similarly concluded that apart from CERs and Gold Standard VERs, information about how credits are tracked was largely absent. Accounting registries track VERs or CERs by assigning a serial number thereby serving to provide greater clarity of ownership and increase transparency. It may well be that the offsets airlines sell are registered by their offset provider according to the standard they use. However, the fact that airlines do not show this information on their websites nor do they seem to be aware of the need to avoid double-counting shows a certain lack of responsibility. This could even leave airlines exposed to litigation or financial loss if it was determined that they were (inadvertently) offering offsets that were already retired, for example.

The purchase of emission reductions in the atmosphere is abstract in nature since the passenger does not receive a concrete product or experience a service that satisfies a real need (Lovell et al, 2009). Consequently, the consumer needs reassurance that they have made a real contribution in the absence of any evidence of the action they have taken. IATA (2008) recommends that an electronic receipt is automatically issued for the amount offset with project details and co-benefits shown, as well as confirmation that the relevant amount will be retired from the registry of the project. In such cases, consumers may be more likely to pay for future carbon offsets with the same airline as they may feel a greater sense of trust and believe more in the positive impacts of their actions.

Quality Assurance (QA)

The UK Government recently announced that it is withdrawing its QA scheme for carbon offsets due to low take-up which will impact the IATA carbon offsetting scheme as well as British Airways (Business Green, 2011). The Australian Government similarly certifies Australian airlines using its NCOS standard and airlines such as Qantas, Jetstar and Virgin Australia carry its QA mark on their websites. Airlines that were assured by either of these national standards were assigned a higher score when assessing quality as part of the review of the critical analysis.

A majority of airlines surveyed are either undecided or don't believe that the UK Government QA scheme can convince passengers of the integrity of offsets (Q26). However, airlines separately ranked quality assurance as the most important factor when selecting a carbon offsetting partner, which shows a clear conflict (Q5). It may be that airlines believe that QA is important to them but not necessarily to their passengers. However, it is hard to think of a more reassuring way of convincing consumers of the credibility of their service than an official endorsement by a sovereign government. An added bonus is that airlines appear to actively want to promote their success in meeting this standard and make effective use of the QA logo on their websites, thereby further raising awareness of carbon offsetting. It will be interesting to see how airlines address the issue of QA in the future and whether airline passengers will create a demand to restart the UK scheme.

Certification by an independent third party is an important contributor to improving credibility of a project in the eyes of the consumer and some airlines showed reports from auditors such as the accounting firms KPMG and PwC. However, airlines were found to be lacking transparency overall based on a comparative analysis of their websites. MacKerron et al (2009) found that consumers were willing to pay substantially more for certified offsets, but only once they were made aware of the existence of certification regimes. Therefore it should be in the best interests of airlines to be more transparent with information related to standards and third-party verification.

Carbon offsetting standards

Carbon offsetting standard was ranked most important by airlines when selecting a carbon offsetting scheme (Q6) which ties in with the results of the comparative analysis of airline websites. It is understandable that respondents ranked CDM and CDM Gold Standard most highly due to their high credibility and backing by the U.N. (Q9). However, it is surprising that VCS Gold was ranked so low (5th) considering that it offers both flexibility and high sustainable development co-benefits. This may be due to a lack of awareness of what the VCS Gold Standard actually offers and is worth exploring further.

Standards used by projects listed on airline websites or those of their partners are compared in Figure 11. This shows an overall increase on the 68% of offsetting schemes with a recognised standard reported by ICAO (2009). A recent report on the state of the voluntary carbon markets agreed that VCS was the most popular standard (Ecosystem Marketplace, 2011). However, airlines supported twice the number of VCS Gold projects than that of the CCBA standard whereas the reverse was true in the broader voluntary market. This is a positive development and highlights the value that the airline industry places on the high demands of the Gold Standard (30% of all projects used either the CDM or VCS Gold Standard). However, airlines could be promoting Gold Standard projects even better on their websites to encourage greater uptake of offsets as discussed later.

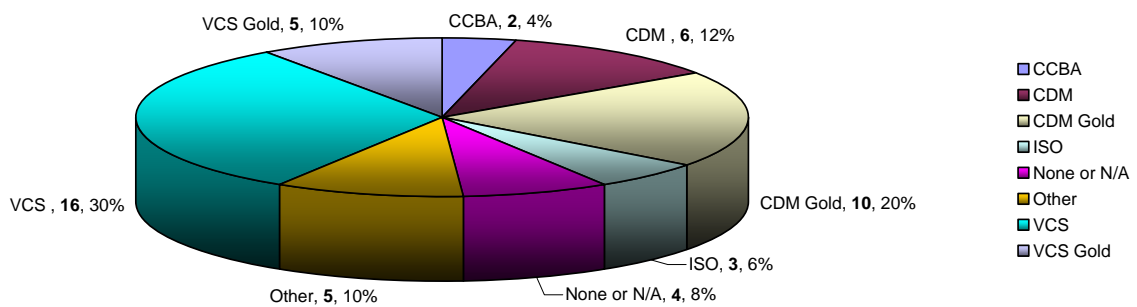


Figure 11: Distribution of carbon offsetting standards

Source: Author

It is disappointing to see that only five projects are based in Africa especially since this region has also been neglected by the compliance markets (Figure 7). Voluntary carbon offsetting has the opportunity to make a real impact in Africa due to the greater variety of standards which can allow for deployment of new technologies and on a smaller-scale with greater flexibility and lower transaction costs. This does not reflect well on corporate responsibility or commitment of airlines to carbon offsetting in least-developed countries. Consumer sovereignty is also lacking as passengers do not have the choice to invest in project in Africa. Airlines should consider either sourcing offsets from the continent or, at the very least, put pressure on their partners to develop this market by creating a greater demand.

Education and awareness-raising

Education was identified as one of four key themes to assess airline performance (see Figure 3). Virgin Atlantic set best practice on two out of three KPIs. For instance, its website displays a useful eight-step guide on how to reduce an individual's carbon footprint with a focus on travel and tourism. However, the overall score for each of the three KPIs that make up this theme was lowest (see Figure 6) with advice on how to reduce an individual's carbon footprint particularly weak. In contrast, Hooper et al (2008) found that more than 75% of carbon offset *providers* gave adequate or comprehensive educational information on their websites. Airlines may be relying on their providers to provide such information through links. However, consumers are less likely to navigate away from airline websites and therefore may not receive this additional information.

Airlines did not demonstrate a technical knowledge of carbon offsetting nor did they communicate this in an effective and user-friendly way to passengers. User-friendliness was chosen as a KPI in order to determine if the consumer is encouraged to find out more about the airline's carbon offsetting through interactive and fresh content. Lovell et al (2009) emphasize that it is specific narratives about carbon offset projects that give these products meaning and value to the consumer. Use of imagery and interactive content on websites are important for the uptake of carbon offsets. Virgin Atlantic set best practice in this category through its excellent animated video with voice-over explaining their approach to carbon offsetting and climate change in simple terms.

The survey findings on airline and project location shown in Figure 7 are broadly in line with a study by Brouwer et al (2008) who found that awareness and demand for climate change mitigation vary based on passengers' place of origin. Europeans are most aware of and willing to pay for carbon offsets whereas North Americans and Asians are less informed and less willing to act. It may be that airlines are reacting to the demand for offsets from passengers, which is reflected in the low response for certain geographical regions. Conversely, it may be due to the very lack of a carbon offset product by these same airlines that is driving the lack of awareness and willingness to pay for climate change mitigation. Hence there appears to be a potential

for greater commitment towards carbon offsetting on the part of Asian airlines in particular where passenger numbers are set to increase greatly.

7.4 Attitudes

Attitudes have already been discussed alongside the other research questions and so this section addresses only those findings that are outstanding. Respondents without a carbon offsetting scheme acted as a control group to validate the findings of the core population of airlines *with* carbon offsetting. This also allowed attitudes between both groups to be compared and contrasted.

Only 11% of airlines without a carbon offsetting scheme responded to the survey indicating that they were almost four times less likely to respond than those with a carbon offsetting scheme. This can partly be accounted for by the greater population of airlines in this category. However, it also reflects the fact that this issue is largely insignificant to the majority of airlines. There was little consensus on why airlines without carbon offsetting decided not to launch a scheme, with the most popular response citing a lack of passenger demand (Q42). Almost half of respondents did not even have a policy on climate change (Q43) even though their main industry representative has published a four pillar strategy and set of ambitious targets (IATA, 2009a). This shows the lack of consensus and a wide disparity of views towards climate change across the airline industry.

Potential benefits of a carbon offsetting scheme varied between both populations of airlines which largely reflected underlying beliefs about climate change. Those without a scheme viewed its potential to increase loyalty amongst environmentally-conscious passengers as most important whereas those with a scheme viewed it as a way to empower passengers to take responsibility of their carbon footprint (Q14/47). Both groups of airlines agreed that the airline industry has a responsibility to its passengers to explain the environmental consequences of flying, with no significant difference in opinion found (Q31/50). The low KPI scores on the theme of education clearly show that airlines with a carbon offsetting scheme are not living up to this responsibility.

Airlines will be obliged to comply with the EU ETS from 2012 and 70% of respondents believed that this will result in a re-evaluation of their carbon offsetting scheme (Q32). A House of Commons (2007, p.46) report expressed the concern that the inclusion of aviation in the EU ETS will not address those emissions which are *below* the cap unless airlines or passengers choose to do so voluntarily through the purchase of carbon offsets. It would be interesting and useful to conduct a follow-up carbon offsetting review after aviation is included in the EU ETS to see if attitudes towards offsetting harden, or performance suffers, amongst airlines.

7.5 Limitations and recommendations

The survey focused on IATA-member airlines only due to limitations associated with securing access to contacts best qualified to respond on carbon offsetting. A future study should consider extending the survey to other airlines and comparing to responses by airlines in this report. The survey in this report also gathered opinion from airlines *without* a carbon offsetting scheme although this was not the primary target population. It would also be interesting to gauge the attitudes of these airlines further in order to understand why the industry as a whole is not offering carbon offsetting to passengers. For instance, what are the majority of airlines without offsetting doing to increase awareness of the environmental consequences of flying?

