Voluntary Offsets For Air-Travel Carbon Emissions

Evaluations and Recommendations of Voluntary Offset Companies

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Preface

This paper was written by the Tufts Climate Initiative and examines the rapidly growing market for voluntary carbon offsets. The report focuses specifically on how to evaluate offsets companies to offset air travel emissions.

Voluntary offsets are of limited value to solve the increasing threat of climate change. They should not be seen as a way to buy "environmental pardons." In most countries, jet fuel is currently not taxed. Yet to internalize some of the environmental cost and to more accurately reflect the true costs of air travel, such a tax is vital. In December 2006, the E.U. will unveil draft rules for capping airline emissions. The E.U. is proposing to regulate intercontinental flights that use European airports for takeoff or landing. Under these plans, there will be a cap on CO_2 emissions – airlines would get a certain number of pollution allowances each year. The U.S. is opposed to such legislation and is threatening legal action against the proposed rules on the grounds that such legislation would violate trade rules.

To successfully avert the looming catastrophes that we are facing with global climate change, very strong and swift regulatory action is needed on the state, national and international level. No voluntary approach to reducing greenhouse gas emissions should be allowed to delay or replace a mandatory federal cap on carbon emissions or a worldwide tax on jet fuel.

Yet voluntary carbon offsets do have their place in spurring innovation and financing carbon-reducing projects that would otherwise not have happened. They are especially appropriate for individuals who have done their best to reduce their personal emissions but would like to neutralize some of the unavoidable emissions that they are responsible for. Air travel is a good example for this. First and foremost, we all should work on minimizing our air travel. But some flying might be unavoidable, for example for academics who need to attend professional conferences, for musicians who tour internationally or for expatriates who wish to visit their relatives.

As is to be expected with new business opportunities, the quality and standards of voluntary offset companies vary widely – or as one of our reviewers put it: "It's the Wild West!" Some offset companies are run by very seasoned carbon trading experts who are well versed in all the issues that surround carbon trading, others are much less experienced and are either using carbon offset to further promote their environmental or humanitarian missions or see the emerging market as a financial opportunity. Neither of these objectives is inherently bad, if the offsets that are sold meet high standards, yet unfortunately that is not always the case.

This report and the 2-page pamphlet '***Flying Green: How To Protect the Climate and Travel Responsibly***' offer guidelines for consumers wishing to offset their emissions. It takes a look at 13 companies and organizations that sell offsets to individuals. The report does not provide final answers but is meant as a think piece to raise the many questions that still need to be addressed in this newly emerging field. We hope that this paper, together with other reports that have recently been published[1] will help catalyze discussion and will ultimately help steer the market towards offering high quality carbon offsets to concerned citizens.

[1] For two other reports on this subject please read, ***A Consumers Guide to Retail Carbon Offset Providers***, a report published by Clean Air – Cool Planet in December 2006. It can be downloaded at www.cleanair-coolplanet.org/ConsumersGuidetoCarbonOffsets.pdf and
The Carbon Trust three stage approach to developing a robust offsetting strategy. Published in November 2006 by the carbon trust. It is available at http://www.carbontrust.co.uk/Publications/publicationdetail.htm?productid=CTC621

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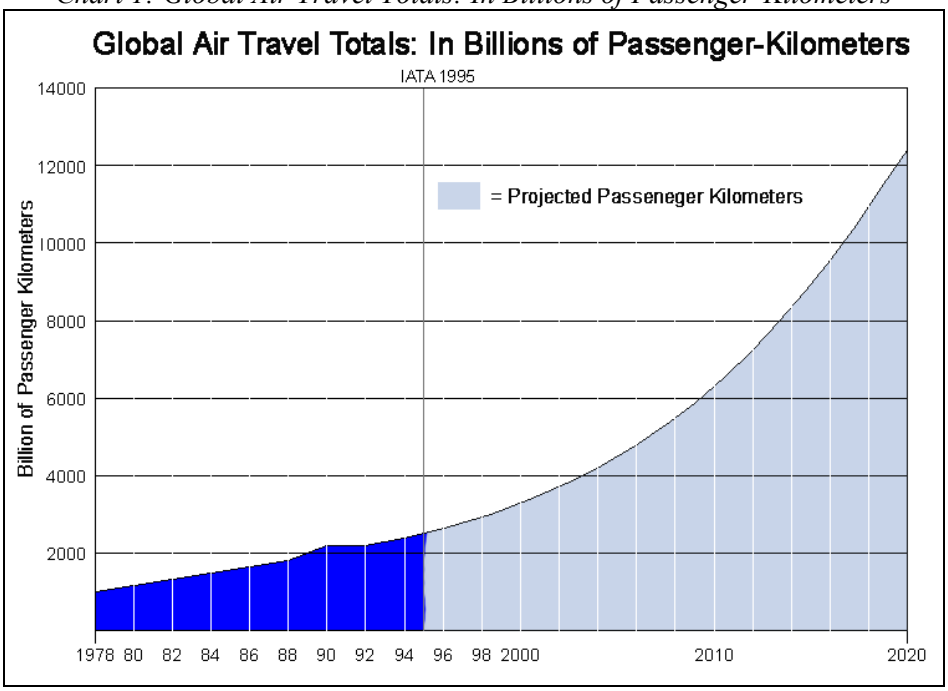
1. Introduction

Aviation is a large and continuously growing contributor of greenhouse gas emissions. In 1992, carbon dioxide emissions from aircraft comprised 2% of total anthropogenic CO_2 emissions (13% of CO_2 emissions from all transportation sources). The Intergovernmental Panel on Climate Change (IPCC) projects that the aviation sector will continue to grow and by 2050 its emissions may have reached 10 times the 1992 level (IPCC, 1999).

Chart 1: Global Air Travel Totals: In Billions of Passenger-Kilometers



Consumers who are concerned about the extent of their environmental impact but who cannot avoid flying completely, may wish to neutralize their travel emissions by purchasing carbon offsets. These voluntary offsets are generally inspired by a sense of responsibility about the personal impact on climate change. They also help educate consumers about the extent of their environmental impact. Recently, some large travel agencies have started giving their clients the option of purchasing offsets for their travel (e.g. Expedia and Travelocity, (MSNBC, 2006)). Also, non-governmental organizations (NGOs) and corporations have started to offset their employees' emissions from traveling. We can expect this trend to grow.

Voluntary offset companies offer organizations and individuals the opportunity to reduce their impact on global warming by purchasing carbon offsets. Individuals calculate the amount of carbon they are personally responsible for and then purchase an offset for that amount. The funds the offset company receives are then used to implement and manage projects that avoid, reduce or absorb greenhouse gases through renewable energy, energy efficiency, or forest and other bio-sequestration projects. Climate change is a non-localized global problem, which means that carbon reductions will have the same impact no matter where they are implemented (Hanson, 2004).

The number of companies that sell carbon offsets to individuals is continuously growing. Currently, there are over three dozen companies and organizations active in the voluntary offset markets. Different offset

companies operate with different consumers in mind. Of the thirteen companies[2] we considered in this paper, eleven offer programs to address the effects of air travel specifically, which is the subject of this paper. For example, their websites ask the user to enter the distance she is going to travel by air and then calculate the amount of carbon she will need to purchase in order to offset the emissions associated with the travel. Two more websites discussed below are primarily designed to offset the carbon gases emitted by cars, but they can also be used to offset air travel CO_2 emissions. These companies are **Cleanairpass** and **TerraPass**.

This paper gives a short overview of international climate change policies and the current carbon market. It examines the quality of the currently offered carbon offsets and the criteria that help ensure high quality carbon offsets are sold to the consumer. The following 13 offset companies were evaluated:

atmosfair (http://www.atmosfair.de/)
Atmosfair is a German offset non-profit company focusing on offsetting air travel. Atmosfair was initiated in 2003 as a joint project of ***forum anders reisen*** (http://www.atmosfair.de/index.php?id=11&L=0), a consortium of travel agencies and the NGO Germanwatch (www.germanwatch.org).

Better World Club (http://www.betterworldclub.com/)
Better World Club (BWC) does not specialize in offsets but provides nationwide roadside assistance, insurance and travel services. For each flight booked, BWC donates $11 to the ***Tides Foundation*** which administers the funds. BWC is a for-profit company founded in 1996.

