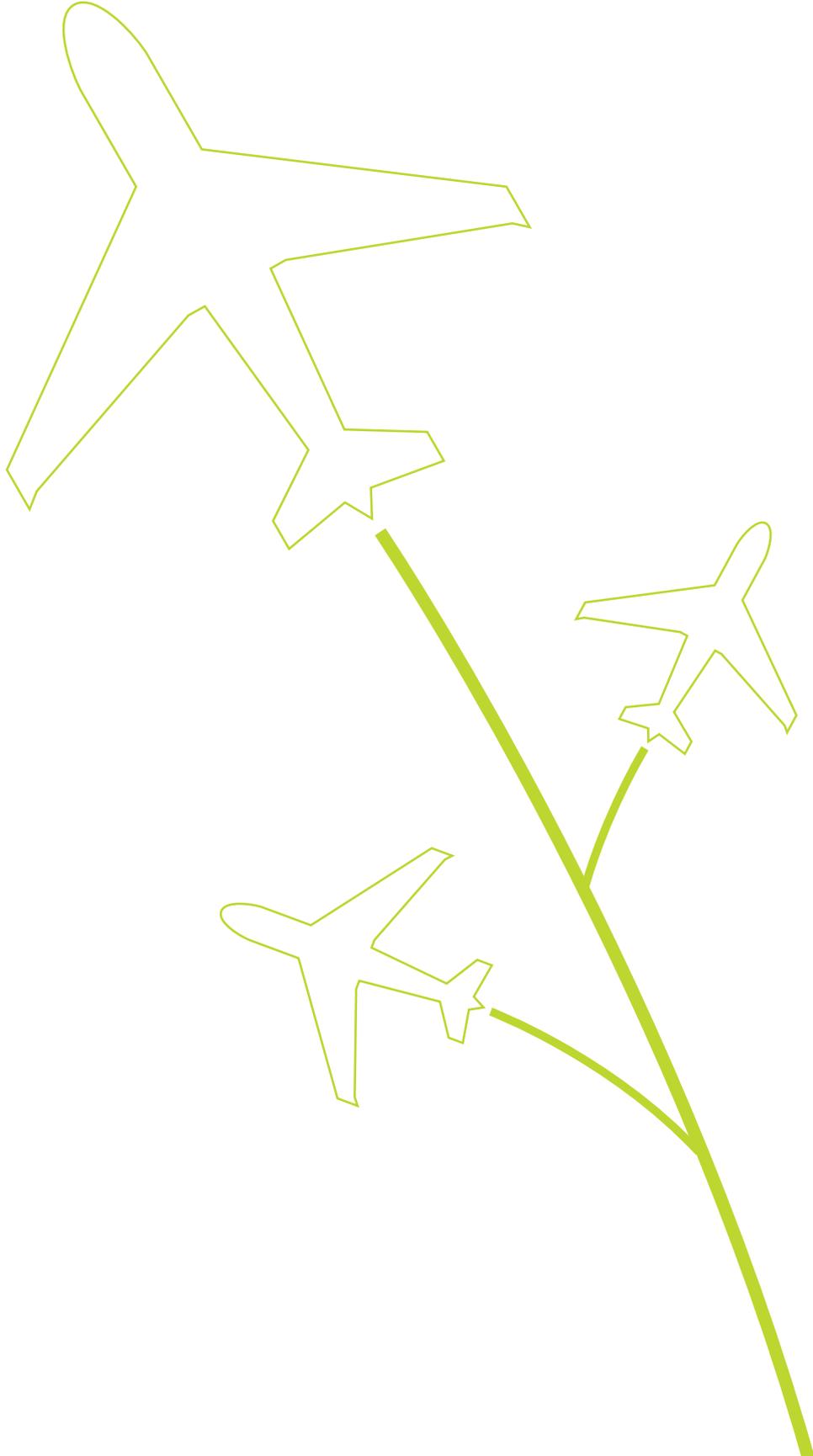




Aviation carbon offset programmes

IATA guidelines
and toolkit





IATA Carbon Offsetting - Guidelines

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Foreword

Environmental responsibility is a top priority for airlines, alongside safety and security. The industry – airlines, manufacturers, and infrastructure providers – has united under a common programme to reduce its climate change impact. We have a shared vision to achieve carbon neutral growth on the way to a carbon free industry. We will achieve this through the IATA four-pillar strategy, now adopted by governments and the industry.

Aviation is responsible for 2% of global CO₂ emissions – but it is a small part of a major problem: climate change. Our industry is fully committed to be part of the solution. First, we are committed to investing in and driving forward technological progress; the second pillar is flying planes more effectively; and the third, building and using efficient infrastructure on the ground and in the air. The fourth pillar, economic instruments, includes tax credits for research and development as well as emissions trading if implemented in the right way through ICAO. Another part of emissions trading is the role that our passengers and customers can play in offsetting their flight emissions by financing a reduction in emissions elsewhere.

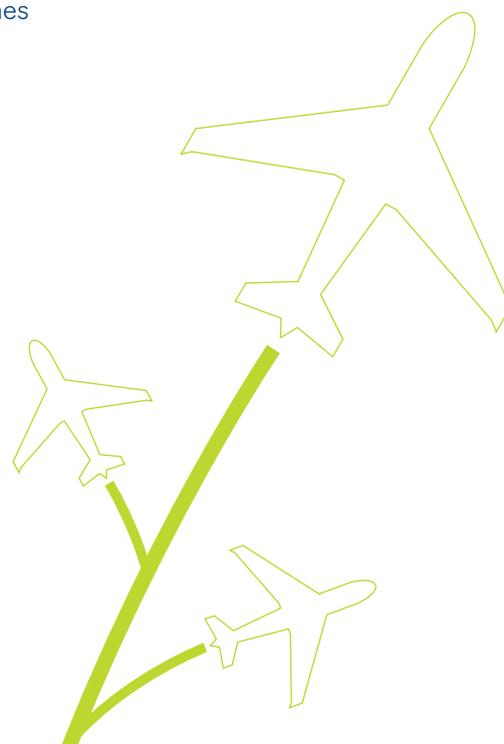
Our customers want to know what the industry is doing to mitigate its climate change impacts and, increasingly, they want to know what they can do to help. There is a desire by many passengers to offset the environmental impact of their flights by funding projects like reforestation or renewable energy such as wind turbines. Some airlines provide this service but many have not yet set up such voluntary offset programmes. As with every other area of our business we owe it to our customers to offer the highest standards of service and voluntary offset programmes are no exception. There are many potential pitfalls in setting up and operating such services and a variety of differing standards and potential approaches that could confuse customers if they are not handled appropriately.

At its December 2007 meeting the IATA Board of Governors undertook to address this by mandating IATA to produce a set of best practice guidelines for offsets and to develop an industry carbon offset programme for future use by airlines if they wish to do so. These initiatives do not impact those airlines that already provide their own offsetting services but are designed for those airlines that are considering developing or adopting their own programmes.