Another limitation of this study is that it did not distinguish between the relative importance of corporate responsibility, consumer sovereignty and commitment towards carbon offsetting. A future study should consider whether themes, sub-themes and specific KPIs identified here should be weighted in order of importance. This paper also did not look at carbon offsetting for corporate clients who may decide to compensate for business travel. IATA (2009a) intends to roll-out its carbon offsetting scheme to online travel agents and Global Distribution Systems as part of a Phase 2. A future study could review carbon offsetting across these sectors as the potential for selling carbon offsets is much greater than for individuals booking through airline websites.

The benchmarking results using KPIs designed in this study could be developed to provide a consumer's guide to airline carbon offset schemes in a similar vein to the guide by Clean Air Cool Planet (2006) on retail carbon offset providers. This could increase consumer sovereignty and allow consumers to make more informed choices on whether to purchase offsets from a given airline.

Lynes and Andrachuk (2008) developed a useful model of the influences on, motivations for and catalysts of an organization's level of commitment towards corporate social and environmental responsibility, using SAS as a case study. It would be useful to apply this model to carbon offsetting specifically, in order to better understand *why* airline commitment is lacking and then to take steps to remedy this. For instance, Scandinavian cultural influences and environmental champions within SAS were found to help drive environmental responsibility.

Further analysis could be conducted on carbon offset uptake rates including the reasons behind the success of the Jetstar carbon offsetting scheme. However, it should be noted that a high uptake rate does not indicate a high quality carbon offsetting scheme nor does it necessarily increase awareness of climate change impacts or ways to reduce personal carbon footprints.

Airline attitudes towards carbon offsetting are likely to shift in light of aviation's inclusion in the EU ETS from 2012. This study suggests that another survey of airlines could be conducted in late 2012 to assess how attitudes have changed and if this has affected the performance of existing schemes or planned launches for new schemes.

Finally, ICAO could consider using the findings of this study as a basis for conducting a more comprehensive survey based on its potential ability to reach *all* airlines. For instance, it could survey airline attitudes to the suggestion in the ICAO (2009) report that demand for voluntary offsetting could be increased if the *responsibility* to offset is transferred from passengers to airlines through a mandatory or opt-out payment system.

8 Conclusions

This study has developed a set of Key Performance Indicators (KPIs) for carbon offsetting and has applied this to compare performance across airlines using a methodical approach. Airlines can learn from each other by benchmarking their performance against that of their peers. A case study on SAS airlines by Lynes and Dredge (2006) concluded that airlines which lead the way in environmental management can act as role models for other members of the industry. Examples of best practice do exist across the range of KPIs identified in this study. Virgin Atlantic's score on educational KPIs in this paper is worth mentioning in this regard.

The SAS sustainability report (2010, p.114) lists a set of nineteen sustainability-related KPIs although none specifically mention carbon offsetting. 70% of airlines surveyed in this paper say that they continuously look to improve their service by measuring performance against set targets (Q20). However, there is a lack of transparency as neither targets nor performance is published on their websites, undermining their level of commitment. This study recommends that airlines adopt KPIs specifically for carbon offsetting and incorporate these into their CSR reporting. Findings in this study will be made available for any interested IATA-member airlines who may then choose to use as a basis for benchmarking their performance. Airlines could also consider looking outside of the airline industry at best practice amongst other carbon offset providers and retailers.

Overall, many discrepancies were found between what airlines say they do or think and what they actually do. The survey results on airline and passenger satisfaction with carbon offsetting schemes suggests substantial room for improvement and it would be interesting to review the situation over time to see if it changes and whether other factors move in line and therefore offer a possible explanation. However, airlines are unlikely to improve uptake rates or other performance objectives unless they show greater commitment to carbon offsetting and prove through actions rather than words that they are sincere when they say that they want to be

environmentally responsible. The airline industry has committed itself to achieving an ambitious set of targets by 2020 and beyond (IATA, 2009a). However, this study found that attitudes towards climate change and carbon offsetting vary widely between airlines with a carbon offsetting scheme and the vast majority *without* a scheme. Airlines need to actively demonstrate a greater commitment to the “polluter pays principle” and at least facilitate their passengers to share in this responsibility through carbon offsetting. Corporate responsibility was assessed along themes of education and credibility. Key performance indicators such as advice on how to reduce an individual’s carbon footprint and openness in reporting of uptake volumes scored lowly in the comparative review.

IATA (2008) stated that a well-organised carbon offset scheme demonstrates a carbon conscious and environmentally responsible attitude by the airline. Airlines expressed a desire to be responsible in a survey of attitudes conducted as part of this study. However, this did not translate into real action when carbon offsetting performance was compared in a review of airline websites. Additionally, no evidence was found that airlines with existing carbon offsetting schemes have read or applied the IATA (2008) guidelines three years after its launch.

The findings in the comparative analysis of airline websites largely agree with those in the ICAO (2009) report. For instance, ICAO concluded that consumers cannot make informed decisions when purchasing offsets and in many cases there is no reassurance that their carbon emissions will fully compensated for. Consumer sovereignty in this paper was also found to be restricted due to a lack of promotion of carbon offsetting on airline websites and payment facilities that did not facilitate carbon offset uptake.

Figure 12 shows how the key themes explored in this study interact with one another at a high level. Although uptake rate should not necessarily be the end goal of a carbon offsetting scheme, it was found to be a key risk by IATA and ICAO. Low uptake was also ranked as the second highest potential risk by airlines to their carbon offsetting schemes when surveyed. Despite this, there appears to be a widespread lack of inaction by airlines to address low demand for carbon offsets. Airlines appear to be in a state of denial on their under-performing programmes. This begs the question as to why they are continuing with their offsetting schemes at all and why other airlines continue to launch new programmes. Uptake rate drives action further up the chain – airlines who secured higher uptake rates were found to promote their carbon offsetting schemes better. Increased uptake should drive investment in online payment facilities and education programmes for carbon offsetting although this study did not find evidence for this. Future studies could consider this possibility.

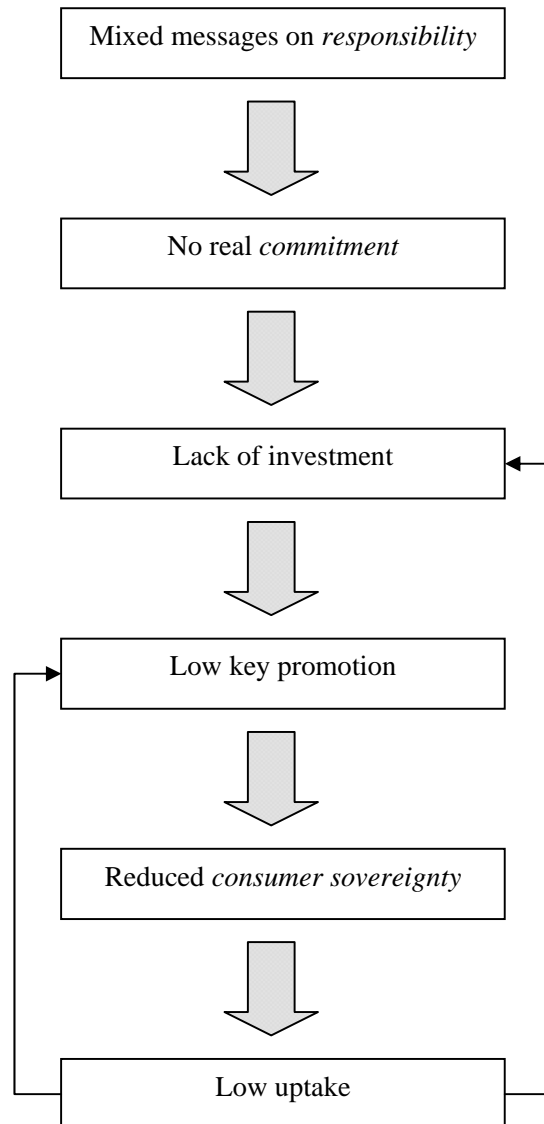


Figure 12: Proposed model ‘A’ relating key themes with low uptake of carbon offsets
 Source: Author

Figure 13 substitutes uptake rate for impacts on climate change as end goal. Airline websites scored particularly low on educating about aviation impacts on climate change and how individuals can reduce their personal carbon footprint. Pricing transparency and assurance on tracking of carbon offsets were identified as weak points that impact upon credibility leading to carbon offsetting schemes that do not deliver on their objective to fully compensate for the consumer’s carbon footprint. In either case, the end result is a greater negative impact on climate change whether directly due to aviation, or indirectly by inaction to reduce one’s personal carbon footprint in everyday life.

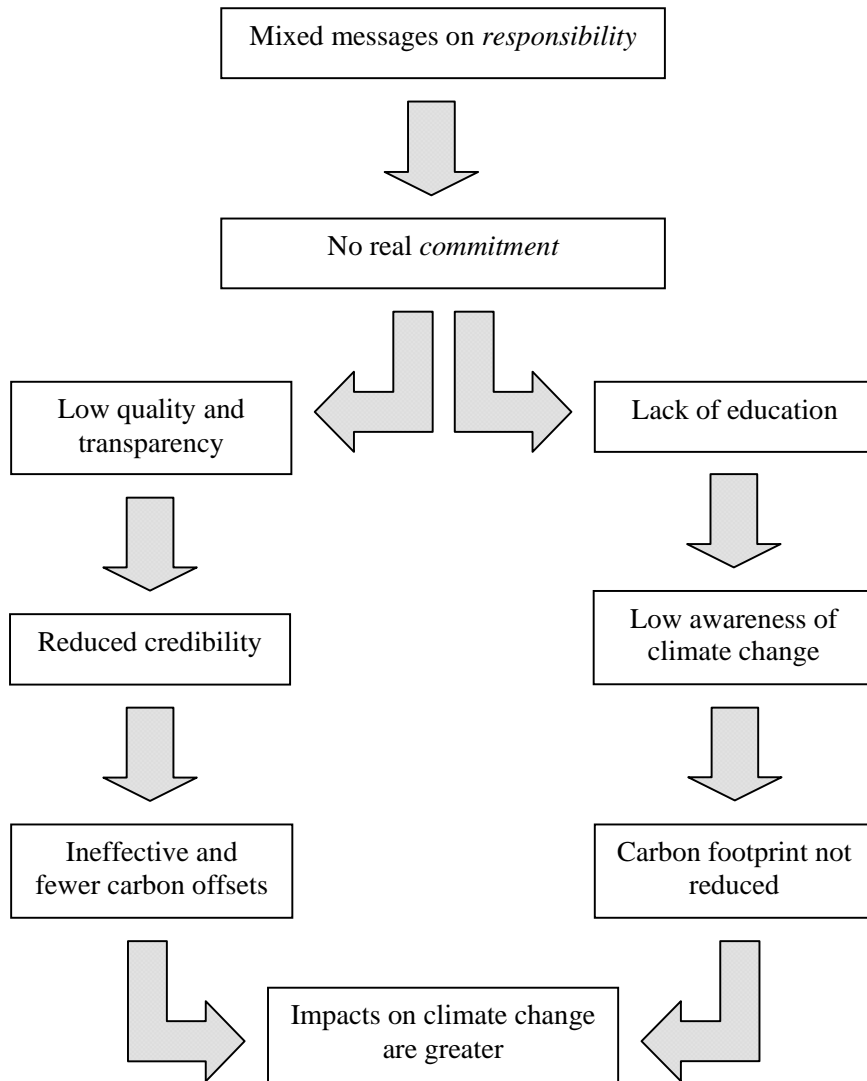


Figure 13: Proposed model 'B' relating key themes with impacts on climate change
 Source: Author