CarbonCounter.org (http://www.carboncounter.org/)
CarbonCounter.org is a collaborative non-profit project started in 2002 by The ***Climate Trust*** (http://www.climatetrust.org) and ***The Mercy Corporation*** to offer offsets to individuals. The ***Climate Trust*** provides offsets to power plants, regulators, businesses and individuals and ***Mercy Corps*** (http://www.mercycorps.org) is an international relief and development agency.

Carbonfund (http://www.carbonfund.org)
Carbonfund is a US nonprofit organization that sells carbon offsets to individuals, businesses and organizations. **Carbonfund** was founded in 2003.

The CarbonNeutral Company (http://www.carbonneutral.com/)
This UK for-profit company, originally known as Future Forests, was founded in 1997 focusing on providing carbon credits generated from forestry projects. The company has expanded its services and now offers offsets from a variety of projects (not exclusively forestry). It also offers marketing and consulting services.

Cleanairpass (https://www.cleanairpass.com/)
Cleanairpass is a non-profit Canadian offset company that focuses on providing offsets to individuals who want to offset their vehicle miles traveled. Cleanairpass was founded in 2005.

Climate Care (http://www.climatecare.org/)
Climate Care is a for-profit company that offers offsets to individuals and businesses. This UK company was founded in 1997.

climate friendly (http://www.climatefriendly.com)
Climate friendly is a for-profit company that offers offsets to individuals and businesses. This Australian organization was founded in 2004.

[2] These companies where chosen by doing a web search on Google. They were chosen for the variety of approaches that they represent. Furthermore, they were the companies that showed up most frequently and were therefore assumed to be among the most popular. Because of time and funding constraints we were not able to include more companies but we are planning to evaluate another set of companies and add our findings to our offset webpage: www.tufts.edu/tci/offsets

myclimate
(Swiss site: **http://www.myclimate.org/?lang=en**) (US site: **http://www.my-climate.com/**)
Myclimate - The Climate Protection Partnership was started in 2002 as an international non-profit venture at the ***Eidgenoessischen Technischen Hochschule*** (ETH) in Switzerland. It sells offsets to businesses, organizations and individuals. To sell carbon offsets in the US **myclimate** has partnered with ***Sustainable Travel International*** (www.sustainabletravelinternational.org) a non-profit organization that specializes in ecotourism and sustainable travel programs. If not noted otherwise, we are referring to the Swiss site in this report.

NativeEnergy (http://www.nativeenergy.com/)
NativeEnergy is a privately held Native American energy for-profit company founded in 2000. NativeEnergy helps build Native American, farmer-owned, and charitable-purpose renewable energy projects.

Offsetters (http://www.offsetters.com/)
Offsetters is a Canadian non-profit company started in 2005 that sells offsets to individuals and businesses. It has also partnered with WestJet. When WestJet flights are booked through the Offsetter webpage funds go directly to Offsetter to invest in offset projects.

Solar Electric Light Fund (http://www.SELF.org/)
The Solar Electric Light Fund, Inc. (**SELF**) is a US non-profit organization founded in 1990 to promote, develop, and facilitate solar rural electrification and energy self-sufficiency in developing countries. It is not an offset company but offers a program where people can donate $10 per ton of CO_2 they emit.

TerraPass (http://www.terrapass.com/)
TerraPass is a for-profit US company that offers offsets to individuals and businesses.
TerraPass was initially created in 2005 as a project for the course "Problem Solving, Design, and System Improvement" taught at the Wharton School of Business at the University of Pennsylvania.

When we evaluated the 13 offset companies we looked at the following criteria:

Company Profile. This includes whether or not the company is non-profit and when and where it was founded. Many of these companies were founded in Europe, but American and Australian companies now also offer offset services. All companies are located in wealthy, industrialized countries.

Overhead. All companies use a percentage of their sales to cover their operating costs. It is clearly better when more money goes directly to emissions-reducing projects. Yet, in this newly emerging field, relatively high operating costs can be expected. They might even indicate that the company is more careful about evaluating their purchases. In our study we determined that non-profit companies usually dedicate more of their income directly to projects. Other companies give as little as 15% of their income to carbon-reducing projects. It is important to keep in mind that the overhead costs are all self-reported and it is unclear what is included or excluded by each company.

Quality of offsets. The most important criteria for evaluating an offset company is the quality of the offset projects it invests in. There are three main categories of off-set projects: emission-free energy generation, reduction of demand for energy, and sequestration. The first two categories avoid emissions, while sequestration projects aim to absorb emissions that have already occurred. Sequestration projects are the most controversial for a variety of reasons discussed below. Results of the projects must be considered in light of their ***additionality***, that is, by comparing the reductions they made against the counter-factual situation of what would have occurred otherwise.

Standards and Verification. Third party standards and verification are crucial to ensure the quality of the offset projects. Voluntary offset companies can currently choose from a variety of standards to judge the performance of their emissions reduction projects. The voluntary market could greatly improve its credibility by introducing a common standard for carbon offset quality. Several such standards are currently being developed. We discuss the most important ones.

Air Travel Emissions Calculator. Most companies have an air travel emissions calculator on their website, yet the parameters used for these calculators vary considerably. Some companies use sophisticated and accurate calculations to determine how much CO_2 a traveler has to offset, others are much less accurate.

Price per ton of carbon offset. We found large differences in price to the consumer per ton of carbon offset. There seems to be no clear correlation between price and other parameters (e.g. for-profit or non-profit or type of offset), except that companies that purchase offsets through the ***Clean Development Mechanism (CDM)*** tend to charge higher prices, which reflect the higher transaction costs associated with CDM projects.

Transparency. Some websites provide very detailed information about projects and the companies' policies, standards and verifications. Other sites have much more limited, or more generic information. Consumer education and transparency is vital in this newly emerging field.

Aspects not evaluated in this report

In this report we did not evaluate the usability or the security on the offset companies' website – e.g. what credit cards are accepted, what security certificates the sites use, and how easy is it to navigate through the sites. These are all important factors that would be worth evaluating, yet go beyond the scope of this paper. We encourage the reader to carefully check these factors before choosing an offset company.

A Note on Data

All of the information used in this study was self-reported by the companies in question on their websites or in the literature they distribute. With some of the companies we communicated by e-mail to clarify certain aspects. Yet often the information available to us was limited or ambiguous. It is also reasonable to believe that each company reaches its statistics in a slightly different manner so that the reported numbers might not be strictly comparable. Non-profit organizations are required to disclose certain types of financial information; while for-profit organizations are sometimes more hesitant to make their data public, so some information may be missing.

The U.S. standard for calculating emissions is in short tons[3]. All emissions in this paper are reported in those units. All currency has been converted into U.S. dollars as of July 3, 2006.

2. International and National Carbon Trading

The rise of voluntary emissions trading companies is taking shape against the backdrop of national and international legislative activity. Voluntary offset companies work within and outside of these legal frameworks. It is important to have a broad understanding of the legislation and policies that underlie the emerging carbon markets in order to better understand the impact voluntary offset companies will have on the carbon economy and climate change policies.

The ***Kyoto Protocol to the United Nations Framework Convention on Climate Change*** is an amendment to the international treaty on climate change. It is a 'cap and trade' system that imposes national caps on the

[3] A short ton is 2000 pounds. A metric tonne is 1000 kg or 2205 pounds.

emissions of ***Annex I*** [4] countries. On average, this cap requires countries which have ratified the protocol to reduce their emissions 5.2% below their 1990 baseline over the period from 2008 to 2012. Although these caps are national-level commitments, in practice most countries will delegate their emissions targets to individual industrial entities, such as utilities and manufacturing companies.

Kyoto enables a group of several Annex I countries to join together and form a so-called 'bubble' that is given an overall emissions cap and is treated as a single entity for compliance purposes. The EU, with its 25 member states, formed such a 'bubble' and created the ***EU Emissions Trading Scheme (ETS)*** which came into force in 2005. Under this cap-and-trade scheme, emissions are limited and can then be traded. The European Trading Scheme (ETS) is the largest mandatory cap-and-trade scheme to date[5]. There are two ways carbon emissions are currently traded:

Allowance-based transactions: The buyer purchases emissions allowances created and allocated (or auctioned) by regulators under cap-and-trade regimes, such as Assigned Amount Units (AAUs) under the Kyoto Protocol, or EU Allowances (EUAs) under the ETS. To make cap-and-trade successful, it is vital that the cap is set stringently enough to facilitate large emissions cuts[6].