This document gives vital guidance for those airlines wanting to implement an offset programme for their customers. It answers a number of questions and guides airlines through this complicated area. I trust you will find the guidelines useful.



Giovanni Bisignani
Director General & CEO



Summary

These guidelines set out a systematic approach to establishing an offset programme. They are intended for use by air carriers that wish to include offsetting as part of their drive to reduce carbon dioxide (CO₂) emissions. Carbon offsets are first explained along with some of the key principles.

This is followed by a step-by-step approach to setting up and managing a carbon offset scheme, summarised in the table below. In the main sections, each of these steps is explained, with relevant advice. Access to further information is provided through a list of relevant sources.

Section	Step	Some key considerations
01	Determine the role of offsets in an overall climate strategy	When to use offsets Who are the stakeholders What are potential risks
02	Determine the scope of activity covered by offsets	What to offset Flight related emissions Passengers and/or freight
03	Review budgetary and regulatory aspects	Review of set-up cost implications Government requirements/guidance Possible tax implications Maintenance and refreshing
04	Choose the customer proposition	Opt in / opt out / included within ticket Link to Frequent Flyer Programme Complete or partial offset Refund policy Transparency
05	Select the offset projects and standards	VER / CER / Gold Standard Type & price of project Consider customer preference Registry arrangements (records)
06	Set management responsibilities	Choosing partners - look behind the label Internal responsibilities Managing the programme
07	Setting up the system	Customer interface Need for specific calculator(s) Airline interfaces
08	Launch and maintain the offset programme	Prepare for launch Plan audit and verification Plan feedback loop PR considerations

Introduction

This document gives guidance to airlines that are considering participating in CO₂ offsetting. Some 27 airlines are already operating offsetting programmes, each with different characteristics. There has been, as yet, no systematic survey of take-up rates or of the total amount of offsets achieved by airlines and their passengers. This section explains the nature of carbon offsets and the basic principles. More detailed guidance is given in subsequent sections.

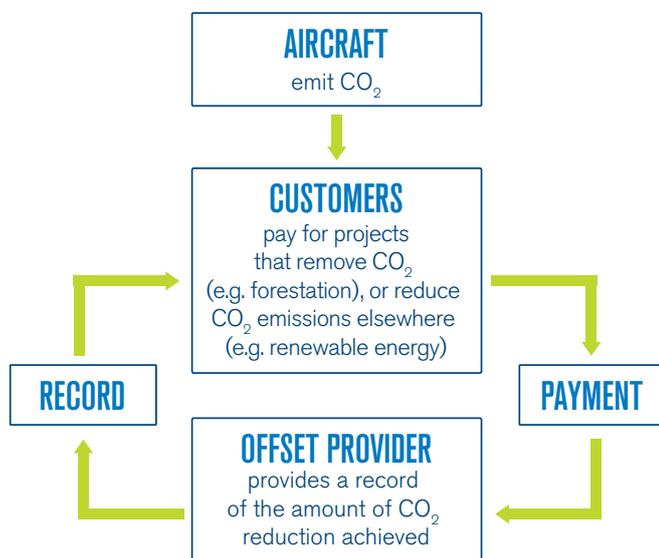
What are carbon offsets?

- In general terms, an offset is a compensating equivalent. As an activity it can mean to balance, cancel out or neutralise.
- In the context of addressing climate change concerns, offsetting is an action by companies or individuals to compensate for greenhouse gas emissions, in this case arising from their use of commercial aviation. The offset can be equivalent in part or in whole to the associated emissions, by financing a reduction in emissions elsewhere.
- Offsets, in either CO₂ or an equivalent offset by another greenhouse gas, can be purchased by countries, companies or individuals to reduce their net carbon emissions.
- There are many different ways to achieve CO₂ reductions that can be used as offsets, many of which bring other social, environmental or economic benefits relevant to sustainable development. There are significant differences between offset types (see section 5).
- Offsets can either be bought from within the international compliance system under the Kyoto Protocol, or in the voluntary market (see section 5). In the context of these guidelines, offsets are considered to be a voluntary action by airline passengers.



How does offsetting work?

In simple terms, when an activity like air travel produces CO₂ emissions, these emissions can be compensated – or offset – by preventing or reducing a similar amount of emissions somewhere else. This can be done either by the airline itself or by its customers. Such offsets can be sourced from various types of project activities (e.g. forestation or renewable energy projects - see section 5) and can be purchased through specialised offset providers or carbon brokers. The buyer then receives a certificate or record from the seller providing details about the project and the amount of CO₂ reduced. The diagram below illustrates this process.



The use of emissions offsets can be conceptually related to emissions trading, and some types of offsets can indeed be used in emissions trading systems (ETS¹) if the requirements for monitoring, reporting and verification specific to the particular ETS are satisfied. For example, participants in a formal ETS, such as the European Union ETS, can generally use credits from United Nations Framework Convention on Climate Change (UNFCCC) accredited projects and related activities. These are known as certified emission reductions (CERs) and help meet reduction obligations under the ETS. However, offsetting is typically a voluntary activity, undertaken by individuals or companies in a largely unregulated environment.

Principles of carbon offsetting²

In order to instil confidence in the purchase and use of carbon offsets and ensure quality of offset programmes in general, a number of principles should be respected.

- **Complementarity** – Offsets and trading should be seen as part of wider efforts to reduce emissions alongside technological and operational improvements in fuel efficiency. Offset programmes will only be credible if they are coupled with serious efforts to minimise the company's CO₂ emissions first.
- **Additionality** - A key requirement for an offset is that the CO₂ reduction or removal used as an offset be 'additional' to business-as-usual activity. As discussed in section 5, demonstrating additionality is complex, but a number of approaches have been used successfully to ensure the environmental integrity of offsets.
- **Verification** - Records of aircraft CO₂ emissions from operations covered by the offset programme must be maintained and be externally verified by an independent third party.
- **Registration** - CO₂ reductions from offset projects should be recorded and tracked through a central registry, with the amounts purchased progressively subtracted from the total determined for that particular project.
- **Traceability** - The receipt issued to the customer should clearly indicate that the credit has been/will be retired as a result of the purchase and cannot be resold. A receipt may also indicate the type of project that was used to generate the offset, or the quality standard that the offset meets.
- **Guarantee** - If an offset is sold where the purchased reduction in CO₂ will be achieved at some future date, then a guarantee that an alternative and equivalent offset will be made if the project fails should be provided. IATA suggests that preferably only offsets already achieved are included.

¹ See Glossary for a fuller explanation of acronyms

² See Section 5 Standards and Section 6 Set management responsibilities for more detailed discussion of some of these principles

1. Determine the role of offsets in an overall climate strategy

When to use offsets?

While aviation is a small contributor to climate change, the industry is working hard to reduce its impact. It seeks to operate in the most fuel-efficient manner, while not jeopardising flight safety.

Emissions reductions can be achieved by a range of measures including:

- Co-operating with governments and air navigation service providers to use the shortest feasible routes³.
- Implementing continuous descent approaches and other operational measures⁴.
- Flying at optimal speeds and altitudes.
- Improving load factors.
- Where there is an option, using aircraft best suited to particular sector distances.
- Careful planning of fleet changes.