I would like to conclude by returning to the question I posed in the opening line of the introduction to this study but rephrased slightly differently. “Do airlines provide me with the opportunity to fly with a clear environmental conscience?” As a consumer, it is unlikely that I could make an informed and timely decision to purchase a carbon offset of my choice. Nor is it likely that I would have complete confidence that my personal carbon emissions would be fully compensated for by a responsible investment in a credible project that also provided value for money. The sky need not be the limit for carbon offsetting although for now it may well be.

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[Reports/5%20Final%20Report%20Potential%20Carbon%20Offsetting%20to%20Mitigate%20Climate%20Change%20Implications.pdf](http://www.omega.mmu.ac.uk/Downloads/Final-Reports/5%20Final%20Report%20Potential%20Carbon%20Offsetting%20to%20Mitigate%20Climate%20Change%20Implications.pdf)

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10 Appendices

Appendix 1 Survey screenshots

PREVIEW: Airline Carbon Offsetting Survey 2011 Refresh View Page 1


Airline Carbon Offsetting Survey 2011
Introduction and instructions

The objective of this survey is to understand the attitudes towards carbon offsetting at an aggregated level across the airline industry. This is an **independent** survey that guarantees complete **anonymity** and **confidentiality** to all airlines that participate.

Key questions

- **Who should participate?** **All** airlines are invited to participate in the survey regardless of whether they a carbon offsetting service. Airlines without a carbon offsetting scheme would not need any specialist knowledge to participate. Only one representative from each airline should respond.
- **How long will it take to complete?** Airlines with a carbon offsetting scheme should allow **10-15 minutes**; airlines without a carbon offsetting scheme should take no more than **5 minutes**.
- **When does the survey close?** The survey is open for **two weeks** and will close on **Friday 22nd April** (any responses returned after this time will be allowed in exceptional cases only).
- **Who do I contact if I have a question or problem?** You can contact Colin Cafferty (ccaft01@students.bbk.ac.uk) and he will endeavour to assist you.

Structure of survey

- The survey has been structured into separate themes per page each containing several questions.
- Explanations of terminology used are provided where appropriate.
- All questions are either multiple-choice or use a rating or ranking scale.
- Certain questions allow you to select an "Other" option – responses should be typed in the box.
- A progress bar shows at the bottom of each page indicating how far you are to completing the survey in percentage terms.
- Any question followed by a red asterisk means it is compulsory – you won't be able to proceed to the next page if it is not answered.
- If you have a carbon offsetting programme, all questions on the final page are optional (no asterisk shown)
- If you don't have a carbon offsetting programme, you should select "No" for question three which will then bring you to a separate and shorter set of questions
- Once you click the "Submit" button on the final page, your response is recorded and cannot be recalled.

Next



Airline Carbon Offsetting Survey 2011

General questions

1. What size is your airline in terms of scheduled passenger numbers carried in 2010? *

-- Please Select --

2. Which geographical region is your airline headquarters located in? *

- Asia
- Europe
- Middle-East and Africa
- North and South America
- Oceania

3. Does your airline have a carbon offsetting scheme? *

- Yes
- No

Next

4. Which type of carbon offset partner does your airline use (if any)? *

-- Please Select --

5. Rank the following criteria in order of importance to your airline when selecting a carbon offset partner. *

1 = highest importance, 7 = lowest importance (please rank all seven)

	1	2	3	4	5	6	7
Charges/fees	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Project Type(s) available	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Project Location(s) offered	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Quality Assurance/Certified Programme	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reputation of partner	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Size and market share of partner	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Degree of transparency offered	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

6. Rank the following criteria in order of importance to your airline when selecting carbon offsetting projects. *

1 = highest importance, 5 = lowest importance (please rank all five)

Note - Standards provide varying levels of assurance to buyers on the quality and authenticity of projects that generate carbon offsets

	1	2	3	4	5
Carbon Offsetting Standard	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Price of carbon offsets	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Project Location	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Project Type	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Social and environmental co-benefits to local communities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7. Rank the following carbon offset project types in order of preference to your airline. *

1 = highest preference, 6 = lowest preference (please rank all six)

	1	2	3	4	5	6
Afforestation/Reforestation (e.g. planting, replanting trees)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Energy Efficiency (e.g. more efficient stoves, use of waste energy)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fuel switching (e.g. from coal to biomass)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Industrial gas destruction (e.g. hydrofluorocarbons)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Methane Capture (e.g. landfill gas, coal mine gas, anaerobic digestion)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Renewable Energy (e.g. wind, solar PV, hydro)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8. To what extent would you agree or disagree to purchase forest carbon offsets as part of the U.N. REDD initiative over and above other project types if offered? *

Note - REDD stands for Reductions in Emissions through Deforestation and Degradation and is a U.N. programme that aims to create a financial value for the carbon stored in forests in developing countries. It also aims to deliver "co-benefits" such as biodiversity conservation and poverty alleviation.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

Appendix 2 Letter to airlines

Dear airline colleague,

We would like to invite you to participate in a comprehensive survey of airline attitudes towards carbon offsetting. Carbon offsetting is an approach towards reducing the climate change risk for an airline and some airlines have already taken steps to provide their passengers with the opportunity to compensate for the carbon emissions generated from their flight. The objective of this survey is to understand the attitudes towards carbon offsetting at an aggregated level across the airline industry. **This independent survey guarantees complete anonymity and confidentiality** to all respondents. This survey has been developed by a Masters student reading Climate Change Management at Birkbeck College, as part of a dissertation on carbon offsetting in the airline industry.

Why you should participate

- **Gather current opinion on the state of carbon offsetting across the airline industry.**
- **Improve existing carbon offsetting scheme or start a new scheme.** Results will be shared with all airlines interested in improving their current offsetting scheme or launching a new scheme.
- **More responses mean better data reliability and confidence in the results.** To be able to provide data that is truly representative of the industry, we count on the support of as many airlines as possible.
- **Contribute to academic research.** This is an independent survey with a clear academic research purpose – it has the full support and cooperation of IATA but remains independent of IATA.
- Freedom to respond anonymously. Responses will not be tracked and questions have been phrased in such a way such that respondents cannot be identified.

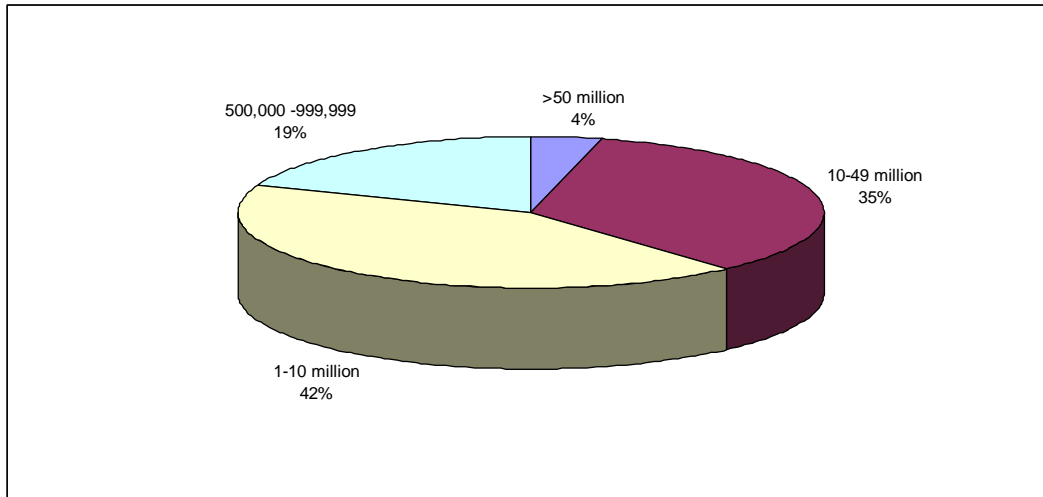
What you need to know about the survey

- Airlines are invited to participate regardless of whether they have a carbon offsetting scheme. Only one representative from each airline should respond. If you are not the most suitable person to respond, we kindly ask that you forward this email to the appropriate colleague.
- The survey can be accessed by clicking on the following URL, <http://sgiz.mobi/s3/Airline-Carbon-Offsetting-Survey-2011>

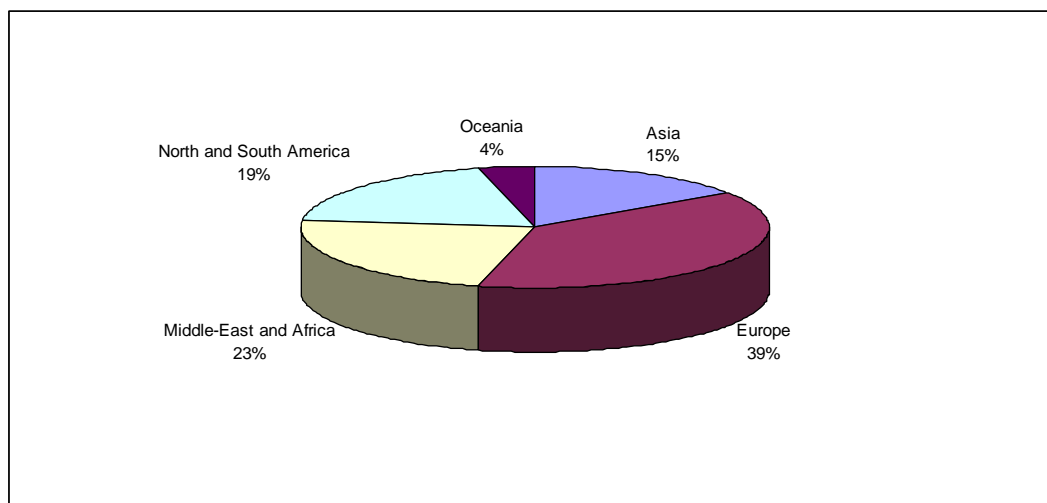
The survey should take you between 10-15 minutes to complete and we would like to ask that you complete the survey by **Friday 22nd April**. Should you have any further questions regarding the survey, you can contact Colin Cafferty (ccaffe01@students.bbk.ac.uk).