Project based transactions: Carbon emissions reductions are traded through newly created credits from projects that offset emissions through renewable energy production, energy efficiency or carbon sequestration. For project-based offsets it is especially important that they fulfill additionality requirements (see section 3.1, p.10). Project-based transactions can be conducted within the Kyoto framework or outside of it to meet voluntary emissions reduction targets. The following two project based mechanisms are part of the Kyoto Protocol:

Clean Development Mechanism (CDM) allows developed countries to gain emissions credits for financing projects based in developing countries (non-Annex 1 countries). CDM projects produce ***Certified Emission Reductions (CERs).***

Joint Implementation (JI) projects work similarly but between two developed countries (Annex 1 countries). JI projects produce ***Emission Reduction Units (ERUs).***

Outside of Kyoto compliant mechanisms, other actions taken to reduce greenhouse gas emissions are being verified and traded. Voluntary markets for emissions reductions that are not compliant with the Kyoto protocol are developing rapidly. Emission offsets in this latter category are verified by independent agents, but are not certified by a regulatory authority for use as a compliance instrument, and are commonly referred to as ***Verified Emission Reductions (VERs).*** VERs are not a standardized commodity.

Several non-Kyoto carbon reduction regulatory schemes and carbon markets are already in existence, and these are likely to grow in importance and numbers in the coming years. These include the New ***South Wales Greenhouse Gas Abatement Scheme,*** a mandatory trading system that requires utilities to reduce their emissions, the cap-and-trade ***Regional Greenhouse Gas Initiative (RGGI)*** of several Eastern US states, the voluntary trading system of the ***Chicago Climate Exchange***, and ***California's Global Warming Solutions***

[4] Governments are separated into two general categories: **Annex 1** countries are developed countries that have ratified the Kyoto protocol, and have legally binding greenhouse gas emission reduction obligations; **Non-Annex 1** countries are developing countries that currently have no greenhouse gas emission reduction obligations.

[5] Several countries have developed or are planning to develop their own internal carbon trading schemes: The UK established a voluntary scheme, which runs from 2002 through 2006. Canada and Japan will establish their own internal markets in 2008.

[6] Additionality (see section 3.1, p.10) is less of an issue in cap and trade programs.

Act of 2006 which caps California's greenhouse gas emissions at 1990 levels by 2020, and the commitment of 131 US mayors to adopt Kyoto targets for their cities.

All these initiatives form a series of linked markets, rather than one single carbon market. Most of them embrace market-based mechanisms to achieve emissions reductions. These varying schemes allow for each system to account for the regional differences in political structure, and economic makeup. It might be possible that carbon credits in one market may at some point be tradable in other schemes. This would streamline the market and could increase efficiency.

2.1 Policy Implications of Voluntary Offset Markets

Voluntary offsets projects could conceivably hamper future regulatory action. For example, if offsets are profitable for an energy producer, this producer will likely oppose regulatory action such as ***Renewable Energy Portfolio Standards (REPS)*** that would mandate all utility companies to have minimum of renewable produced energy in their mix because the provider could then no longer sell the RECs or the carbon benefits (see section 2.2, p.8). It is likely that not only the utility but also the offset companies would oppose such standards because they would undermine their markets. Yet, the overall carbon benefits would be higher with REPS. Viewed at this macro scale, the offset market could potentially undermine stronger, more potent policy action.

Although the voluntary offset market is still young, such policy implications are worth considering, as examples in other industries well illustrate. For example, many of the recycling companies in Massachusetts are opposed to the expansion of the bottle bill, which would put a deposit on all soft drink bottles and cans. Under the expanded bottle bill, the recyclers would lose the revenue stream from recycling the bottles and cans that are currently not included in the existing bottle bill. Although the existing bottle bill has been very successful[7], all of the efforts that have been made to expand the bottle bill have been unsuccessful so far.

Policy implications of mandatory and voluntary carbon markets will have to be seriously examined. Market-based approaches to solving environmental problems have proven to be very successful in certain instances, yet they are no panacea to such large scale problems as climate change and can only be successful if regulated and implemented jointly with far reaching and smart policies such as federal carbon caps, carbon taxes, strict and well enforced building codes, and stringent efficiency standards for vehicles and appliances.

2.2 VERs, CERs, RECs, 'Futures,' and Bundled Offsets

Voluntary offset companies can operate within or outside the Kyoto framework. The advantage of working within Kyoto is that emissions reductions (CERs or ERUs) are verified under a unified regulatory framework, yet the administrative burden is larger than in a more informal market. Projects that do not fall under the Kyoto mechanisms are more difficult to verify, since there are no clear guidelines and third party certification is done at the discretion of the offset company. That means that the quality of VERs can greatly vary. This makes it harder for the consumer to be sure her emissions are truly offset by the VERs she buys.

Sometimes projects in developing countries are not registered as CDM projects because they are too small. **Myclimate** estimates that a carbon offset project must reduce at least 5,000 metric tons of CO2 per year in order justify the CDM transaction costs[8]. Such projects can still adhere to high standards, for example they

[7] 68% of the beverage containers covered by the law are recycled – only 39% of non-redeemable containers are recycled. Unclaimed deposits currently provide $34 million annually in state funding. Under the expansion, approximately $15 million in additional unclaimed deposit revenue could be generated. (http://www.massbottlebill.org/ubb/facts.htm, last accessed, 11/30/06)

[8] http://www.myclimate.org/index.php?lang=en&m=projects&um=standard&uum=ver, last accessed 11/30/06

can be implemented using the ***Gold Standard's*** new standards for VER generating projects — projects that are outside of the Kyoto Protocol (see section 3.3, p. 12.)

Mechanism	Unit	Type	Regulatory Framework
IET - International Emissions Trading	AAUs - Assigned Amount Units (Allowances[9])	Quota	Kyoto
JI - Joint Implementation	ERUs - Emission Reduction Units	Credit[10]	Kyoto
CDM - Clean Development Mechanism	CERs - Certified Emissions Reductions	Credit	Kyoto
Voluntary Carbon Trading	VERs - Verified Emissions Reductions	Credit	No unified regulatory framework

Table 1: International Carbon Trading and Project Mechanisms

Renewable Energy Credits (RECs) represent the delivery of one megawatt-hour of renewable power to the total energy infrastructure. These RECs can be sold and traded independent of the electricity produced. RECs stand for the environmental benefits created when electricity is generated from renewable resources instead of fossil fuels, like coal and natural gas. RECs are traded both in mandatory and in voluntary markets.

RECs are frequently turned into carbon credits by multiplying them by a factor that accounts for the avoided CO2 emissions. In theory, it does not matter if RECs are sold as RECs or as carbon credits as long as they are not double counted (see section 3.2, p.11). Yet in practice the issue is a bit more complicated: The conversion factors used are usually those that are published by the US Energy Information Administration[11]. The factors are published for each state and depend on the energy mix used in that state to produce the electricity. Yet these factors are only averages and therefore might not reflect the energy mix of the electricity the consumer is trying to offset.

Even more importantly, RECs do not have to adhere to the same strict ***additionality*** standards (see section 3.1, p.10) as carbon offsets; renewable energy plants have to be built after 1997 and cannot be sold and at the same time be counted towards ***Renewable Portfolio Standards***. Because of the economic benefits of many renewable energy projects, such as wind farms, it is especially difficult to determine additionality with RECs. Yet some companies, for example **NativeEnergy**, clearly state that their RECs have to comply with the same additionality criteria as carbon offsets (VERs.) In this case, RECs are a credible alternative to VERs. Yet most companies do not make this distinction.

Future offsets

Carbon offset companies can purchase carbon offsets that have already been achieved or that will happen in the future. Obviously, buying future offsets carries the risk of buying credits that might not actually happen. On the other hand, it is often the financial investments in such ***futures*** that will allow a project to actually be implemented – in other words, ***futures*** can guarantee the financial additionality of a project (see section 3.1, p.10). Offset companies can mitigate this risk by offering a broad portfolio that also includes high quality offsets from projects that are definitively being implemented.