Through examination of the potential to reduce fuel consumption, benchmarks can be set for future emissions both in terms of absolute amounts and fuel per RTK.

These and other measures have resulted in airlines decoupling growth from emissions. While the industry is growing by 5 to 6 percent per year, emissions are growing by some 3 percent per year.

However, in the short to medium term, there are limits to what the industry can do further to reduce CO₂ emissions from its own operations. Emissions that cannot be avoided can be offset through a customer-based offset programme, which will complement other measures to reduce the net impact of flying by achieving equivalent carbon reductions from actions taken outside the aviation industry. Arguments supporting offsetting include:

- Increasingly, customers are looking for the opportunity to reduce the environmental impact of their flights. Offsetting is a positive action that can be taken immediately by customers to help mitigate aviation's impact on climate change.
- Through an offset programme, customers can contribute directly to reduction, and at the same time be informed about aviation's impacts on the climate and what is being done to mitigate them.
- Customers can choose from a range of projects (e.g. reforestation, wind energy) that gives them a sense of empowerment and choice. Identification with particular projects can improve customer response, thus improving the credibility of the offset programme.
- Quality offsets, particularly in the voluntary market can offer CO₂ reduction at low cost compared to other market-based approaches such as taxes, charges or trading.
- Through driving down the net emissions of CO₂ from aviation, offsetting could reduce the exposure to regulatory and market mechanisms such as taxes.
- A well-organised offset programme demonstrates a carbon conscious and environmentally responsible attitude of the company running the programme.
- It can lead to better understanding of carbon markets, which is important for those airlines that could become involved in emissions trading.

³ In 2007, IATA worked with governments to optimise 395 routes and 80 terminal management areas, saving 3.8 Mt CO₂. For 2008, an additional 2 Mt has already been identified.

⁴ For example, action by IATA's Green Teams in 2007 led to 7 Mt in CO₂ savings by identifying fuel saving measures such as weight reductions, improved maintenance techniques and better flight and fuel planning accuracy

Who are the stakeholders?

A number of groups have an interest in the success of offset programmes. These stakeholders include the following:

- Governments are keen to see airlines take action to ensure their long-term position in a sustainable society.
- Carriers and their shareholders want their investment to be protected by appropriate programmes and planning.
- Corporate customers will increasingly look hard at the 'need to fly' or move freight by air and the position individual airlines take on climate change, as well as the cost of offset programmes.
- Not for profit organisations will continue to push for responsible action by airlines.
- Employees will wish to be associated with companies that are environmentally responsible.
- Passengers will want to see 'value for money' and real emissions reductions when they pay for an offset.
- Offset providers will wish to be part of a responsible and successful programme.

What are the potential risks?

When used properly, carbon offset programmes can form a powerful addition to any strategy addressing aviation's climate change impact. However, airlines considering offset programmes should take care to examine thoroughly any offset proposition before taking it up, using this document for reference. There are a number of points that must be considered carefully, for example:

- With many organisations now offering offsets, it is essential to look 'behind the label' at the credentials of those involved. Ensure that the offset provider is financially sound. Airlines should beware of irresponsible marketing including
 - » Misleading calculation of carbon quantities
 - » Lack of quality verification of carbon benefits
 - » Possible double selling of credits
- Confusion could arise where an offset project, e.g. wind turbines, could both be a voluntary offset programme in countries where there is no agreed target under the Kyoto Protocol and also counted as part of a government target in countries with targets under Kyoto.

- When buying offsets that are yet to be achieved there is a possibility that something could go wrong, with the offsets not being achieved.
- Care should be taken to ensure that customers are not being asked to offset to achieve a carbon reduction that has already been accounted for. For example, if emissions from power utilities are covered under a cap-and-trade emissions trading programme, the scope of the offset programme should not include emissions associated with the use of electricity by the aircraft while on the ground.
- Offsets are seen by some commentators as an easy way to assuage individual or corporate guilt over CO₂ intensive activities. Some see offset programmes as an 'easy way out', detracting from efforts to reduce CO₂ emissions at the source. Airlines should be prepared to address this type of criticism by explaining that offset programmes are part of an overall emissions reduction strategy.
- The credibility of the programme will be at risk if there is a low take-up within a reasonable time from launch. Promotion of the programme through company communications channels such as websites and in-flight entertainment as well as providing information and easy access to offsetting opportunities will encourage and facilitate take-up.
- Targets, progress reviews, customer feedback and periodic refreshment of the programme will further enhance credibility.



2. Determine the scope of activity covered by offsets

What to offset?

- Aviation involves a range of activities that generate CO₂ and other greenhouse gases. These include:
 - » Transport to and from airports
 - » Manufacturing of aircraft and components
 - » Maintenance of aircraft
 - » Ground handling operations
 - » Airport facilities including retail outlets
 - » Flight operations

General guidance on reporting greenhouse gas emissions is available from sources such as the Carbon Disclosure Project, an organisation that works with corporations to disclose their greenhouse gas emissions (www.cdproject.net).

- The largest cause of aviation emissions is passenger flight operations. These guidelines are aimed at this source⁵.
- In determining the emissions to be offset, the programme should cover all commercial flights involving passengers. Non-commercial flights, such as test flights and aircraft positioning, should be considered within internal corporate programmes.
- Calculation of CO₂ emissions could be approached in three different ways:
 - » Fuel recorded from start-up of engines prior to departure to close down on arrival. If fuel use is recorded, this will include fuel used to power Auxiliary Power Units and taxiing.
 - » All fuel purchased by the airline for use in aircraft. This would cover all commercial flight operations (including taxiing and at the gate) as well as some maintenance activities and non-commercial flights.
 - » The use of accepted standard factors per flight kilometre for fuel consumption, for example from manufacturers or aircraft performance models, multiplied by the distances flown on individual sectors. This is the default approach recommended in this guidance, in line with the work carried out by ICAO (see section 7).

3. Review regulatory and budgetary aspects

Regulations

Fiscal regulations

Airlines should seek guidance from tax authorities on whether offsets are taxable or not. This should include consideration of any constraints on promotion of offset schemes. In the UK some providers charge Value Added Tax while others don't. The situation is far from clear and the UK authorities have yet to make a ruling. Are offsets voluntarily purchased by consumers a part of the ticket price or not? Different tax regimes may apply to different types of offset providers such as limited companies and charities.

Offsets in context

Offset programmes have to be put in context with other market mechanisms for reducing carbon emissions. These include taxes, charges and emissions trading.

Taxes targeting fuel use and/or related emissions generate cash for the general, usually national, exchequer. Revenue from charges is supposed to be put towards mitigating the related environmental harm. Both are designed to increase the cost of carbon emissions to a point where improvements are made in fuel-efficiency or even to reduce demand.