Appendix 3 Survey questions and responses

Q1 What size is your airline in terms of scheduled passenger numbers carried in 2010?



Q2 Which geographical region is your airline headquarters located in?



Q3 Does your airline have a carbon offsetting scheme?

Value	Count	Percent %
Yes	10	38.5%
No	16	61.5%

Q4 Which type of carbon offset partner does your airline use (if any)?

Value	Count	Percent %
Third party offset provider	6	60%
Bank	1	10%
Offset broker	2	20%
Airline's carbon trading desk/ Own internal activity	1	10%

Q5 Rank the following criteria in order of importance to your airline when selecting a carbon offset partner.

Criteria	Total Score ¹	Overall Rank
Quality Assurance/Certified Programme	44	1
Project Type(s) available	39	2
Project Location(s) offered	34	3
Reputation of partner	33	4
Charges/fees	32	5
Degree of transparency offered	32	6
Size and market share of partner	17	7

¹ Scores for each ranking question is a weighted calculation. Items ranked first are valued higher than the following ranks; the score is the sum of all weighted rank counts.

Q6 Rank the following criteria in order of importance to your airline when selecting carbon offsetting projects.

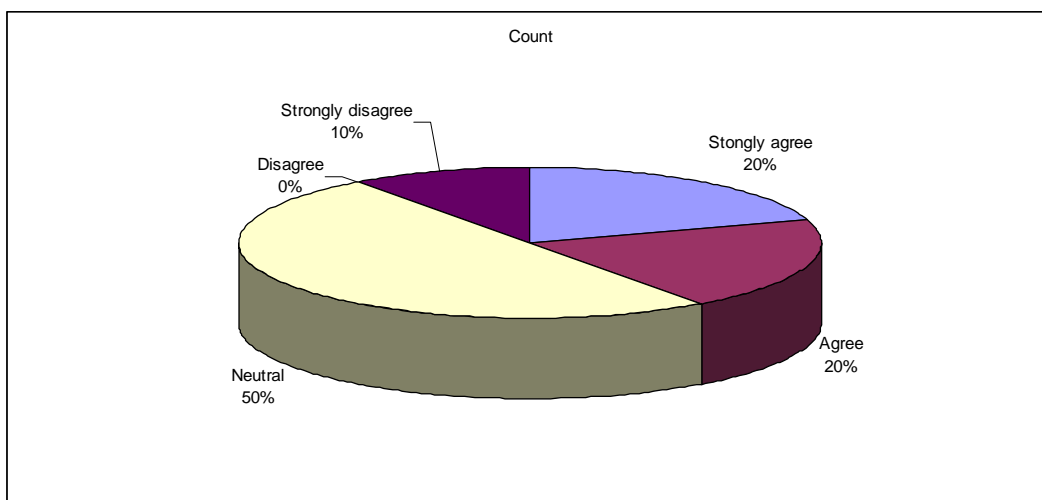
Criteria	Total Score ¹	Overall Rank
Carbon Offsetting Standard	40	1
Project Location	27	2

Criteria	Total Score ¹	Overall Rank
Price of carbon offsets	25	3
Project Type	22	4
Social and environmental co-benefits to local communities	18	5

Q7 Rank the following carbon offset project types in order of preference to your airline.

Project Types	Total Score	Overall Rank
Renewable Energy (e.g. wind, solar PV, hydro)	41	1
Afforestation/Reforestation (e.g. planting, replanting trees)	38	2
Energy Efficiency (e.g. more efficient stoves, use of waste energy)	35	3
Fuel switching (e.g. from coal to biomass)	25	4
Methane Capture (e.g. landfill gas, coal mine gas, anaerobic digestion)	21	5
Industrial gas destruction (e.g. hydrofluorocarbons)	14	6

Q8 To what extent would you agree or disagree to purchase forest carbon offsets as part of the U.N. REDD initiative over and above other project types if offered?



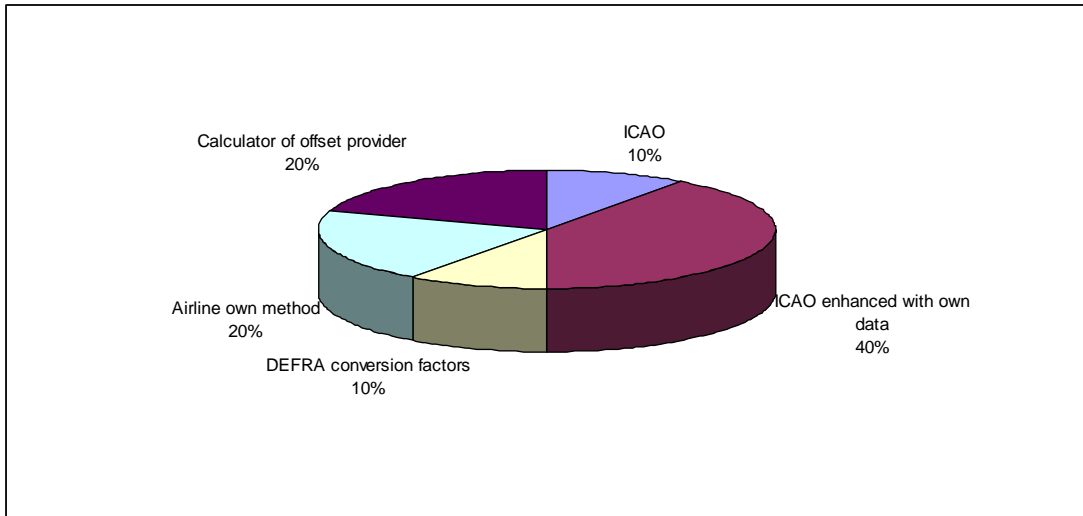
Q9 Rank the following standards for carbon offsets in order of appeal to your airline.

Standards	Total Score¹	Overall Rank
CDM - Certified Emission Reductions (CERs)	48	1
CDM Gold Standard	48	2
Voluntary Carbon Standard (VCS)	38	3
Climate Community and Biodiversity (CCBA) Standard	34	4
VCS Gold Standard	33	5
Other	25	6
Plan Vivo	19	7

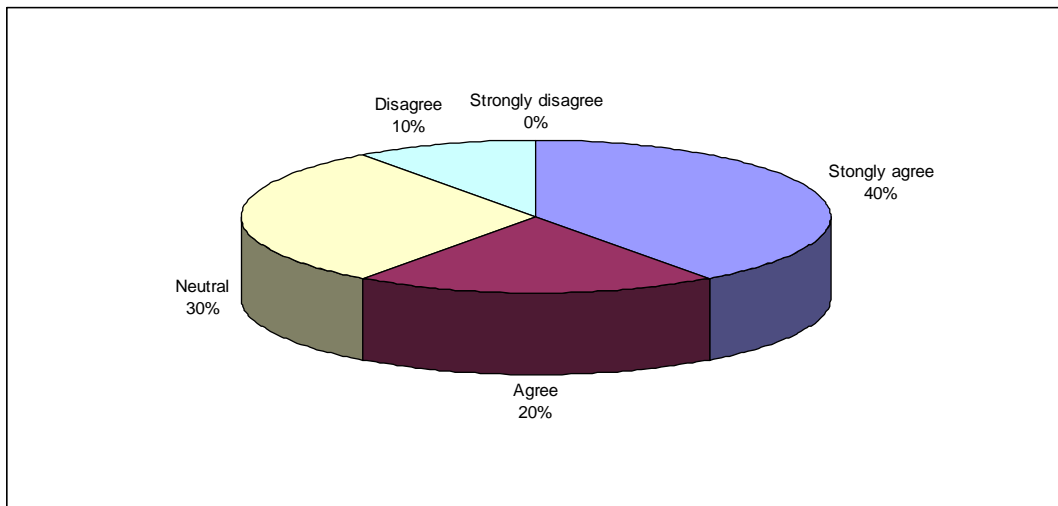
Q10 Rank the following criteria in order of importance to your airline when deciding on which carbon calculator to use.

Criteria	Total Score¹	Overall Rank
Using fuel data specific to your airline	38	1
Simplicity of calculator	31	2
Providing a full explanation of how the calculator works	29	3
Verifying the calculator through an independent third party	26	4
Following ICAO methodology	25	5
Other	0	6

Q11 What methodology is your airline using for its carbon calculator?



Q12 To what extent do you agree or disagree that an industry standard approach for methodology and emission calculations would increase passenger uptake of carbon offsets?



Q13 Rank the following potential risks to your carbon offsetting scheme in order of greatest impact.