[9] Allowances are the unit of compliance that are traded in cap and trade programs.
[10] Credits (Offsets) are emission reductions that an emitter has achieved in excess of any required reductions. The excess amount is the credit and can be sold on the market.
[11] http://www.eia.doe.gov/oiaf/1605/e-factor.html

Bundled offsets
Bundled offsets are emissions that do not come from one single project but are, similar to a Mutual Fund, a collection of offsets from varying offsets. If all the offsets in the bundle come from high quality emissions reductions projects, then bundling is a valuable approach to insure against risks, for example from future offsets, and to lower prices. For example **MyClimate** offers two different offset portfolios to their clients, the more expensive one includes offsets that come with more external benefits (e.g. bringing new technologies and know-how to very remote areas), the less expensive one includes projects that have lower implementation costs.

Bundling offsets is problematic if low quality emissions reductions are mixed into the portfolio. For example the ***Chicago Climate Exchange*** (see section 3.3, p. 12) offers bundled offsets that include project based emissions as well as emissions reductions achieved by member corporations that went above their emissions reductions target. These emissions reductions, although laudable, are not the same as offset reductions created through offset projects alone. They raise issues of additionality, double counting, and transparency. This is especially true since CCX's standards and verifications procedures are proprietary.

Because the voluntary carbon market is so young, we recommend consumers act as conservatively as possible and buy carbon offsets with highest standards of certification and verification, even if those currently carry higher transaction costs.

3. Carbon Offset Quality

Arguably the most important aspect of an offset company is the quality of its project portfolio. High quality carbon offsets must clearly demonstrate additionality, avoid double counting, have a realistically calculated baseline and emissions reduction projection, account for leakage and be permanent. In the following sections we explore each of these issues.

3.1 Additionality

To ensure that credits are only given to projects that would not have happened otherwise, projects have to be "additional." There has been substantial debate about how to interpret additionality. Additionality is generally defined in two ways:

Environmental or greenhouse gas additionality - ensures that a project reduces emissions more than would occur in the absence of the project. Establishing a reliable method to determine whether reductions are additional to what would have already occurred can be challenging. First, measuring environmental additionality requires a hypothetical baseline which represents what would have occurred without the project. In a project that provides a new more efficient technology to reduce emissions, the baseline is calculated in terms of the technology that would have been used otherwise. To use a hypothetical example, the emissions from a wind farm are compared to the emissions from the coal-burning facility it replaced. This reduction is then *environmentally additional* to what would have happened otherwise. A further complexity is judging whether the outcome of a certain offset project would have happened without the intervention of the project itself. For example, would the project area have soon received the new technology even if the offset project did not provide it? (Meyers, 1999).

Financial / investment additionality – the emissions reductions would not occur if it was not financed as a carbon reduction project (e.g. as a CDM or JI project). In other words, the main funding objective for a project must be to achieve carbon reductions. For example, if an array of solar thermal installation is financed largely though the sale of offset futures (see section 2.2, p.8) , this project would then be considered financially additional, in other words, it would not have been built, if the revue from the offset futures had not been available. Financial additionality is a stricter standard than environmental additionality. It is unclear if additionality should apply to investments that are profitable in their own right, since it is likely that investors

will make such investments without further inducement. In this case, other regulatory and political barriers would need to be taken into account.

It is never possible to establish with certainty what would have happened in absence of a particular project and there are clear potentials for abuse. There are strong financial incentives for the seller (project financier and implementer) as well as the offset buyer to overestimate the "business-as-usual" baselines and thus artificially inflate emission credits for improved performance. There is clearly a need for strict monitoring and third-party verification of carbon projects[12]. Although the risks for "cheating" are real and substantial, it is also important to recognize that additionality rules that are too stringent can hamper project implementation.

While all of these concerns are hard to address, voluntary offset companies must deal with them to some degree when choosing projects. It is usually the certification and verification organizations that ensure additionality (see section 3.3, p. 12).

3.2 Double Counting

Unfortunately, it is all too easy to double count emissions reductions – have multiple stakeholders take credit for them. A hypothetical extreme example would be an electricity provider who builds a wind farm and then sells their power at a premium as 'green power' to local customers but also sells their carbon credits, their Renewable Energy Credits (RECs) and uses the wind farm to qualify for Renewable Portfolio Standards. In addition, if the wind farm was located in a state or country that has a legislated cap on carbon emissions or needs to reduce its emissions under the Kyoto protocol, the wind farm would also count toward that state's or country's emissions reductions goal. In this extreme example, the emissions reductions from the wind farm are counted 6 times!

Some of these double counting issues are easily addressed:

- Offset companies must retire their offsets once they sell them (i. e. they can only be sold once).
- Offset companies must ensure that carbon offsets from renewable energy projects are not also sold as Renewable Energy Credits.
- Utilities that sell RECs from Renewable Energy Projects are prohibited to use that project to qualify for Renewable Portfolio Standards.

Other double counting issues are more difficult to address: For example, if a US citizen were to buy offsets that are then are invested in a wind farm project in Canada, he will take credit for these emissions reductions. But Canada will also count the resulting reduction in carbon emissions from the new wind farm toward their emission reductions goals that they are required to meet as signatories of the Kyoto protocol.

This means, not only are the emissions double counted but the wind farm has effectively replaced another set of emissions reduction measures that Canada would have had to take in order to meet its Kyoto requirements. Viewed this way, it can be argued that the wind farm does not have any net carbon benefits. On the other hand, a valid counter argument can be made that such a wind farm project would stimulate the renewable energy industry in Canada and might therefore encourage further renewable energy projects and a move towards a low carbon economy.[13]

[12] The guidelines set by the CDM Executive Board for assessing additionality help minimize such abuse. http://cdm.unfccc.int/methodologies/PAmethodologies/AdditionalityTools/Additionality_tool.pdf

[13] More about how well country have succeeded in implementing climate mitigation policies and strategies see Germanwatch's report: *Climate Change Performance Index 2007* http://www.germanwatch.org/klima/ccpi.htm, accessed on 11/21/06)

It can also be argued that because of the uncertain future of the Kyoto agreement and because international environmental agreements are notorious for their unenforceability, it is unclear how seriously countries take their treaty obligations. In other words, in our hypothetical answer, Canada might not take any actions to reduce their carbon emissions and withdraw their commitment to Kyoto. In this case, the wind farm would be additional and paradoxically the double counting issues would be less serious. The same would hold true, if the wind farm was build in the US, which has not ratified the Kyoto agreement.

Clear rules and guidelines are needed to avoid double counting of voluntary offsets generated in Annex I countries (see section 5, p.16).

3.3 Standards and Verification

To address concerns of additionality, monitoring and verification companies often involve a third party and use internationally recognized criteria. Standards set criteria by which projects are chosen and evaluated. Such standards may include criteria for: type of project, impact on local communities, additionality and leakage[14]. These standards may be set by the offset company itself or a third party. Most companies use third party standards. These standards allow for better project comparison and evaluation.

The Climate Group (TCG) and the International Emissions Trading Association (IETA) are currently developing ***The Voluntary Carbon Standard (VCS).*** The stated goal of a VCS is to provide "a certification tool that is designed to give users confidence that voluntary project-based GHG emission reductions are real, measurable, permanent, additional and independently verified" (The Climate Group.)

Standards alone cannot ensure the quality of a project. It is only through the implementation and verification of these standards that projects can reliably be evaluated. Verification consists of the periodic monitoring and review of ongoing projects in addition to an evaluation after the project period has ended. The monitoring ensures that the project is meeting goals and operating properly. For example, if a project is installing stoves, monitoring allows for assurance that the stoves are working and are being used.

End-of-project verification ensures that the carbon emissions have been reduced by the amount intended. It is particularly important to have a third party involved at this point as there is an obvious incentive for project financers and offset buyers to see that projects have met their goals. Independent verification is crucial for the credibility of emission reduction projects. Below is a description of the most frequently used standards:

Clean Development Mechanism (CDM)

http://cdm.unfccc.int/
Used by: **atmosfair** and **myclimate**

As mentioned earlier, the CDM is part of the United Nations Framework Convention on Climate Change (UNFCCC). As the largest regulatory project based mechanism, the CDM offers the public or private sector in developed nations the opportunity to purchase carbon credits from offset projects in developing nations. CDM is involved in setting standards and verifying projects. Emissions reductions are verified and certified by authorized third parties ***(Designated Operational Entities.)*** CDM standards are stringent and robust yet have high transaction costs so that usually only large projects are registered. CDM requires strict additionality for certification of carbon offset projects[15].