Emissions trading is designed to allow companies emitting more than their allowance under an overall, regulated, cap to purchase carbon credits from organisations where the cost of carbon abatement is lower. The European Union Emissions Trading Scheme is the only such programme where international aviation will be included, possibly by 2012.

By comparison, offsetting is a more positive action that can be taken immediately by customers to help mitigate aviation's impact on climate change. Through driving down the net emissions of CO₂ from aviation, offsetting could reduce the exposure to regulatory and other market mechanisms.

⁵ Given the contribution of freight (belly freight and all-cargo) to overall aircraft emissions, airlines considering an offset programme may wish to develop a programme to cover both areas. IATA is considering other areas such as freight operations and may issue relevant guidance in due course.

Budget

The customer pays for a CO₂ reduction related to the amount of air travel from the airline. The payment for the offset, generally made at the time of ticket purchase, is then channelled separately, possibly through a contracting organisation. Normally, the individual transaction costs and any profit margin for the contracting company are included in the charge made to the customer.

It is not expected that the airline will profit from the sale of offsets. A question will arise then as to whether the airline should absorb the costs involved in setting up and maintaining the offset scheme or whether such administrative costs may reasonably be covered to any degree by monies collected from customers.

Most environmental groups and perhaps most customers would expect the airline to absorb administrative costs. As a minimum, the airline would need to be transparent in this regard. In any event, the administrative costs to the airline are likely to be significant and will include the following:

IT – setting up the system

If emissions calculations are to be made for customers, this will involve designing and installing a system, integrated with ticket purchasing, that allows easy calculation of the CO₂ emissions associated with a ticket purchase. This is generally done through a calculator, which can provide electronic feedback of the CO₂ footprint of all of the sectors flown by the airline and allows customers to determine the CO₂ associated with their flight and the cost of offsetting. Coupled to this will be the presentation of the cost of the offset within the ticket purchasing process. A number of IT companies are familiar with this concept.

Management of the system

The system can either be managed by the airline or could be contracted to one of the organisations offering offset services. Elements of the system include:

- Monitoring, such as periodic reviews of the system and customer feedback.
- Ensuring that the calculator(s) are up to date.
- Checking the overall accounts and auditing both internally and, from time to time, by a competent external body.

As in all outsourced activities, sufficient internal effort and expertise must be available to ensure effective oversight.

Information provided to customers and others

Customers should be provided with sufficient information.

- To allow them to understand what an offset is.
- How the quantity of CO₂ associated with a particular flight is estimated.
- What project the money will go to.

This information will be summarised in a receipt. Airlines should include a refund policy in the event of a flight being cancelled or a refundable ticket not being used. Reporting on the offsetting programme should be part of the corporate responsibility or environmental reporting by the airline.

The costs of offsetting non-passenger elements

Under the system we have described, not all flights are eligible to be offset. Freight, non-revenue passengers and positioning flights may not be included. Airlines should consider these aspects and determine a policy on such emissions.

Maintenance and refreshing

Allowance should be made in forward budgets for the costs of maintaining the system including activities such as audits and periodic refreshing of the information presented. As the fleet and destinations served change, adjustments will be necessary to any calculators provided.

4. Choose the customer proposition

Nature of the offer

Airlines interface with their customers in three main ways: directly; through travel agents; and, in the case of freight, through freight forwarders. These guidelines are aimed primarily at passenger traffic. If an offset programme is to be effective it is essential that the transaction is simple and transparent and that transaction costs are kept to a minimum.

Single transaction

The opportunity to offset can be offered directly at the time of ticket purchase or it can be carried out through a third party. Possibilities include:

- Use of travel agents and holiday operating companies to offer offsets.
- A link to a related site operated by an offset partner.
- Included within the price of a ticket or freight charge.

For the sake of simplicity and transparency, it is recommended that ticket purchase and offset purchase be offered to the passenger in a combined, single transaction.

Quantified emissions or not?

One decision is whether to link the amount to be paid to the quantified emissions associated with a particular flight or simply to offer the customer the opportunity to make a donation to an offset programme without making this link.

The latter approach could be used to make the same donation for a range of flights or for all bookings made with the airline. It would have to be at a level below the amount required to offset all but the shortest flights, in order to avoid charging customers for more CO₂ than that associated with their flight.

For reasons of transparency, IATA recommends identifying the emissions associated with a particular flight.

Payment options

Companies already operating offset programmes generally offer customers one of the following payment options:

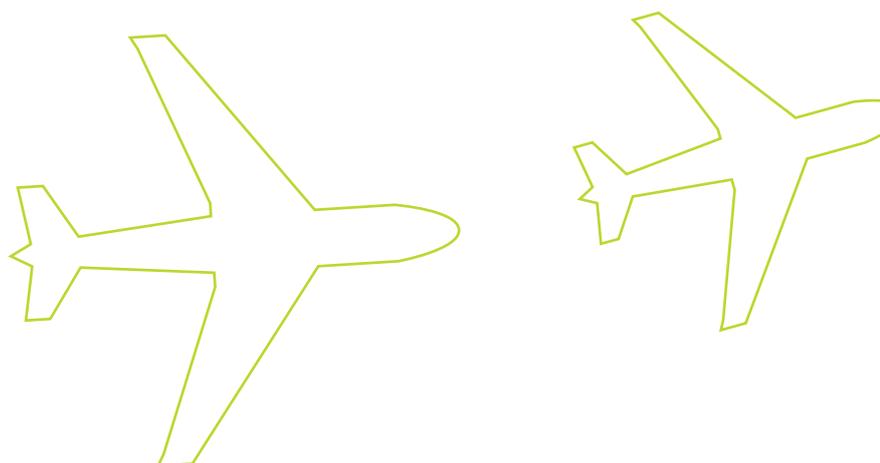
a. Opt-in: The customer pays for the offset, for example by ticking a box or similar action at the time of the ticket purchase. This option is the most commonly used.

b. Opt-out: The payment is included, unless the customer wishes not to offset. In this case an opt-out box or similar is ticked.

c. Mandatory: The cost of an offset is included automatically in the ticket price along with other additional costs such as taxes, charges or fuel surcharges.

d. Frequent Flyer Miles (FFM): A further possibility is for the offset to be paid for in frequent flyer miles.

The advantage of a. and b. is their relative simplicity in that the money can be transferred by credit card and can be managed independently of ticket sales, possibly through a third party. Option c. is also simple but would require internal segregation of funds and does not offer the customer a choice. General experience has been that where the offset is not automatically included in the price of a ticket, opt-out programmes lead to a higher uptake among airline passengers than opt-in programmes. Option d. is more complex in its design but experience to date suggests that the use of FFMs to purchase offsets is a popular choice with passengers.



Refund policy

It is recommended that a clearly evident refund offer be made for offsets purchased for air travel tickets that are not used. Refund claims for offsets should be made at the same time as claims for ticket refunds.

Where the passenger interrupts the journey and part of the ticket is not used, or where the ticket is not refundable at all, it is recommended not to offer a refund of the offset payment.

In both cases customers should be advised that their offsets were not cancelled, suggesting they 'save' them for when they travel next time.