Potential Risks	Total Score ¹	Overall Rank
Reputational damage	33	1
Low uptake of offsets by passengers	30	2
Offsets do not achieve carbon emission reduction claimed	29	3
Carbon offset partnership fails to meet objectives	26	4

Potential Risks	Total Score ¹	Overall Rank
Offset provider goes bankrupt	18	5

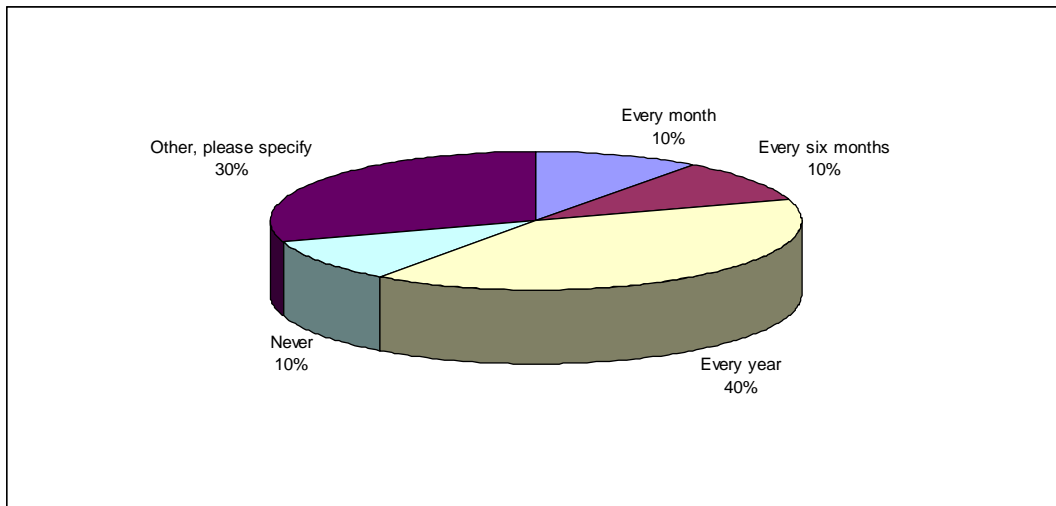
Q14 Rank the following potential benefits of your carbon offsetting scheme in order of importance.

Potential Benefits	Total Score ¹	Overall Rank
Empowering passengers to take responsibility for their carbon footprint	42	1
Enhancing Corporate Responsibility and environment credentials of the airline	41	2
Increasing loyalty amongst environmentally conscious passengers with the airline	39	3
Educating passengers about aviation's impact on climate change	35	4
Preparing your airline for future emissions trading	29	5
Reducing exposure to potential future regulation and taxes	24	6

Q15 To what extent do you agree or disagree that the following approaches would improve the visibility of your carbon offsetting scheme to passengers?

Approach	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Add logo or link to the front page of your website	60%	40%	0%	0%	0%
Include option to offset in flight booking	80%	20%	0%	0%	0%
Promote on your aircraft	40%	30%	20%	10%	0%

Q16 How often do you refresh the online (Internet) information regarding your carbon offsetting scheme?



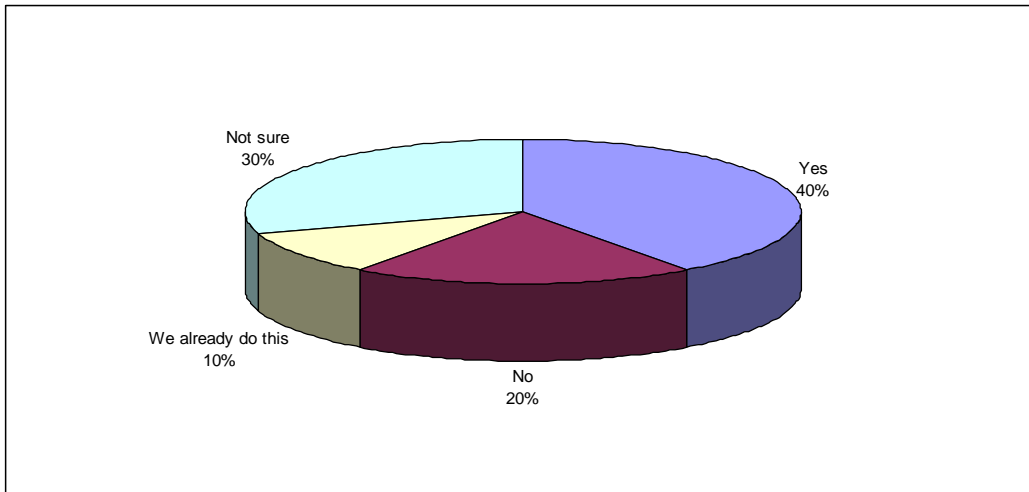
Q17 How do you think you can improve your current carbon offsetting scheme?

Method	Count	Percent %
Integration into the booking flow	6	60%
Better PR	7	70%
Certification and accreditation of programme	1	10%
Greater choice of projects (including local projects)	3	30%
Other, please specify	3	30%

Q18 How do you promote your carbon offsetting scheme?

Method	Count	Percent %
Advertising in the In-flight magazine of airline	7	70%
Logo or link on main page of airline website	6	60%
Detailed content on airlines environmental or corporate responsibility web page	8	80%
Newsletter on airline website	3	30%
In-flight video/In-flight entertainment system	3	30%
Other, please specify	1	10%

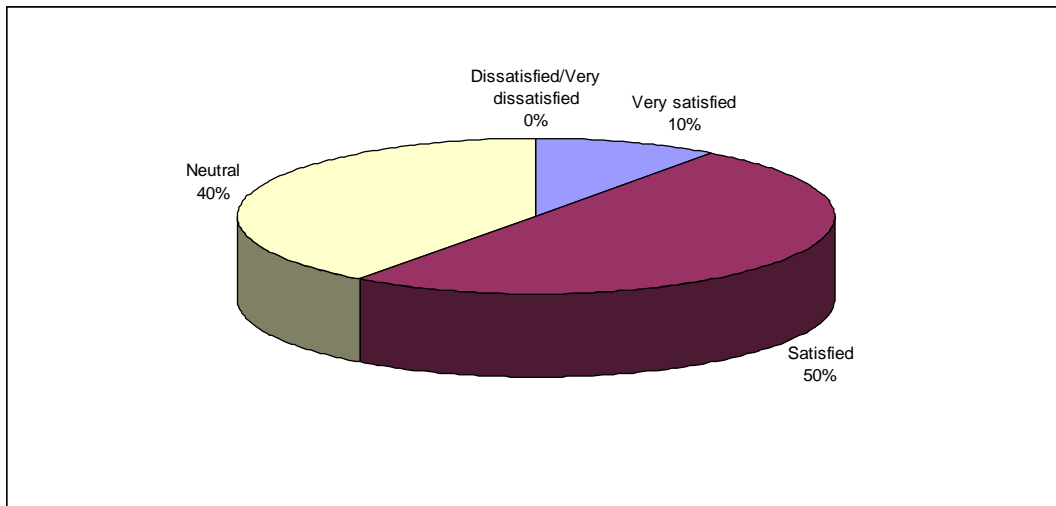
Q19 Would your airline consider offsetting the emissions of its employees in order to promote uptake of carbon offsetting by passengers?



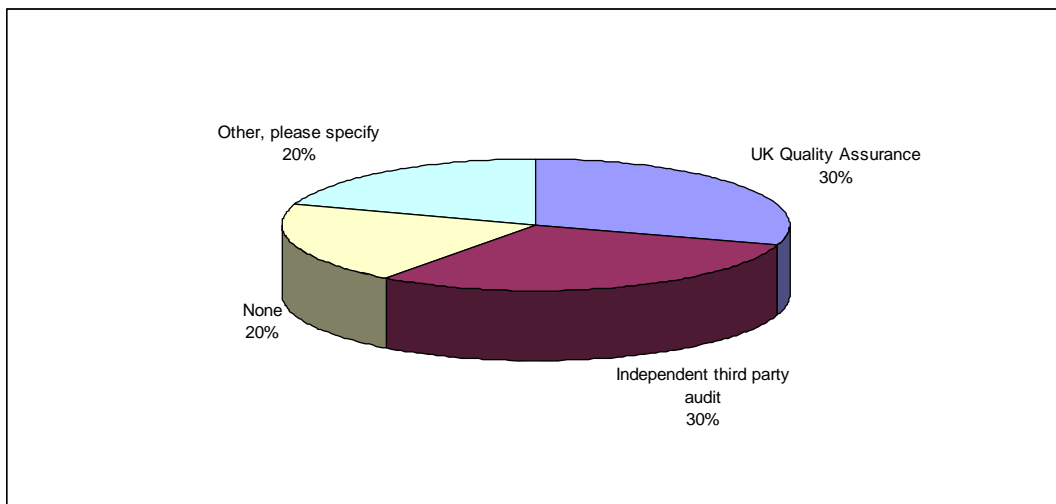
Q20 Does your airline take any of the following actions to improve the service offered by your carbon offsetting scheme?

Actions	Count	Percent %
Continuous improvement by measuring performance against set targets	7	70%
Regular progress reviews with your carbon offset partner	6	60%
Collecting customer feedback	3	30%
None of the above	1	10%
Other	1	10%

Q21 To what extent is your airline satisfied or dissatisfied with the performance of its carbon offsetting scheme?



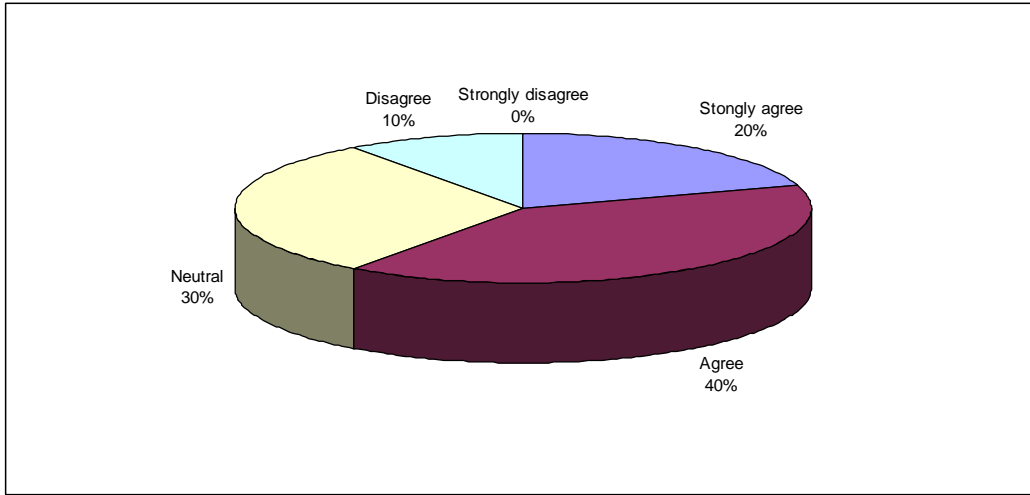
Q22 Which of the following verification or auditing methods, if any, do you use for your carbon offsetting scheme?