Gold Standard

[14] Unintended release of CO2 as a result of the project (e.g. farmers move away from a now protected forest and start clear cutting an area that was previously untouched; or new compressed natural gas buses replace diesel buses but because of small gas leaks, the greenhouse gas balance is not improved as expected.)

http://www.cdmgoldstandard.org/
Used by: **atmosfair**, **myclimate, Climate friendly**

The Gold Standard was developed by a network of non-government organizations, which sets higher standards than the CDM. It is endorsed by 42 NGOs worldwide. Gold Standard projects include renewable energy or energy efficiency technologies (no sequestration projects are accepted). The Gold Standard requires strict additionality for certification of the carbon offset projects. For a project to be selected, these standards must be met and are checked by a UNFCCC-accredited organization. Monitoring and verification is also done by these organizations to ensure the benefits are realized.

Gold Standard projects take into account differing environmental, social and economical factors, to maximize the secondary benefits and to minimize the negative impacts of a project. It actively encourages local participation in project design, and seeks to maximize sustainable development benefits.
Gold Standard projects are usually CDM projects. Because of the high transaction costs of CDM/Gold Standard the projects are usually large scale.

Voluntary Gold Standard

For smaller projects that are not CDM registered a Voluntary Gold Standard (VGS) was released in spring of 2006. The aim was to simplify procedures and to reduce transaction costs for small scale projects while still maintaining high quality standards. VGS can only be used in non-Annex 1 countries.

The Gold Standard is the most rigorous standard available to date. Although adhering to the Gold Standard incurs higher transaction costs and can therefore lead to higher prices for consumers, we strongly recommend purchasing offsets that follow these strict guidelines.

Chicago Climate Exchange (CCX)

http://www.chicagoclimatex.com/
Used by: **Carbonfund**, **Cleanairpass**, **TerraPass**

The Chicago Climate Exchange is a voluntary, cap-and-trade emission trading system. CCX operates mainly in the US but also has members and affiliates in Canada and Mexico. Members commit to reduce their emissions by a certain amount each year, measured against their original baseline. Companies that achieve reductions that go above the commitment can sell these emissions reductions as CCX's commodities called ***Carbon Financial Investments (CFIs.)*** Companies can also invest in external carbon projects which are implemented in the US, Canada, Mexico and Brazil. These projects involve mostly methane capture and carbon sequestration though forestsy and no-till agriculture. The offset from these projects are also tradable as CFIs.

The CCX certification and verification process is proprietary. It is therefore difficult to evaluate the quality of CCX's carbon offsets. Several NGOs have criticized the CCX for its loopholes, lack of clearly defined additionality criteria and a general lack of transparency (Dale, 2006). In addition, many of the member companies of CCX have over-complied with their commitments. This not only raises the question of if the cap is set stringently enough but also leads to an over-abundancy of available CFIs.

CCX has certainly demonstrated a very innovative and valuable approach to carbon trading. Yet, because of a lack of transparency, the inherently different nature of CFIs and VERs, and to a lesser degree because of their focus on bio-sequestration in their external offset projects (see section 4.3, p.15), we advocate that consumers minimize purchasing voluntary offsets that were generated through CCX.

Green-e

http://www.green-e.org

Used by: **NativeEnergy, TerraPass, Carbonfund**

Green-e is run by the Center for Resource Solutions (CRS) (www.resource-solutions.org/index.htm) a US based non-profit company that measures and verifies a range of renewable energy projects. Green-e both sets standards for US renewable energy projects and verifies the projects. Green-e certified ***Renewable Energy Credit (REC)*** have to be generated by power plants that were built after 1997 and they cannot be used to also meet regulatory portfolio standards.

RECs can be sold and traded independent of the electricity produced both in mandatory and in voluntary markets. As mentioned earlier, RECs do not have to adhere to the same strict additionality standards (see section 3.1, p.10) as carbon offsets. Because of the economic benefits of many renewable energy projects, such as wind farms, it is especially difficult to determine additionality with RECs.

CRS is currently working on developing new, stricter standards for RECs that are converted to carbon offsets. We strongly support efforts to develop clear, transparent and strict rules for selling RECs into the voluntary carbon market. Given how important renewable energy production will be in guiding us towards a low-carbon future, we support the financing of renewable energy projects though voluntary carbon offset companies, as long as the project are of high quality, fulfill strict additionality standards and are not double counted.

4. Offset Project Types

Most companies invest in a variety of different carbon offset projects. These projects can be broadly categorized into three main types: renewable energy, energy efficiency and sequestration projects. Projects are implemented either internationally or domestically.

4.1 Renewable Energy

Numerous renewable energy technologies exist. Most offset projects focus on wind, biomass, and solar technologies. Examples of such projects include solar panels to create electricity for a home in a developing nation or the construction of a wind farm in the US.

Economic, geographic, social, and political factors all need to be considered to establish the feasibility of renewable energy projects. Many renewable energy projects have high up-front capital costs, although they may offer high rates of return (Martinot, 2000). Legislative hurdles and local opposition to a project can further complicate the implementation of such projects.

Projects that are implemented in poorer nations are often much more cost effective but such projects can easily be compromised by a lack of local capacity and the needed infrastructure to operate the new technology. Project staff may introduce the new technology and then leave the project site without creating a sustainable situation under which the new technology can be maintained and repaired (Martinot, 2000; Turkenburg, 2000).

Moving away from fossil fuel based electricity production to renewable energies is crucial for the long-term protection of the global climate. We therefore recommend offset projects that lead to the production of renewable energy.

4.2 Energy-Efficiency

Energy efficient products or systems use less energy to perform the same task. For example, if a new refrigerator of the same size replaces an old, less efficient one, energy is saved. If the electricity to power the refrigerator comes from a coal or oil power plant, the new refrigerator will not only use less energy but also produce less greenhouse gas emissions than the old one.

Examples of energy efficiency technologies include compact florescent lamps, energy efficient motors, and redesigned cooking stoves. Installing more efficient stoves in developing nations can reduce coal and wood consumption. Improving efficiency of wood use is particularly important in areas where wood harvesting contributes to deforestation. Establishing a baseline can be difficult, for example, reducing the amount of wood burned does not result in a net greenhouse gas reduction: the burning of wood is considered carbon neutral since the carbon released is equal to the carbon the tree absorbed. Yet, if there is permanent deforestation as a result of fire wood use, more efficient stoves can reduce CO_2 emissions.

Energy efficiency projects need to be carefully evaluated for their economic, environmental and social benefits. In developing nations, new technologies need to be introduced alongside building the necessary local capacity to make the projects sustainable (Martinot, 2000).

Many energy efficiency projects have higher transition costs than large centralized renewable energy production projects on a per unit of energy basis because they are small and decentralized (Martinot, 2000). Transition costs include planning, installation, operation and maintenance.

Because of the decentralized nature of energy-efficiency projects, monitoring and evaluating energy efficiency projects can be challenging. Establishing a baseline and estimating emissions reduction for small decentralized projects is difficult and labor intensive.

Despite the issues that can arise with energy efficiency projects, such projects have great potential in decreasing greenhouse gas emissions. Well implemented energy-efficiency projects are among the best offset projects.

4.3 Biological Sequestration[15]

Biological sequestration absorbs CO_2 emissions through the growth of vegetation. Bio-sequestration projects, usually called ***Land Use, Land Use Change and Forestry (LULUCF)*** projects, are the most controversial of the three main types of offset projects. (Brown, 2000; Osborne, 2005).

The amount of carbon sequestered by vegetation depends upon a number of factors including the age of the trees, their growth rate, local climatic conditions and soil conditions. Additionally, the carbon intake may be altered over time as temperatures and carbon dioxide concentrations in the atmosphere change with global warming. While greater concentrations of carbon dioxide may increase the growth of trees, greater cloud cover can reduce light and thus limit growth. Additionally, photosynthesis is reduced when temperatures are above optimal levels (Clark, 2003; Brown, 2000; Osborne, 2005).