Transparency and general information

Customers should be able easily to access information on the nature of the programme including:

- What emissions are being offset and how they are calculated, including any disclaimers, where appropriate.
- Where the money goes. The margin taken by the offset provider should be clear along with any tax and any costs recovered by the airline.
- Where the project is located and the project development organisation. Alternatively, the quality standard the project has been certified under and the entity that conducted the third-party verification. In the case of voluntary programmes the nature of the registry or other records of the 'stock' of offsets should be made clear.

Information should also be provided to customers on achievements through the offset programme in terms of quantities, offset and projects supported, as well as on key developments with respect to aviation's impact on climate change, possibly through links to relevant sites such as IATA, ICAO and ATAG.

This information should not interfere with the ease of access to offsets and simplicity of the offset purchasing system, but should be easily accessible and signposted in an appropriate way.



5. Select the offset projects & standards

Over the last few years an almost bewildering array of CO₂ products has become available and the market is still developing. An important distinction is between projects in the voluntary (or non-regulated) market, which generate offsets called VERs (Verified - or Voluntary - Emission Reductions), and projects in the Kyoto (or regulated) market, which generate offsets called CERs (Certified Emission Reductions). A key difference is that VERs rely on third party verification while CERs are formally certified under Kyoto rules. As shown opposite, different quality standards can apply to VERs and CERs.

Projects

Offsets can be sourced from various types of project activities:

- LULUCF (Land Use, Land Use Change and Forestry⁶)
 - » Avoided deforestation
 - » Reforestation of former forest areas
 - » Afforestation of new areas
 - » Other types of land use projects
- Industrial greenhouse gas offsets
 - » Reduction of emissions and/or destruction of hydrofluorocarbon compounds (HFCs)
 - » Reduction of emissions and/or destruction of nitrous oxide (N₂O)
- Methane (CH₄) capture and use in energy generation
 - » From landfills
 - » From mines
 - » From anaerobic digestion of, for example, livestock wastes
- Energy efficiency
 - » More efficient stoves
 - » More efficient power generation
 - » Light bulb replacement
 - » Use of “waste” energy in co-generation
- Renewable energy
 - » Wind turbines
 - » Hydroelectricity
 - » Solar, thermal and photovoltaic systems

The success of a carbon offset programme depends amongst other things on the choice of projects offered to the customer. Points to consider when selecting a project include:

- Standard – what verification and auditing procedures are in place.
- Price – VERs, from the voluntary carbon market, are generally cheaper than CERs from the regulated Kyoto market.
- Relevance to your business
- Geographical location
- Resonance with customers – those projects with social and economic benefits to local communities may appeal more.

⁶Forestry and tree planting have been popular environmental initiatives. Carbon sequestration through afforestation and reforestation can qualify as a part of carbon pools as tradeable CERs through the Clean Development Mechanism. However, approval of avoided deforestation, while possibly more attractive, has proved more difficult to obtain under UNFCCC systems.

Standards

It is important to examine project offers with care, not just the way in which the product is being sold and the reputation and reliability of the organisation offering the offsets, but also the quality standard applicable to the project and offsets.

There is a range of standards including the following⁷:

- Clean Development Mechanism (CDM)
- Gold Standard (GS)
- Voluntary Carbon Standard 2007 (VCS 2007)
- The Voluntary Offset Standard (VOS)
- Climate, Community and Biodiversity Standards (CCBS)

It is worth repeating that only CERs – through the so-called Clean Development Mechanism and Joint Implementation projects – are directly related to the Kyoto Protocol. The quality of CERs is ensured via the Gold Standard, which incorporates wider sustainable development criteria. Note that this standard can be equally applied to VERs as well.

Some key comparisons between VERs and CERs are shown in the table below.

A comparison of CERs and VERs.

	VERs	CERs
UN or government approved	No – voluntary, verified, and not regulated by government	Yes – certified through UN CDM process
Single standard	No – depends on verifier. Subject to same variation as CERs	In principle yes, but subject to variation e.g. in geographical location and nature of project
Gold Standard	Can apply but not a requirement	Can apply but not a requirement
Other standards	VCS, VER+, VOS, CCBS	CERs are tradeable with units in the EU ETS
Forestry	Can include a wide range of forestry projects	Limited - inclusion of afforestation and reforestation
Price (per tonne of CO₂)	Generally, but not necessarily exclusively, less expensive	Generally, but not necessarily exclusively, more expensive

⁷ Adapted from Kolmuss et al, 2008.

5. Select the offset projects & standards (continued)

Additionality

Additionality addresses the question: “would the activity have occurred, holding all else constant, were the activity not implemented as an offset project?” Or, in simpler terms “would the project have happened anyway”? If the answer is yes the project is not additional. Additionality is determined by examining a proposal against one or more tests, depending on which quality standard is being employed. The range of tests includes factors such as whether:

- A project is implemented to fulfil official policies, regulations or industry standards.
- The project would have been implemented anyway for cost savings.
- The prospect of additional income from carbon offset helped make the project viable.
- The project crosses significant non-financial barriers, such as a lack of know-how or institutional barriers.
- The project uses cutting edge technologies that are not commonly used in similar sectors. If very common technologies are used a project might not be additional because the carbon offsets may not be essential to making the project happen.

One way to increase the probability of achieving additionality is to select permanent projects clearly outside regulatory requirements.

Registries

Carbon offset registries keep track of offsets and are vital in minimising the risk of double counting (that is, to have multiple stakeholders take credit for the same offset).

Registries also clarify ownership of offsets. Typically a serial number is assigned to each verified offset. When an offset is sold, the serial number and “credit” for the reduction is transferred from the account of the seller to an account for the buyer. If the buyer “uses” the credit by claiming it as an offset against their own emissions, the registry retires the serial number so that the credit cannot be resold.

- For example, under the Clean Development Mechanism (CDM), the CDM registry is used to issue CERs from registered CDM project activities. Up to date information on all registered projects is maintained by UNFCCC.

- While many VER projects are small in scale compared to CER projects, this should not prevent a robust registry system being in place to record the origin, ownership and retirement of VER credits.
- There is as yet no central registry for VERs although moves are being made, for example, through the Voluntary Carbon Standard (VCS), a standard developed for non-regulated carbon offset projects (<http://www.v-c-s.org/>).
- Existing registries for the voluntary market have been largely developed by non-profit organisations and the private sector. Many are operated by the project developers, some in conjunction with verification bodies.
- Some of these registries are tied to certain standards whereas others function independently. Most voluntary standard registries are still in the planning stage and not yet operational.
- When transactions occur without registry administration, providers and buyers must find other accounting systems to ensure the integrity of the delivery process. Since offsets have no physical form, buyers must be given proof that the stated emission reductions have truly taken place. A verification report from an independent third party can serve this purpose. Furthermore, buyers must obtain all rights and titles to the emission reductions and assurance that the provider did not and will not double-sell the offsets.
- This confirmation usually takes the form of a “transfer of title and ownership” document signed by the provider. However, unless the provider engages an independent third party to verify its internal processes, the buyer cannot be sure that the provider has truly retired the stated amount of offsets.