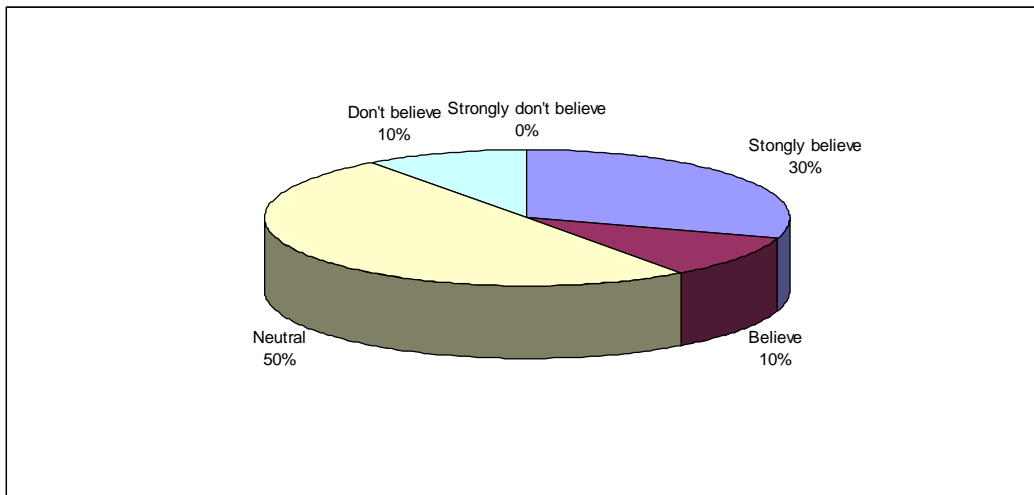
Q23 Do you have a control mechanism in place that monitors the registration and cancellation of carbon offsets so they cannot be re-traded in the market or double-counted?

Control mechanism	Count	Percent %
Yes	2	20%
No	4	40%
Don't know	4	40%

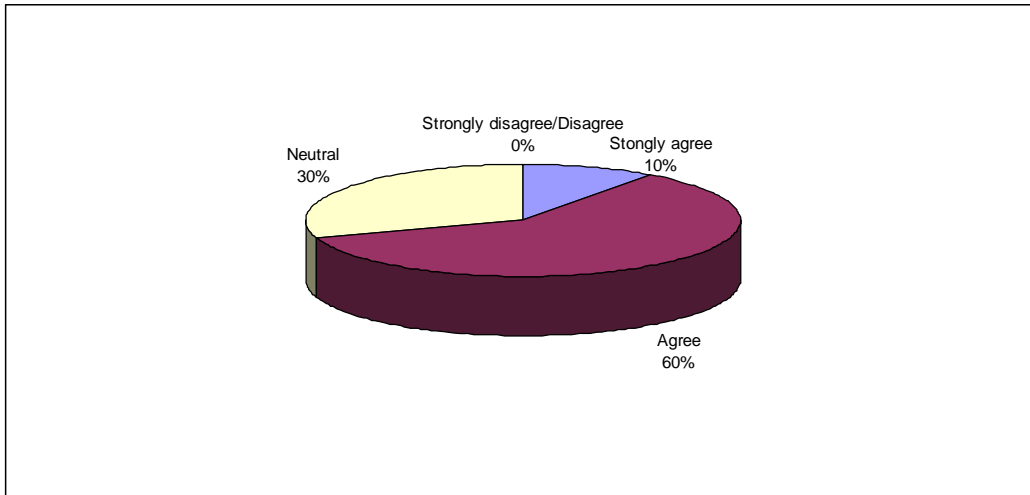
Q24 To what extent do you agree or disagree that offering a high quality carbon offset scheme will give you a competitive edge over other airlines and attract new business?



Q26 Do you believe that taking part in the UK Government Quality Assurance Scheme or another national QA scheme can convince your passengers of your carbon offsetting schemes environmental integrity?



Q27 To what extent do you believe that your passengers are satisfied or dissatisfied with the quality of your carbon offsetting scheme?



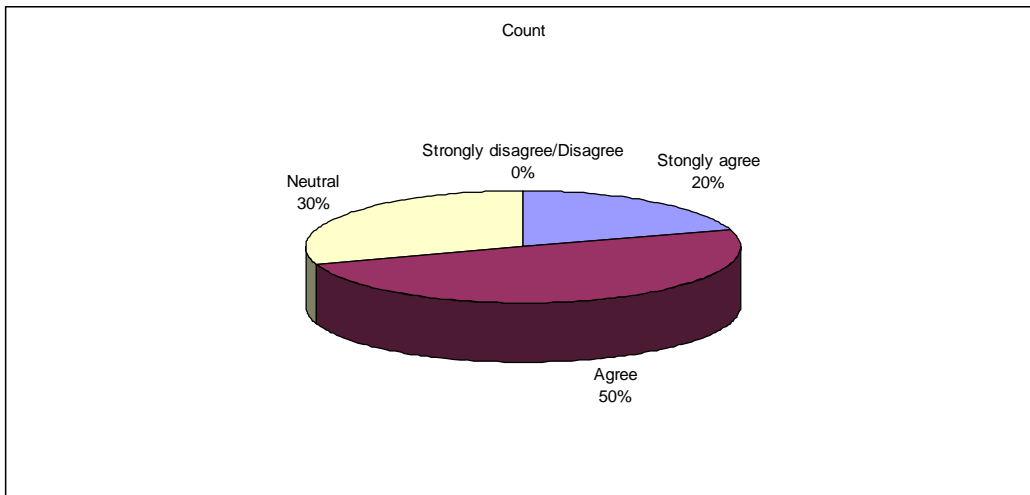
Q28 Do you monitor and record the tonnes of CO2 reduced via your carbon offset scheme?

Value	Count	Percent %
Yes	8	80%
No	2	20%

Q29 Does your airline publicly disclose its carbon offsetting volumes?

Value	Count	Percent %
Yes	3	30%
No	7	70%

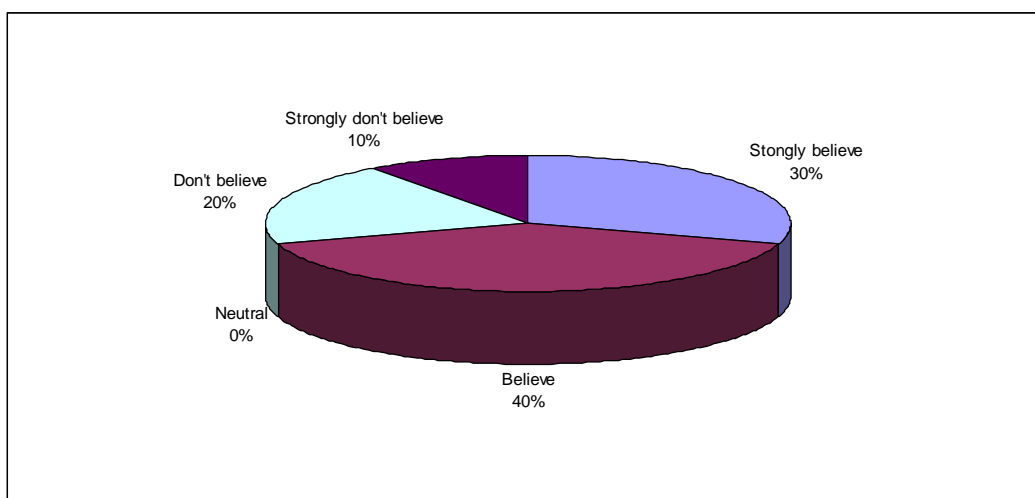
Q30 To what extent do you agree with the following statement? Passengers will need to help shoulder the burden of reaching the airline industry's goal of carbon-neutral growth from 2020 by purchasing carbon offsets



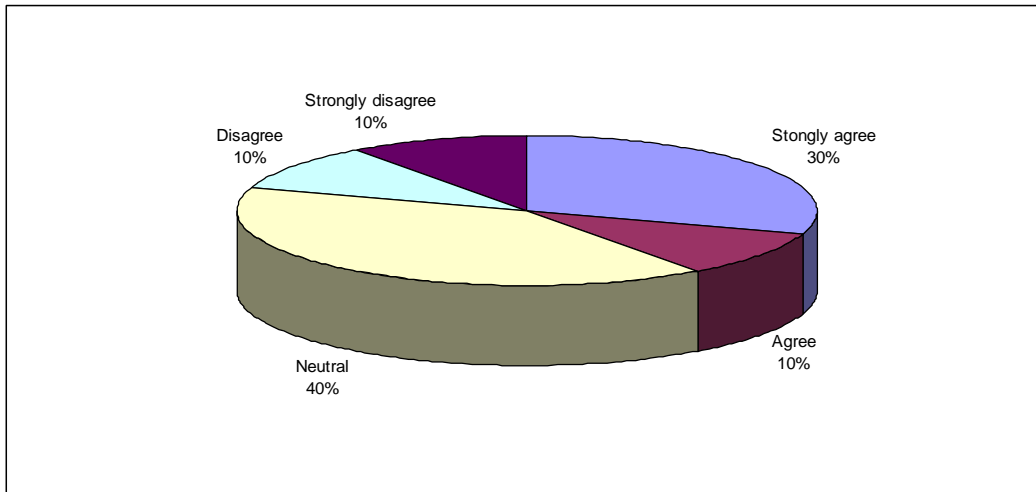
Q31 Do you think the airline industry has a responsibility to its passengers to explain the environmental consequences of their choice to fly?

Value	Count	Percent %
Yes	8	80%
No	1	10%
Not sure	1	10%

Q32 To what extent do you believe that your airline's participation in the EU ETS (EU Emissions Trading Scheme) is likely to result in you re-evaluating your carbon offsetting scheme?



Q33 Voluntary carbon offsets are not recognized by the EU ETS (EU Emissions Trading Scheme). To what extent do you agree or disagree that airlines should get recognition by the EU ETS for the carbon offset by their passengers?



Q34 Do you apply any type of charges to carbon offsets?

Charges	Count	Percent %
Mandatory sales tax	1	10%
Administration fee	1	10%
None	8	80%

Q35 Have you thought of extending your carbon offsetting scheme to allow frequent flyer miles as a payment method?

Value	Count	Percent %
Yes	7	70%
No	3	30%

Q36 Do you have any plans to include cargo in your carbon offsetting scheme?

Value	Count	Percent %
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Yes	4	40%
No	5	50%
Don't know	1	10%

Q37 Have you considered offering a carbon offsetting scheme specifically for corporate clients rather than individual passengers?

Value	Count	Percent %
Yes	6	60%
No	4	40%

Q38 Have you considered match-funding offsets donated by passengers?