If global warming is to be controlled, a transition away from fossil fuels is imperative. Therefore, carbon sequestration should not be seen as a long-term solution. Predictions state that only 10% of human emissions over the next 100 years can be offset by forests (Hamilton, 2002).

One of the largest challenges that arise with carbon sequestration is measurement. The carbon cycle in trees is complex. During the day, plants synthesize carbon dioxide yet at night and under stress situations (e.g. drought and heat) the process reverses and plants respire CO_2. Furthermore, the carbon cycle is altered by seasonal changes in temperature and precipitation (Hadley, 2002).

Additionally, leakage must be considered to properly measure project benefits. Leakage is the unanticipated loss of carbon reductions. For example, farmers may be moved off a given plot of land to allow a project to plant trees for sequestration, but the farmers may clear trees in another location to begin farming there. Thus the project may not be able to claim a net reduction in carbon emissions (Brown, 1999).

[15] Much research is currently done on geological sequestration – the underground injection of CO_2 emitted by fossil fuel power generation. At this point, geological sequestration is very costly and does not offer an alternative to the transition from fossil fuels to renewable carbon-free sources.

A final issue concerning measurement is permanence. For a LULUCF project to realize its full potential of sequestration, it must last. There are two main ways that the benefits could be negated. First, natural events such as fires, pests, or diseases could destroy a forest. Second, the forest could be cut down by human activity. In either case, the intended sequestration would be negated (Brown, 1999).

Additionally, the age of the forest impacts carbon uptake; young forests absorb more carbon than older ones but mature forests store more carbon per acre in trees and soil and their biological value is also much higher. A tree plantation that is harvested at relatively short intervals and then replanted can have a high rate of carbon sequestration. Yet, while such a system of monoculture may have high carbon benefits, its ecological value is low, specifically in terms of biodiversity.

Ultimately, the exact tons of carbon sequestered might be less important than considering which projects help the transition to a low carbon economy. Both energy efficiency projects and renewable energy projects promote a more efficient, lower carbon economy, while LULUCF projects constitutes at best a stop gap measure that might ensure the protection of valuable biodiversity in old growth forests, at worst it can negatively impact biodiversity and also hamper the development opportunities of poor subsistence farmers in developing nations.

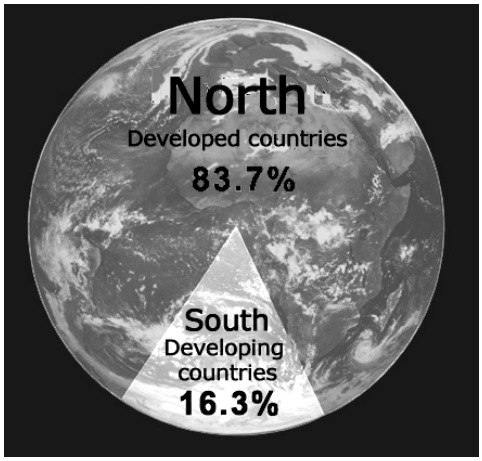
Clearly, land use management and reforestation projects are vitally important to protect and restore watersheds, ensure clean drinking water and protect biodiversity. Yet we feel that such projects should be implemented to secure exactly those benefits and not to achieve carbon sequestration. We do not mean to discredit all LULUCF projects. May of them are well planned and implemented. But because of all the uncertainties involving bio-sequestration projects, and because of the vital importance that renewable energy and energy efficiency play in guiding us towards a low-carbon society, we do not recommend buying voluntary carbon offsets that are largely based on LULUCF projects.

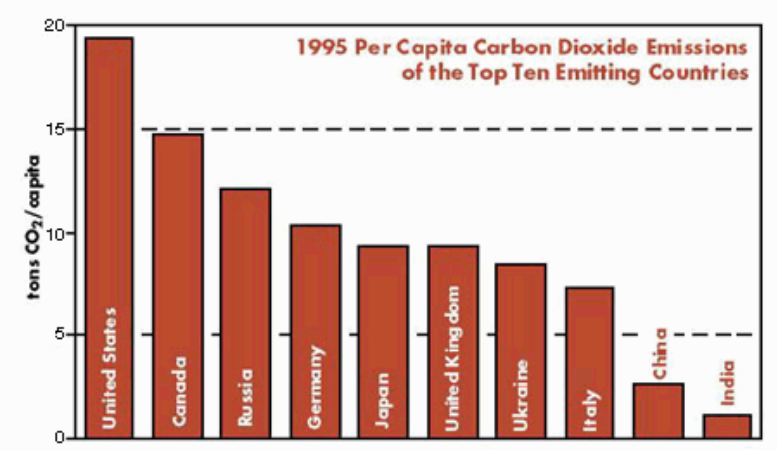
5. Offset Project Location

5.1. Developed Nations (Annex 1 Countries)

All countries have a responsibility to reduce their emissions, yet the weight of responsibility lies with the developed nations who are not only historically responsible for the largest part of emissions, but also have the highest per capita emissions (see graphs below and Annex A). It can therefore be argued that rich nations have a moral obligation to take the lead in cutting their domestic emissions. Furthermore, projects implemented in Annex 1 countries do not place developing countries at a disadvantage in terms of cost to reduce emission in the future as described below (Agarwal, 2002). Also, some clients may prefer domestic projects that support the domestic economy (Hanson, 2004).

Cumulative CO_2 Emissions from 1800-1988:
The Ecological Debt of the North





(Source: Dr. Martin Storksdieck) **(Source: NRDC)**

Projects in the North are often not as cost-effective to implement as projects in developing countries. Additionally, those who feel a moral responsibility to help developing nations may not be satisfied with these projects. Large-scale domestic projects, such as wind farms, are susceptible to high upfront costs and political hurdles. However, technical know-how and verifiability of projects are easier to establish domestically than in a developing nation.

Yet there are also some drawbacks to domestic projects implemented in rich nations. Some of the issues involving double-counting and the risk that voluntary offset projects just replace other carbon mitigation measures which would have had to be implemented in order for the country to meet its Kyoto obligations discussed in *Section 3.2, p.11.*

Also, aside from large renewable energy projects, voluntary domestic carbon projects are often small-scale.[16] That means that the change they facilitate is marginal and does not facilitate more comprehensive policy change. On the contrary, the argument can be made that such projects hamper more forceful regulatory action (see *Section 2.1, p.8*).

5.2 Developing Nations (Non-Annex I countries).

International projects are usually implemented in developing nations because of their cost effectiveness (Hanson, 2004). The Clean Development Mechanism (CDM) of the Kyoto Protocol puts in place a framework to implement such projects. It allows industrialized countries with a greenhouse gas reduction commitment to invest in emission reducing projects in developing countries as an alternative to what is generally considered more costly emission reductions in their own countries. The CDM is supervised by the CDM Executive Board and is under the guidance of the Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC).

Clients may be attracted to projects in developing nations for moral reasons. Developed, rich countries are largely responsible for creating climate change which in turn will cause most harm in the poorest populations of developing nations. In a best-case scenario, international projects can bring resources, technology, infrastructure, and know-how to poorer nations and provide many additional benefits to the country (Edwards, 2003; Agarwal, 2002).

[16] Michael Lazarus, Stockholm Environment Institute, phone conversation, 11-7-2006.

However, there are several criticisms of international projects. First, such projects allow developed countries to avoid domestic emissions reductions. Without strong domestic political action the dependence on carbon fuels in developed nations will continue to grow and renewable energy sources will not be sought. Therefore emissions will continue and the threat of climate change will increase (Agarwal, 2002).

Second, developed nations are placing others at a long-term disadvantage. When all the cheaper emissions reductions are made by foreigners, developing nations will later only be able to make the expensive changes. Additionally, as the Kyoto Protocol does not require developing nations to reduce their emissions during the first phase[17], they will not be credited for these reductions (Agarwal, 2002).

Finally, there are also monitoring and evaluation concerns. To be sure that emissions reductions do occur, projects must be adequately monitored and evaluated. First, an accurate baseline for emissions must be gathered and then the project must be monitored to assure proper functioning. After that, long term follow up is needed. These evaluative goals are particularly difficult to meet when the project occurs on a small scale and operates in a remote location (Meyers, 1999).