6. Set management responsibilities

Managing the programme

Setting up an offset programme will bring the requirement for a range of activities including dedicated IT, relationship with offset providers, determination of fuel burn and CO₂ emissions, internal and external audit where appropriate, financial control and communication. With the exceptions below, these aspects are covered elsewhere in this guidance. In the lead up to launch it is recommended that a team be established including those with the appropriate expertise. Some additional activities may be necessary on a case-by-case basis, such as government relations, in order not to avoid conflict with government priorities and policy. A senior manager should lead the team with access to the top management of the airline.

Audit and Verification

Offset programmes should be subject to at least the same standards of financial audit as other parts of the business. This also applies if the programme is outsourced and it is recommended that annual accounts be published in appropriate ways. Audits should also include a thorough check on the achievement of offsets and of the registry records.

Different validation and verification processes apply to different types of projects. Those that are generated under CDM or JI processes are subject to the rigorous requirements of the UNFCCC protocols. However, even with such CERs care has to be taken as no project is entirely risk free.

With VERs and other voluntary instruments, verification is generally carried out by a third party in accordance with specific protocols generated in co-operation with the project developer, although reference may be made to CDM protocols. Thus with VERs care should be taken to check that adequate processes are in place covering verification, additionality and to avoid double counting.

Verification applies to both the achievement of offsets (whether certified or voluntary) and to the quantities of emissions being offset. There are a growing number of verification authorities, including those with broader certification and verification expertise who have competence in this area. In particular the expertise on quantification of emissions is being developed in Europe as part of the preparation for inclusion of aviation in the EU ETS. Generally, it will be sufficient to report publicly that emissions have been verified by such an organisation.

Choosing partners

The climate impact of aviation is a long-term issue and hence an offset programme is likely to last for a number of years. As with other supplier relationships, selection of partners and their products is critical to success of the programme. Thus in approaching a decision on which company to work with a number of key aspects should be taken into account.

Key partners could include:

- Offset brokers – generally part or subsidiaries of finance houses dealing in larger quantities of offsets. In such case account management could be largely internal within the airline.
- Offset providers – organisations or companies that provide a bespoke service including calculators, materials for the clients' websites and account management.
- Consultants – who may also be providers, who offer advice on meeting your particular requirements.

Choice of partners will depend on the size of the airline, the nature of the relationship that you wish to develop and normal aspects such as technical competence and value for money.

The market in offsets is developing rapidly and there are many potential partners. Before considering a contractual relationship on the provision of offsets, the reputation of the possible partner and any partners should be scrutinised.

Buyers are advised to apply normal procurement and contract processes including:

- Specification of what they are purchasing - with reference not only to the specific offset but also referring to possible additional benefits.
- Rights to audit information on verification of the offsets and to the records of cancellation.
- What happens if credits are not delivered or are not achieved? This applies in particular if credits are purchased ahead of delivery, which might be attractive on a price basis.
- An appropriate dispute resolution procedure.

7. Setting up the system

The customer interface

If the offset offer is not conspicuous and easy for the consumer to understand and implement, then take-up will be low and the credibility of the airline's offset programme will be at risk.

Thus the offer should be in a prominent place on the booking system, either as an opt-in decision to pay for an offset or an opt-out where a conscious decision is taken not to include the price of an offset. In either case, the quantity of CO₂ to be offset and the price should be clearly visible.

The booking system should be linked to the system of the offset provider to allow the latter to automatically issue an electronic receipt for the amount offset with details of the project that is being supported and confirmation that the relevant amount will be removed from the registry of the project. This receipt can be branded in an appropriate way.

The customer should also have easy access through appropriate links to information on: where the money is going; how the CO₂ footprint of the flight is calculated; where the project is; how it achieves the objective of CO₂ reduction; as well as any other economic and social benefits.

The carbon calculator

As the offset industry has developed, a range of approaches to estimating the CO₂ footprint of flights has been used. Unfortunately, there has been little consistency so far in the methodologies used to make these estimates. In order to achieve a more consistent approach, IATA recommends using the ICAO (2008) methodology involving the following steps⁸:

- **User input:** based on user input, the airline's booking system defines the itinerary and it specifies origin, destination and any stopover airports. This will normally include codeshare and other sectors paid for through that airline.
- **Trip distance:** the Great Circle Distance (GCD)⁹ between two airports is calculated using longitude and latitude coordinates. A correction factor can be used to take account of delays and wind and weather conditions en-route.
- **Aircraft type:** for calculation of the carbon footprint, it is necessary to define the type(s) of aircraft used to fly the specified itinerary. If actual data is not used, it is suggested to use information from flight schedules¹⁰.

- **Total fuel burn:** to determine the total fuel burn for the flight(s) the use of actual trip fuel data would give the most reliable results. If such data were not used, an alternative data source would be the CORINAIR Emissions Inventory Guidebook (EIG)¹¹.
- **Passenger to freight ratio:** to establish the passenger-related fuel use for the flight the total fuel burn is divided between the number of passengers and the tonnage of mail and freight using load factor data. Unless actual flight data is used, average passenger and freight load factors can be used to establish the ratio to make this division.
- **Seat capacity & passenger load factor:** the passenger-related fuel use for the flight is divided by the actual number of passengers on the flight. If actual numbers are not used, some assumptions will need to be made for the seat capacity and passenger load factor on the flight, using either airline or industry averages.¹²
- **CO₂ per passenger:** using the above factors, the CO₂ associated with each passenger is calculated as follows:

$$\frac{(\text{total fuel burn} * \text{pax to freight ratio}) * 3.157}{(\text{seat capacity} * \text{pax load factor})}$$

where 3.157 is the factor used to convert fuel to CO₂.

A distinction can be made between economy and premium class passengers, reflecting the additional space and weight taken up by the latter. To do this, an adjustment factor must be developed for premium class passengers and applied to the CO₂ per passenger¹³. In accordance with the ICAO method it is suggested to use a factor of 1 for economy passengers and 2 for premium class passengers.¹⁴

In order to apply a multiplication factor for premium class passengers without overestimating the total flight emissions, a base seat fuel factor is calculated by dividing the passenger-related fuel use for the flight by the total number of seats in each of the two cabin classes adjusted by the respective cabin class factors, as follows:

$$\frac{(\text{total fuel burn} * \text{pax to freight ratio})}{(\text{economy seat capacity} * 1 + \text{premium seat capacity} * 2)}$$

The base seat fuel factor is then multiplied by the cabin class factor to calculate the CO₂ associated with each economy or premium class passenger:

$$\text{base seat fuel factor} * \text{cabin class factor} * 3.157$$

⁸ In the context of the ICAO methodology, it should be noted that this is likely to be revised and updated in the future. Also, the ICAO guidance specifies that generic calculators should not be used to design taxes/charges or any incentive metrics and notes that there can be trade-offs between level of detail and ease of use.