Value	Count	Percent %
Yes	4	40%
No	5	50%
Don't know	1	10%

Q39 Does your airline currently offset its own corporate carbon emissions by purchasing offsets directly?

Value	Count	Percent %
Yes	3	30%
No	7	70%

Airlines without a carbon offsetting scheme

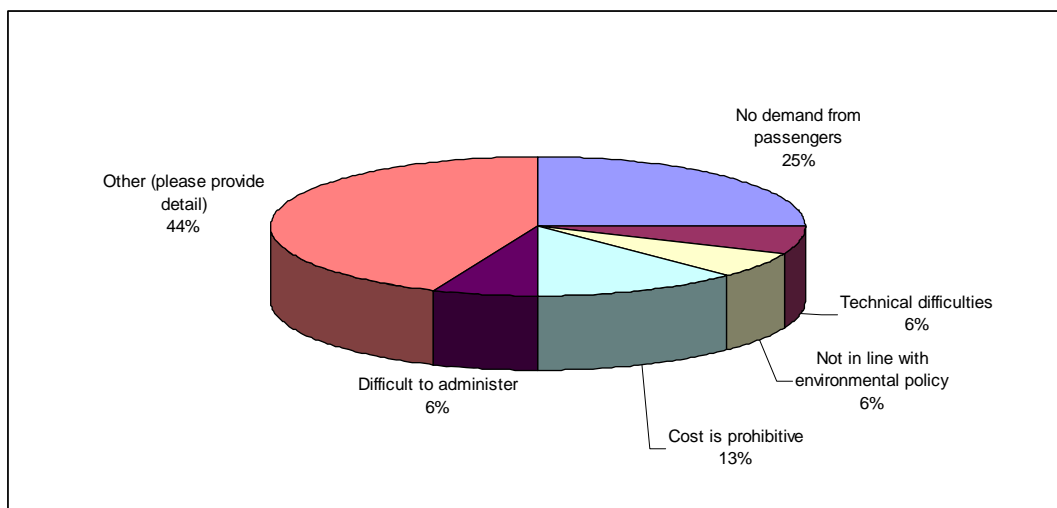
Q40 Did you ever have a carbon offsetting scheme in the past but which is now discontinued?

Value	Count	Percent %
No	16	100%

Q41 What was your airline's main reason for discontinuing your carbon offsetting scheme?

Value	Count	Percent %
N/A	0	0

Q42 What is your airline's main reason for not having a carbon offsetting scheme currently?



Q43 Does your airline have an official policy on climate change?

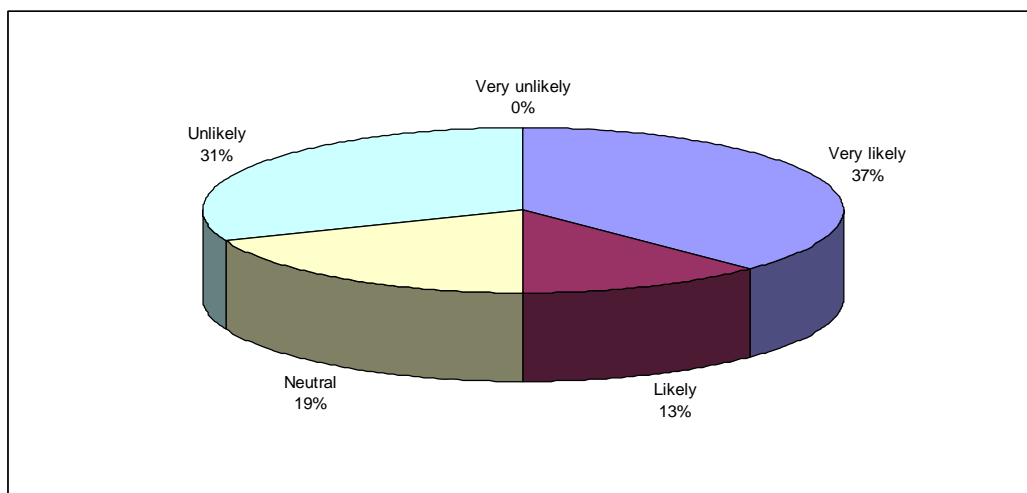
Value	Count	Percent %
Yes	9	56.3%
No	7	43.8%

Q44 Could the International Civil Aviation Organization's resolution at the 37th Assembly in 2010 on carbon offsetting influence your decision to implement a carbon offsetting scheme in the near future?

"Voluntary carbon offsetting schemes constitute a practical way to offset CO2 emissions, and invites States to encourage their operators wishing to take early actions to use carbon offsetting, particularly through the use of credits generated from internationally recognized schemes such as the CDM."

Value	Count	Percent %
Yes	10	62.5%
No	5	31.3%
Not sure	1	6.3%

Q45 How likely are you to launch a carbon offsetting scheme in the next 12 months?



Q46 Rank the following potential risks to your airline in order of greatest impact if you were to start a carbon offsetting scheme.

Potential Risks	Total Score ¹	Overall Rank
Reputational damage	46	1
Offsets do not achieve the carbon emission reduction claimed	44	2
Carbon offset partnership fails to meet objectives	43	3
Low uptake of offsets by passengers	42	4
Offset provider goes bankrupt	34	5

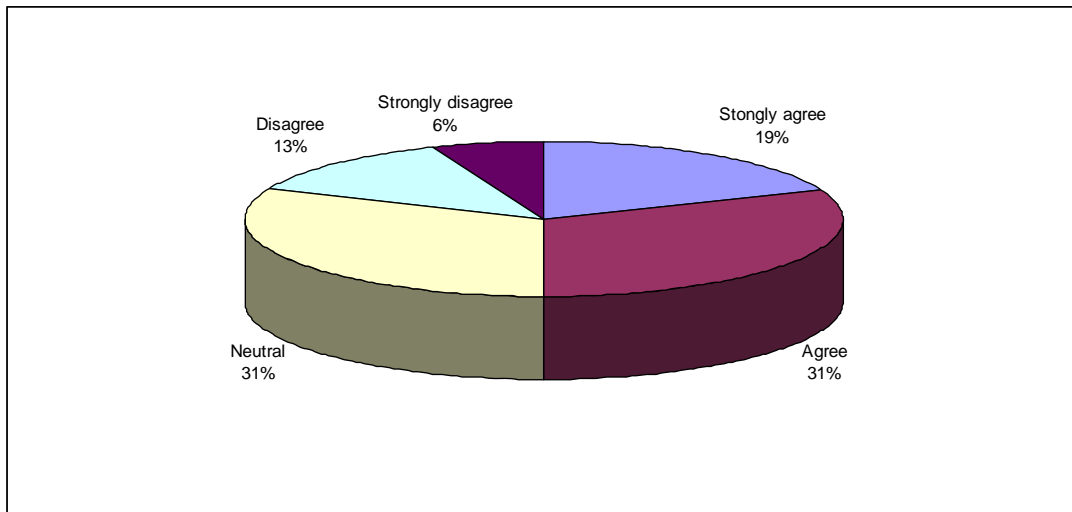
Q47 Rank the following potential benefits in order of importance if your airline was to decide to offer a carbon offsetting scheme.

Potential Benefits	Total Score ¹	Overall Rank
Increasing loyalty amongst environmentally conscious passengers with the airline	58	1
Educating passengers about aviation's impact on climate change	57	2
Enhancing Corporate Responsibility and environment credentials of the airline	53	3
Empowering passengers to take responsibility for their carbon footprint	46	4
Preparing your airline for future emissions trading	41	5
Reducing exposure to potential future regulation and taxes	36	6

Q48 Does your airline currently offset its own carbon emissions or those of its employees by purchasing offsets directly?

Value	Count	Percent %
No	15	93.8%
Don't know	1	6.3%

Q49 Do what extent do you agree with the following statement? Passengers will need to help shoulder the burden of reaching the airline industry's goal of carbon-neutral growth from 2020 by purchasing carbon offsets



Q50 Do you think the airline industry has a responsibility to its passengers to explain the environmental consequences of their choice to fly?

Value	Count	Percent %
Yes	10	62.5%
No	6	37.5%

Please use this section to offer additional information on any of your answers or let us know your thoughts on this survey

Sample responses
This survey is a good to start cooperation
I think the airline industry does not have to punish itself by offering a service that has an increased public demand. I grew up in West Berlin with a wall around me and flying was the only hassle free mode of transportation from A to B. I truly believe that flying is beautiful and we should advocate this but we also should use our combined power to push governments and suppliers to meet our demands in order to serve the travelling public in a sustainable manner.
Our airline was prepared to launch a carbon offsetting program, but was denied permission from our mother company. They cited 3 reasons: (1) They felt that there would not be enough demand from our customers (2) The difficulty of integrating an offset program onto our existing web platform (3) They felt that the EU ETS was a form of carbon offsetting.

Sample responses

Carbon offsetting depends on global warming model which is now in doubt, and the result of the new study is not due to be known for several years. At the moment the evidence from the UK experts shows the earth is getting colder and that global warming is only the result of events hundreds of years before i.e. the whole carbon market is liable to 'dissolve' when the results are known.