It is also worth pointing out that many carbon offset projects are somewhat experimental in nature, for example, introducing a new technology. The burden when such a project does not live up to expectation represents just a small cost for Northern institutions, but a failed solar power project in an Indian village can have far reaching negative consequences on that community. Apart from the primary problem – a lack of reliable power supply – unsuccessful projects hamper associated infrastructure development and opportunities to build capacity.

The advantages and disadvantages of projects in developing nations therefore depend very much on how projects are designed and implemented[18]. Because there are also major concerns with projects implemented domestically, we do not recommend one over the other but we stress the importance of projects that can prove clear additionality, sustainable development benefits, permanence, and contribute to the long-term goal of a carbon free, highly energy efficient economy. High standard and verification requirements such as the Gold Standard and the Voluntary Gold Standard help maximize the benefits of projects implemented in non-Annex 1 countries.

6. Company Profiles

6.1 Location and Date of Inception

Carbon offsets are an international business, which reflects the global nature of the problem they address. Even if a particular jet engine releases CO_2 over the North Atlantic or the state of Colorado, the environmental effects are cumulatively felt around the planet, and buying offsets from a London-based company for a project based in Brazil is a valid exchange. Four of the companies we evaluated are based in

[17] The First Phase of the Kyoto Protocol ends in 2012.

[18] **Indigenous People See Harm from Kyoto Carbon Trading.**
By Alister Doyle and Gerard Wynn, Reuters, November 8, 2006.
"Indigenous peoples from the Amazon to Asia said on Wednesday that U.N.-backed clean energy projects meant to combat global warming were aggravating threats to their livelihoods. They said hydropower projects or plantations of fast-growing trees, prompted by a billion-dollar scheme under the U.N.'s Kyoto Protocol for limiting the planet's dependence on fossil fuels, were damaging nature. 'We are not only victims of climate change, we are now victims of the carbon market,' Jocelyn Therese, a spokesman for indigenous peoples of the Amazon basin, told a news conference on the fringes of U.N. talks on global warming. 'Efforts that are supposed to...retard climate change are having an equally disastrous effect,' said Ana Pinto, representing indigenous peoples in India."

Europe, two of which are from the UK. Additionally, there is one company from Australia and two from Canada. The remaining six are from the US.

The oldest companies, which began in 1997 and 1998, are both from the UK. The first US company was started in 2000. The number of offset companies is steadily growing on all three continents that were examined. Four of the companies in this paper began their operations in 2005 and all but 3 started selling offsets in 2002 or after.

6.2 For-Profit versus Non-Profit Companies

The offset companies function either as for-profit or a non-profit company. Seven of the companies are for-profit and six are non-profits. The distinction between non-profit and profit does not give an indication of the project and offset quality the company sells. In our study we did find though, that for profit companies where less forthcoming about their financial situation and tended to have higher overhead costs.

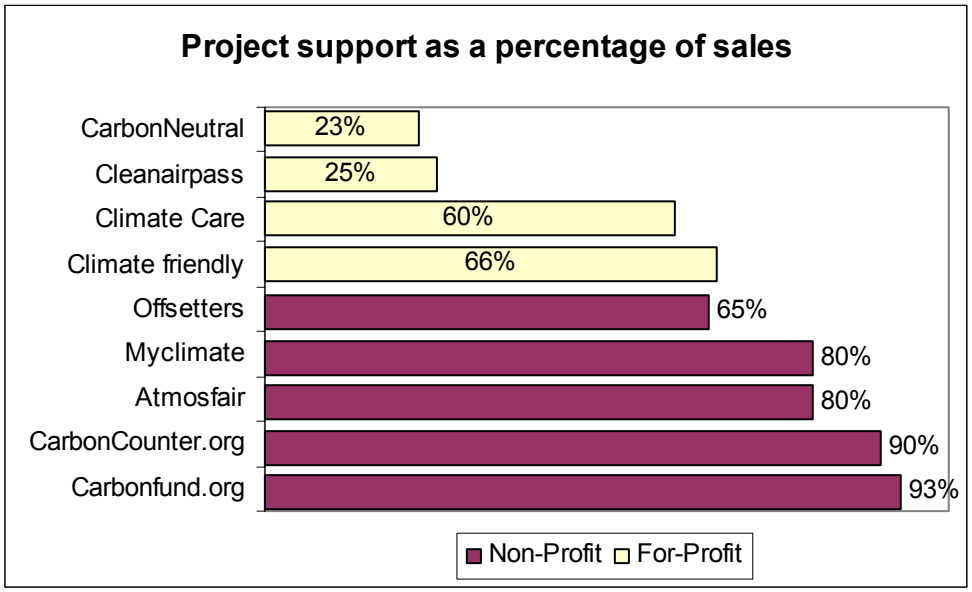
Table 2: Companies' year of inception, location, and status

Company	Year of Inception	Location	Company status
Solar Electric Light Fund	1990	US	Non-Profit
Better World Club	1996	US	For-profit
The CarbonNeutral Company	1997	Europe	For-profit
Climate Care	1998	Europe	For-profit
NativeEnergy	2000	US	For-profit
CarbonCounter	2002	US	Non-Profit
Myclimate	2002	Europe	Non-Profit
Carbonfund	2003	US	Non-Profit
climate friendly	2004	Australia	For-profit
Atmosfair	2005	Europe	Non-Profit
Cleanairpass	2005	Canada	For-profit
Offsetters	2005	Canada	Non-Profit
TerraPass	2005	US	For-profit

6.3 Overhead Costs

The percentage of offset sales that actually goes to climate projects ranges quite significantly: from 25% (**Clean Air Pass**) and 15-30% (**The CarbonNeutral Company**) to 90% (**CarbonCounter**) and 93% (**Carbonfund**) of sales going directly to project implementation. (Chart 2) Five of the six non-profits provided answers on their website or replied via email, but the information was only available for four of the seven for-profit companies.
As all of these numbers are self-reported, it is not clear how the companies arrive at these percentages. Some may include overhead and administration costs in project costs. Others may not include those expenses. **CarbonCounter** is a project of two other non-profit companies (Climate trust and Mercy Corps). Furthermore, **Better World Club** does not manage their projects; rather the Tides Foundation administers this aspect. In these cases it is particularly hard to know exactly what percentage of offset sales go directly to projects. Despite the difficulty of comparing one company's data with another, the numbers indicate a clear trend: The mean for non-profit companies is 81.6% and for for-profit companies 43.4%. Although not all of the for-profit companies provided information, the difference between non-profit and for-profit organizations is large enough that it is safe to conclude that non-profits use a larger percentage of their funds for direct project implementation.

Chart 2: Percent of Funds Invested in Projects



Notes:
Better World Club, NativeEnergy, Solar Electric Light Fund, TerraPass are not included in this graph because no financial information was available.
A value of 22.5 was used for **The CarbonNeutral Company** as it is the average of the 15-30% range they provided.

7. Air Travel Emissions Calculators

Calculators have to fulfill three requirements: they have to educate the consumer, be user friendly and accurate. Nine of the offset companies do not provide their customers with detailed information about the complexities of calculating air travel emissions. The four companies that do are: **atmosfair**, **climate friendly**, **NativeEnergy** and **myclimate**. These companies also link to the IPCC's and other reports on this topic. **Climate Care** features a link to a paper they commissioned from Oxford University.[19] The other 9 companies do not discuss these complex issues on their webpage.

7.1 User friendliness of calculator

There are three basic ways customers can calculate emissions from their air travel:

A. Entering the total miles flown.

CarbonCounter, **Carbonfund** and **NativeEnergy** require customers to enter the mileage they would like to offset. It is assumed that users can find this information for themselves. There are other websites (such as http://www.webflyer.com) which compute the distance between major airports. None of the offset companies that ask for mileage have links to such sites. Adding such links would increase the user friendliness of these sites.

[19] Jardine, Christian N. (2005). Part 1: Calculating the Environmental Impact of Aviation Emissions.,Environmental Change Institute: Oxford University Centre for the Environment. Available online at: http://www.climatecare.org/_media/documents/pdf/Aviation_Emissions_&_Offsets.pdf Last accessed on 7/7/06.