⁹ The Great Circle Distance is the shortest path between two points on the surface of a sphere

¹⁰ For example from the OAG – Official Airline Guide

The airline interface

Staff, in particular those dealing directly with the public, media and decision-makers, should be well informed about the offset programme. They should be included in the preparations for launch of the programme and they should be briefed on:

- Why the offset programme is being introduced.
- General aspects of aviation and climate impact and measures being taken to mitigate through steps such as:
 - » Operational improvements
 - » Fleet replacement and new technology
 - » Other CO₂ saving measures such as possible use of biofuels
 - » Any regulatory requirements such as emissions trading
- The current position on non-CO₂ impacts of aircraft exhaust emissions (see box).
- Particular information on the CO₂ emissions from the airline such as the total relative to national transport emissions or some other simple comparison.
- How the offsetting programme works.
 - » Whether it covers both freight and passengers
 - » How receipts are given and accurate records maintained
 - » How aspects such as crew and non-revenue passengers are covered
 - » Where the projects are and how they work
 - » Where the money goes

Non-CO₂ impacts of aviation on the climate

- Carbon dioxide is not the only greenhouse gas – for terrestrial sources there are six recognised significant impacts – overall they lead globally to an effect that is around 1.3 times that of CO₂ emissions on their own. (IPCC 2001).
- Approximately 30% of the overall human-induced greenhouse effect can be attributed to the non-CO₂ greenhouse gases. This proportion, for ground level emissions, will vary from source to source and from country to country depending on the effectiveness of controls over the non-CO₂ greenhouse gas emissions. While the effect of these is well understood, that of the non-CO₂ gases from aviation is not.
- Aviation is complicated by the fact that most exhaust gas is emitted at cruise altitudes where emissions such as NO_x and water vapour have indirect impacts that do not occur at ground level.
- CO₂ emitted by aviation is effectively indistinguishable from that from ground sources because of its lifetime of 100 years and more. On the other hand the effects of NO_x at cruise and the impact of contrails and cirrus clouds related to aviation are much shorter lived and regional.
- It is not common practice to apply a multiplier to non-aviation ground based sources when embarking on offset initiatives. To do so for aviation would not only introduce a high level of uncertainty into the calculations but could also be counterproductive. Increased costs related to non-CO₂ impacts such as cirrus clouds could encourage avoidance strategies such as flying lower which in turn would lead to greater fuel burn and emission of more CO₂.
- Two of the leading atmospheric scientists in this field have recently stated (Sausen and Schumann, 2007):
 - “A scientifically sound solution for the inclusion of non-CO₂ effects in an emissions trading programme (or other approach) would eventually call for something other than a simple multiplication factor. Such a simple multiplication factor would weaken incentives to reduce the total climate impact beyond a reduction of the fuel consumption, which is to say there would be no benefit in reducing non-CO₂ effects”
- IATA recognises that there are non-CO₂ impacts and strongly supports the drive for a better scientific understanding of these effects in the upper atmosphere. Equally strongly, IATA supports a strategy based on concentrating on CO₂ until the appropriate ways in which to deal with the other impacts become clear. Given the much shorter lifetimes of the other impacts it is imperative that action is taken now to address CO₂.
- It is already apparent that low NO_x technology is likely to offer a substantial reduction in NO_x emissions at cruise altitudes, thus further reducing the modest net global warming that current understanding suggests results from aircraft NO_x emissions.

¹¹ Note however that the CORINAIR database does not contain fuel burn data for all existing aircraft types and so-called “equivalent” types may have to be used as a substitute to approximate the estimated fuel burn for scheduled aircraft types.

¹² If no load factor data per cabin class is available it can be assumed that the same load factor applies to all classes.

¹³ Note that according to the ICAO methodology the cabin class correction factor is used only on equivalent aircraft types that support such differentiation, and only for flights of more than 3,000 Km.

¹⁴ This factor is not likely to be scientifically rigorous but a crude estimate designed to compensate to some extent for reduced capacity associated with premium seating arrangements.

8. Launch and maintain the offset programme

Preparation

Launch of the programme will require:

- Setting a date for introduction.
- Steps 1-7 should be in hand and management should be confident that they can be completed on time.
- Systems should be adequately tested. This could involve the use of focus group(s) to test user friendliness.
- A communications plan should be prepared including information for staff, customers and to external audiences including the media. This should include channels such as in-flight media and web sites.
- Special advance notice may be relevant for corporate customers.
- A Question & Answer briefing or similar information should be circulated to senior management and to staff directly involved.

Monitoring progress and audits

Before the programme is launched a system for monitoring and auditing the programme should be set up. This should include:

- A system for internal reporting of progress so that records are available from the start.
- Regular reporting to top management.
- An internal audit to be carried out shortly after the launch and at regular intervals, not less than yearly, thereafter.
- An external audit to be carried out and the findings published at about 18 months to two years after launch.
- Monitoring and audits should cover the complete system including relevant partners.

Feedback and improvement

- Periodic customer surveys should be carried out to assess ways to improve the system.
- The programme should be reviewed and modified in the light of feedback and any changes in regulations, advances in understanding of non-CO₂ impacts and company policy.
- Regular updates on the programme, its achievements and related matters such as understanding of aviation's climate change impact should be carried in publications such as in-flight magazines.
- The offset programme should become an integral part of the airline's approach to corporate responsibility.

Some project types

Main supporters	Market share	Third-party verification required	Separation of verification and approval process	Registry	Project types	Excludes project types with high chance of adverse impacts	Price of offsets
Clean Development Mechanism Certified Emission Reductions (CERs)							
UNFCCC parties	large	yes	yes	yes	All less REDD, new HFC, nuclear	no	€14–30
Gold Standard							
Environmental NGOs (e.g. WWF)	small but growing	yes	yes	planned	EE, RE only	yes	VERs: €10–20 CERs: up to €10 higher
Voluntary Carbon Standard 2007 (VCS 2007)							
Carbon market actors (e.g. IETA)	new, likely to be large	yes	no	planned	All less new HFC	no	€5–15
VER+							
Carbon market actors (e.g. TÜV SÜD)	small but growing	yes	no	yes	CDM less large hydro	yes	€5–15
Voluntary Offset Standard (VOS)							
Financial industry and carbon market actors	N/A	yes	no	planned	CDM less large hydro	yes	N/A
Climate, Community and Biodiversity Standards (CCBS)							
Environmental NGOs (e.g. Nature Conservancy) and large corporations ¹⁵	large for LULUCF	yes	no	N/A	LULUCF	yes	€5–10

¹⁵ Author's Comment: The CCBS is a Project Design Standard only and does not verify quantified emissions reductions.

Appendix 1.

Glossary

Additionality. The principle that carbon credits can only be awarded to projects that would not have happened anyway.

Carbon credits. Units of CO₂ expressed in amounts of metric tonnes that can be used in offset programmes. Some types can be used in meeting regulatory requirements.

Carbon Disclosure Project. Carbon Disclosure Project is an organisation that works with corporations to disclose their greenhouse gas emissions. In 2007, it published the emissions data for 2,400 of the world's largest corporations, accounting for 26% of global anthropogenic emissions.