Appendix 4 – Statistical tests for survey results

Question pairs	Data Type 1 ¹	Data Type 2 ¹	No. of groups	Objective	Suitable statistical test
1 vs. 31	Nominal (>2)	Interval	One	Identify diff between groups	1-way ANOVA
2 vs. 31	Nominal (>2)	Interval	One	Identify diff between groups	1-way ANOVA
1 vs. 3	Nominal (>2)	Nominal (2)	One	Identify relationship	Chi Squared
2 vs. 3	Nominal (>2)	Nominal (2)	One	Identify relationship	Chi Squared
22 vs. 23	Nominal (>2)	Nominal (>2)	One	Identify relationship	Chi Squared
27 vs. 28	Nominal (2)	Nominal (2)	One	Identify relationship	Chi Squared
30 vs. 49	Nominal (>2)	Nominal (2)	Two	Between group comparison	Chi Squared
38 vs. 47	Nominal (2)	Nominal (>2)	Two	Between group comparison	Chi Squared
42 vs. 43	Nominal (2)	Nominal (>2)	One	Identify relationship	Chi Squared
29 vs. 48	Interval	Interval	Two	Between group comparison	Independent samples t-test
2 vs. 7	Nominal (>2)	Ordinal	One	Identify relationship	Kruskal-Wallis test
1 vs. 9	Nominal (>2)	Ordinal	One	Identify relationship	Kruskal-Wallis test
2 vs. 9	Nominal (>2)	Ordinal	One	Identify relationship	Kruskal-Wallis test
1 vs. 33	Nominal (>2)	Nominal (>2)	One	Identify relationship	Log-linear
2 vs. 33	Nominal (>2)	Nominal (>2)	One	Identify relationship	Log-linear
21 vs. 26	Interval	Interval	One	Identify relationship	Pearson's r
5 vs. 25	Ordinal	Interval	One	Identify relationship	Spearman's rho
6 vs. 9	Ordinal	Ordinal	One	Identify relationship	Spearman's rho
7 vs. 8	Ordinal	Interval	One	Identify relationship	Spearman's rho
10 vs. 12	Ordinal	Interval	One	Identify relationship	Spearman's rho
13 vs. 45	Ordinal	Ordinal	Two	Between group comparison	Wilcoxon-Mann-Whitney
14 vs. 46	Ordinal	Ordinal	Two	Between group comparison	Wilcoxon-Mann-Whitney

Source: Author (based on guidance available at - <http://www.whichtest.info/index.html>)

¹number of variables shown in brackets

Appendix 5 Airline carbon offsetting websites

All websites last accessed through below links on 3rd September 2011

Airline	Carbon offset web page
Air Canada	http://www.aircanada.com/en/travelinfo/traveller/zfp.html
Air France	http://corporate.airfrance.com/en/sustainable-development/co2-calculator/
Air New Zealand	http://www.airnewzealand.co.nz/carbon-offset
ANA	http://www.ana.co.jp/eng/aboutana/corporate/csr/offset/index.html
Austrian Airlines	http://www.austrian.com/Info/Flightinformation/CO2offsetting.aspx?sc_lang=en&cc=RU
British Airways	http://www.britishairways.com/travel/csr-your-footprint/public/en_gb
Brussels Airlines	http://company.brusselsairlines.com/en_be/corp/citizenship/co2.aspx
Cathay Pacific	http://www.cathaypacific.com/cpa/en_INTL/manageyourtrip/travelextras/flygreener
Cebu Pacific	http://www.cebupacificair.com/wwfbrightskies/index.html
Continental	http://www.continental.com/web/en-US/content/Contact/products/carbonoffset.aspx
EasyJet	http://www.easyjet.com/en/environment/carbon_offsetting.html
El Al	http://app.elal.co.il/MiniSites/GreenerGlobe/
Harbour Air	http://www.harbour-air.com/offsetting.php
Icelandair	http://www.icelandair.co.uk/information/green-icelandair/iceland-carbon-fund/
JAL	http://www.jal.com/en/carbon_offsetting/

Jetstar	http://www.jetstar.com/au/en/what-we-offer/carbon-offset
Kenya Airways	http://www.kenya-airways.com/home/about_kenya_airways/carbon_offset_program/default.aspx
KLM	http://www.klm.com/travel/gb_en/plan_and_book/fly_co2_neutral/all_about/index.htm
Lufthansa	http://lufthansa.myclimate.org/EN
Malaysian Airlines	http://mas-app.xm-apac.com/campaigns/
Monarch	http://www.monarch.co.uk/about-us/environment-and-co2-offsetting
Nature Air	http://www.natureair.com/carbonneutral/
Net Jets	http://www.netjetseurope.com/en/Our-climate-commitment/All-inclusive-carbon-offsets/
Qantas	http://www.qantas.com.au/travel/airlines/fly-carbon-neutral/global/en
SAS	http://www.flysas.com/en/Travel_info/CO2-emissions2/?WT.ac=Footer_TI8#
Swiss	http://www.swiss.com/web/EN/about_swiss/environmental_affairs/Pages/co2_compensation.aspx
TAP	http://www.tapportugal.com/Info/en/ABOUTTAP/OurCompany/TAPandEnvironment/CarbonOffset
Thomas Cook	http://www.thomascook.com/sustainable-tourism/looking-after-the-environment/
Thomson	http://www.thomson.co.uk/editorial/press-centre/2008/thomson-and-first-choice-sustainable-development-scheme.html http://www.holidaysforever.co.uk/thomson/pages/beforeyougo/world_care_fund.html
United	http://www.united.com/page/article/0,6867,53032,00.html
Virgin Atlantic	http://www.virgin-atlantic.com/en/gb/allaboutus/environment/projects.jsp
Virgin Australia	http://www.virginaustralia.com/carbonoffset/faq/

Appendix 6 List of all IATA member airlines contacted

Airline	Region	Airline	Region	Airline	Region
Adria Air	Europe	Transaero	Europe	Pluna	North & South America
Aegean Air	Europe	Turkish Airlines	Europe	SLM	North & South America
Aer Lingus	Europe	Ukraine Int Airlines	Europe	TACA	North & South America
Aeroflot	Europe	Virgin Atlantic	Europe	TAM Brazil	North & South America
Aerosvit	Europe	Volga-Dnepr Airlines	Europe	TAM Paraguay	North & South America
Aigle Azur	Europe	Wideroe	Europe	US Airways	North & South America
Air Austral	Europe			Volaris	North & South America
Air Baltic	Europe	Air Astana	Asia	United Airlines	North & South America
Air Berlin	Europe	Air China	Asia		
Air Europa	Europe	Air India	Asia	Afriqiyah	Middle East & Africa
Air France	Europe	Air Macau	Asia	Air Algerie	Middle East & Africa
Air Malta	Europe	Air Mauritius	Asia	Air Madagascar	Middle East & Africa
Air Moldova	Europe	Air Seychelles	Asia	Air Malawi	Middle East & Africa
Air Nostrum	Europe	ANA	Asia	Air Namibia	Middle East & Africa
Air One	Europe	Asiana	Asia	Air Zimbabwe	Middle East & Africa
Alitalia	Europe	Bangkok Airways	Asia	Egyptair	Middle East & Africa
Armavia	Europe	Biman Bangladesh	Asia	El Al	Middle East & Africa
Austrian Airlines	Europe	Cathay Pacific	Asia	Emirates	Middle East & Africa
Belavia	Europe	Cebu Pacific	Asia	Ethiopian Airlines	Middle East & Africa
Binter Canarias	Europe	China Airlines	Asia	Etihad	Middle East & Africa
Blue Panorama	Europe	China Southern	Asia	Gulf Air	Middle East & Africa
BMI	Europe	Dragonair	Asia	Interair	Middle East & Africa
British Airways	Europe	EVA Air	Asia	Iran Air	Middle East & Africa
Brussels Airlines	Europe	Garuda Indonesia	Asia	Iran Aseman Airlines	Middle East & Africa
Carpatair	Europe	Hainan Airlines	Asia	Israil	Middle East & Africa
Cimber	Europe	JAL	Asia	Jordan Aviation	Middle East & Africa
Cirrus Airlines	Europe	Jet Airways	Asia	Kenya Airways	Middle East & Africa
Corsair	Europe	Korean air	Asia	Kish Airline	Middle East & Africa
Croatia Airlines	Europe	MAS	Asia	Kuwait Airways	Middle East & Africa
CSA	Europe	MIAT	Asia	LAM	Middle East & Africa
Cyprusair	Europe	PIA	Asia	Lybian Airlines	Middle East & Africa
Estonian Air	Europe	Philippine Airlines	Asia	Mahan Airlines	Middle East & Africa
Finnair	Europe	Shandong Air	Asia	MEA	Middle East & Africa
Flybe	Europe	Shanghai air	Asia	Oman air	Middle East & Africa
Hahn Air	Europe	Shenzhen Air	Asia	Precision Air	Middle East & Africa
Iberia	Europe	Singapore Airlines	Asia	Qatar Airways	Middle East & Africa
Icelandair	Europe	Sri Lankan	Asia	RAM	Middle East & Africa
JAT	Europe	Thai Airways	Asia	Royal Brunei	Middle East & Africa
KLM	Europe	TNA	Asia	Royal Jordanian	Middle East & Africa
Lauda Air	Europe	Xiamen Air	Asia	SAA	Middle East & Africa
LOT	Europe			Safair	Middle East & Africa
Lufthansa	Europe	Aerolinas Argentinas	North & South America	Saudi Arabian	Middle East & Africa
Luxair	Europe	Aeromexico	North & South America	Sudan Air	Middle East & Africa
Meridiana	Europe	Air Canada	North & South America	Syria Air	Middle East & Africa
Montenegro Airlines	Europe	Air Transat	North & South America	TAAG	Middle East & Africa

Olympic Airlines	Europe	Alaska Air	North & South America	Tunisair	Middle East & Africa
SAS	Europe	Atlas jet	North & South America	Yemenia	Middle East & Africa
SATA	Europe	Avianca	North & South America		
Skyways	Europe	Continental	North & South America	Air New Zealand	Oceania
Swiss	Europe	Cubana	North & South America	Air Pacific	Oceania
TAP	Europe	Delta	North & South America	Air Tahiti	Oceania
TAROM	Europe	LAN Chile	North & South America	Air Vanuatu	Oceania
TNT	Europe	LAN Ecuador	North & South America	Qantas	Oceania

Appendix 7 - Acronyms

APD	Air Passenger Duty
ATAG	Air Transport Action Group
ATM	Air Traffic Management
CCBA	Climate Change and Biodiversity Alliance
CDM	Clean Development Mechanism
CER	Certified Emissions Reduction
CR	Corporate Responsibility
CSR	Corporate Social Responsibility
CST	Consumer Sovereignty Test
CO₂	Carbon Dioxide
DECC	Department of Energy and Climate Change (UK)
DEFRA	Department of Environment, Food and Rural Affairs (UK)
DfT	Department for Transport
ERU	Emission Reduction Unit
EUA	EU Allowance
EU ETS	European Union Emissions Trading Scheme
GDS	Global Distribution System
GHG	Greenhouse Gases
GS	Gold Standard
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
ICROA	International Carbon Reduction and Offset Alliance
IPCC	Intergovernmental Panel on Climate Change
JI	Joint Implementation
KPI	Key Performance Indicator
Mt	Million tonnes
NGO	Non Governmental Organisation
NOAA	National Oceanic and Atmospheric Association
NO_x	Nitrogen oxides
REDD+	Reductions in Emissions from Deforestation and Forest Degradation
RFI	Radiative Forcing Index
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Voluntary Carbon Standard
VER	Verified Emissions Reduction