CCBA. Climate, community and biodiversity project design standards.

CDM (Clean Development Mechanism). Under the Kyoto Protocol, developed countries can offset their emissions by funding emission reduction projects in developing countries.

CER (Certified Emission Reduction). Units of CO₂ in metric tonnes issued by the United Nations from emission reduction projects in developing countries. They are tradeable and can be used by developed countries to meet their emission reduction goals under the Kyoto Protocol.

CO₂ (Carbon dioxide). This is the main global greenhouse gas and thus the largest contributor to man-made climate change, produced from burning fossil fuels and deforestation.

EE. Energy Efficiency.

EU ETS (European Union Emissions Trading Scheme). Aviation will be incorporated possibly from 2012.

FFP. Frequent Flyer Programme

GHG Protocol. The Greenhouse Gas Protocol, a partnership between the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD), is a widely used international accounting tool for government and business leaders to understand, quantify, and manage greenhouse gas emissions.

HFC. Hydrofluorocarbon.

IPCC (Intergovernmental Panel on Climate Change). A scientific intergovernmental body set up by the World Meteorological Organisation (WMO) and by the United Nations Environment Programme (UNEP). The IPCC was established to provide the decision-makers and others interested in climate change with an objective source of information about climate change.

JI (Joint implementation). Under the Kyoto Protocol organisations in developed countries can undertake projects in other developed countries. This is different to CDM.

Kyoto. The Kyoto Protocol was adopted in 1997 and requires participating countries to reduce their emissions by an average 5% below 1990 levels by 2012. It is administered by the UNFCCC.

LULUCF (Land use land use change and forestry). The term given to tree-planting projects, reforestation and afforestation, designed to remove CO₂ from the atmosphere.

RE. Renewable Energy.

REDD. Reduced emissions from degradation and deforestation.

Registry. A body holding records of formally approved projects such as the registry of CDM projects. VER projects and others can also have registries but these are outside of government.

Retiral. This means removing carbon credits or 'tearing them up' thus preventing further use or trading.

RTK (Revenue tonne kilometres). The product of the payload and the distance flown.

UNFCCC (United Nations Framework Convention on Climate Change). An international treaty developed in 1992 that aims to combat climate change by reducing global greenhouse gas emissions. It set the framework for binding agreements under the Kyoto Protocol.

VCS. Voluntary Carbon Standard. A standard developed for non-regulated carbon offset projects.
<http://www.v-c-s.org/>

VER (Verified or Voluntary Emissions Reductions). Reductions that, unlike CERs, are sold on the voluntary market. VERs are linked neither to the Kyoto Protocol nor to the EU ETS.

Verification. The process through which an external party confirms the accuracy of estimates. With respect to these guidelines, it applies in particular to emissions of CO₂ from airlines and also to CO₂ reductions achieved through offset programmes.

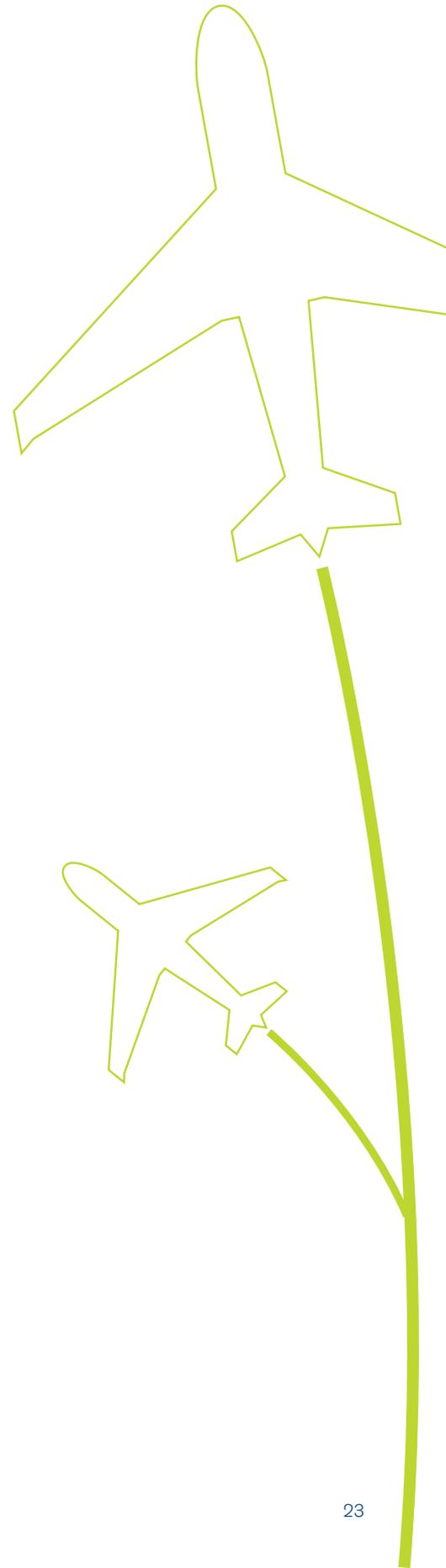
VOS. Voluntary Offset Standard.
See <http://www.carboninvestors.org/>

Appendix 2.

Further information

This is provided as an introduction to the relevant literature and is not intended to be comprehensive. See the following links:

- Carbon Disclosure Project www.cdproject.net
- Defra. Draft Code of Practice for Carbon Offset Providers. Accreditation requirements and procedures. (2008). UK Department for Environment, Food and Rural Affairs www.defra.gov.uk/Environment
- Environmental Finance, February 2008. Special Report. Voluntary Carbon 2008. Climate change, offsets and the carbon markets.
- Gold Standard. See <http://www.cdmgoldstandard.org>
- Greenhouse Gas Protocol. <http://www.ghgprotocol.org>
A corporate accounting and reporting initiative.
- Hamilton, K., Stewart, E., and Waage, S. (2006). Offsetting Emissions. A Business Brief on the Voluntary Carbon Market. Ecosystem Market Place and Business for Social Responsibility.
- ICAO (2008) (in preparation, based on draft dated 27.11.07). Methodological Guidance. ICAO Carbon Emissions calculator.
- IPCC 2001, as quoted at <http://www.epa.gov/climatechange/economics/international.html>
- Kolmuss, A., Zink, H. and Polycarp, C. (2008) A comparison of carbon offset Standards. WWF Germany.
- Kolmuss, A. & Lane J. (2008). Carbon Offsetting and Air Travel. Part 1: CO₂-Emissions Calculations.
- Sausen, R. and Schumann, U. (2007). ICAO Journal, 6 no 5.
- Sustainable Aviation – a UK industry initiative. www.sustainableaviation.co.uk
- UK House of Commons Environmental Audit Committee, (2007). The Voluntary Carbon Offset Market para 32, p19.
- UNFCCC http://cdm.unfccc.int/Issuance/cers_iss.html
Up to date information on all projects registered through UNFCCC.





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