B. Entering origin and destination of the trip

atmosfair, **Climate Care**, **The CarbonNeutral Company, climate friendly**, and **Offsetters** have calculators that let customers enter their airport of origin and their destination. Multiple flights may be calculated using this method and then offset simultaneously. **Myclimate** offers a choice between entering mileage and entering the origin and destination of the flight.

C. Offsetting a fixed amount without calculating the precise emissions.

A number of the offset companies offer a simpler alternative to calculating emissions.
The CarbonNeutral Company offer in addition to their point to point calculator the option of choosing a short, medium and long haul flight, instead of calculating the precise emissions.

Better World Club's system is not based on a careful calculation. Instead, they use a loose approximation of one ton per flight, for which they donate $11 to the Tides Foundation as an offset.

Solar Electric Light Fund (SELF) does not offer calculators on its website, but has links to calculators to determine the amount of carbon emitted per flight and offers a program (**SELF**'s Carbon Neutral Club) where people can donate $10 per ton of CO_2 they emit.

7.2 Calculator Accuracy

Measuring greenhouse gas emissions from aircrafts is a complicated issue as a number of effects must be considered such as contrails, cirrus clouds and additional greenhouse gases (Bows, 2005; IPCC, 1999)[20].

7.2.1 Variables: Radiative Forcing

Calculating the CO_2 emissions from jet fuel fuel burned on flights is relatively simple but the overall warming impacts of air travel are much more complex and difficult to calculate. Therefore, and to allow comparisons of varying types of emissions, the concept of *radiative forcing* is used. Radiative forcing measures the rate at which a given atmospheric gas alters radiation that is entering the atmosphere. A positive value denotes warming; a negative number signifies cooling (IPCC, 1999).

The main greenhouse gases emitted from aircraft are carbon dioxide (CO_2), water vapor, nitrogen oxides (NO_x), and methane (CH_4). Aircraft travel at altitudes of 9 to 13 kilometers (approximately 5.6 to 8 miles). At these altitudes, the effect of the emitted gases is considerably different than on the ground level and in many cases still incompletely understood[21]. Aircraft also emit water vapor during flight. When emitted in the stratosphere, H_2O can cause the formation of ice clouds, called contrails. Where contrails persist, cirrus clouds begin to form which have an additional impact on global warming. Clouds can have a double effect on radiation: they warm the earth by reducing the amount of radiation from the earth that escapes into space but also cool the earth by reflecting the sun's rays back into space. However, contrails lead to a net warming (William, Noland and Toumi, 2002; IPCC, 1999).

The IPCC has estimated total radiative forcing of air travel to be 1-5 times larger in the stratosphere than in the troposphere and calculated the average for full radiative forcing to be a factor of approximately 2.7 (IPCC, 1999.) Therefore to estimate the impact of an airplane trip a multiplier should be used on the CO_2 emissions from jet fuel to account for full radiative forcing.

[20] For an excellent paper on the effects of air travel on climate change please see Lee (2004).
[21] For example, NO_x emissions have a stronger global warming impact in the lower troposphere. When NO_x is emitted in the troposphere, ozone levels increase, causing the earth to warm because ground level ozone is a greenhouse gas (IPCC, 1999).

Unless the growth of the air travel industry is slowed, it is estimated that by 2050 air travel will be contributing at least 6% of the total radiative forcing from human activities (RCEP, 2003; Bows, 2005).

Although more research is needed to fully understand the chemical processes in the stratosphere, the research used by the IPCC is very robust. We therefore recommend using a calculator that includes a multiplier for the increased radiative forcing in its carbon calculations. Only five of the evaluated offset companies use a multiplier to account for radiative forcing: **atmosfair**, **Climate Care**, **climate friendly**, **myclimate**, and **NativeEnergy**.

7.2.2 Variables: Flight Distance

The rate at which fuel is burned is proportional to the drag which is the force of resistance that must be countered by the force of the engine's propulsion. During the take-off and landing, the engine is at full thrust and more fuel is consumed during take-off and climbing. Shorter flights therefore have a lower overall fuel efficiency; ie. use more fuel per mile than long-distance flights (RCEP, 2003). As the aircraft climbs and begins to cruise - that is, above the altitude of 3000 feet - drag and therefore rate of fuel use decreases (IPCC, 1999). On longer flights (those over approximately 994 miles) the amount of fuel used during take-off is less significant compared to the whole. This efficiency gain is partly offset on long distance flights by the added weight of the fuel that an airplane needs to carry on such long trips (RCEP, 2003.)

To more accurately calculate emissions, some of the companies' carbon offset calculators distinguish between short, medium or long flights. **Atmosfair**, **myclimate**, **The CarbonNeutral Company**, and **NativeEnergy** account for fuel efficiency differences between long and short flights. **NativeEnergy**, for example, uses a calculator that asks for mileage flown to be entered. The data entry points are then divided into three categories: short, medium and long haul flights and CO_2 emissions factor of 0.64, 0.44 or 0.40 lbs of CO_2 per passenger mile, are applied respectively.

Often, airplanes do not take the most direct route and having to change airplanes is very common. This leads to additional inefficiencies. **Atmosfair** accounts for route and layover.

7.2.3 Variables: Occupancy Efficiency

At full occupancy an aircraft will fly at maximum efficiency. Therefore a flight that is at maximum payload burns less fuel per passenger than a flight that is at less than its maximum payload. On average, international flights fly at 78% of maximum payload and domestic flights at around 65% (RCEP, 2003).

The **atmosfair** emissions calculator addresses the different seat occupancy rates by applying a common average of 80% for charter flights. For scheduled flights the seat occupancy rates are also differentiated according to the flight region: for Germany 60%, EU 62%, intercontinental traffic 75%. If the flight type is not known, an average of 75% is applied[22].

7.2.4 Business vs. Economy

Business and first class seats are larger and take up more room. Therefore, a passenger traveling in business or first class is responsible for more emissions because they have effectively excluded additional people from traveling on that same flight (IPCC, 1999).

[22] The Atmosfair Emissions Calculator, pdf,
http://www.atmosfair.de/fileadmin/user_upload/image4/atmosfair_calculator_04.pdf
accessed last on 10/31/06

Atmosfair calculates that business class seats require 1.4-times as much space as the economy seats. For fuel consumption this means that economy passengers consume 10% less than the average for all seats, while business passengers consume 40% more.

myclimate allows customers to enter whether they fly business or economy class. A passenger traveling business class is charged 1.5 times the emissions of a traveler in economy class.

7.2.5 Type of Plane

Type of plane also effects efficiency. The size, number of seats, engine types and other characteristics all influence the emissions of a flight. In general, older airplanes are less efficient than newer models. Most calculators use an average based upon all planes or choose just one typical commercial plane (IPCC, 1999).

Atmosfair allows customers to enter information about the type of airplane. **Climate Care** uses the fuel efficiency of 737s for short haul flights and 747s and the Airbus A340 for long distance flights.

7.2.6 Accuracy versus Ease of Use

The air travel emissions calculators do not vary widely in terms of overall ease of use. All that is required for any calculator is the entry of mileage or airports. Additional information, may be entered but is not required. Therefore a trade-off between accuracy and ease of use is not necessary.

7.3 Sample Calculations

To better compare how offset companies calculate and price their emissions offsets we have calculated for two sample flights:

- A short domestic flight: Boston - Washington, DC - Boston
- A long-distance, transatlantic flight: Boston - Frankfurt, Germany - Boston

The following three companies were not included:

Solar Electric Fund does not have its own calculator but has a link to http://www.earthfuture.com/climate/calculators/ which lists many available calculators. For air travel, the recommended calculator is http://chooseclimate.org/flying/ . The consumer has to click on an interactive map to choose departure and destination point. The consumer can also enter occupancy rate and choose between economy and business class. For the international flight, this calculator estimates a trip length of 4370 miles and 5.3 tons of CO_2 emissions per person. This calculator seems to underestimate trip length. The calculated CO_2 emissions are very high. The site gives detailed information about how the numbers are calculated. It would go beyond the purpose of this report to analyze this calculator in more detail but it seems that the CO_2 emissions are possibly overestimated on this site.

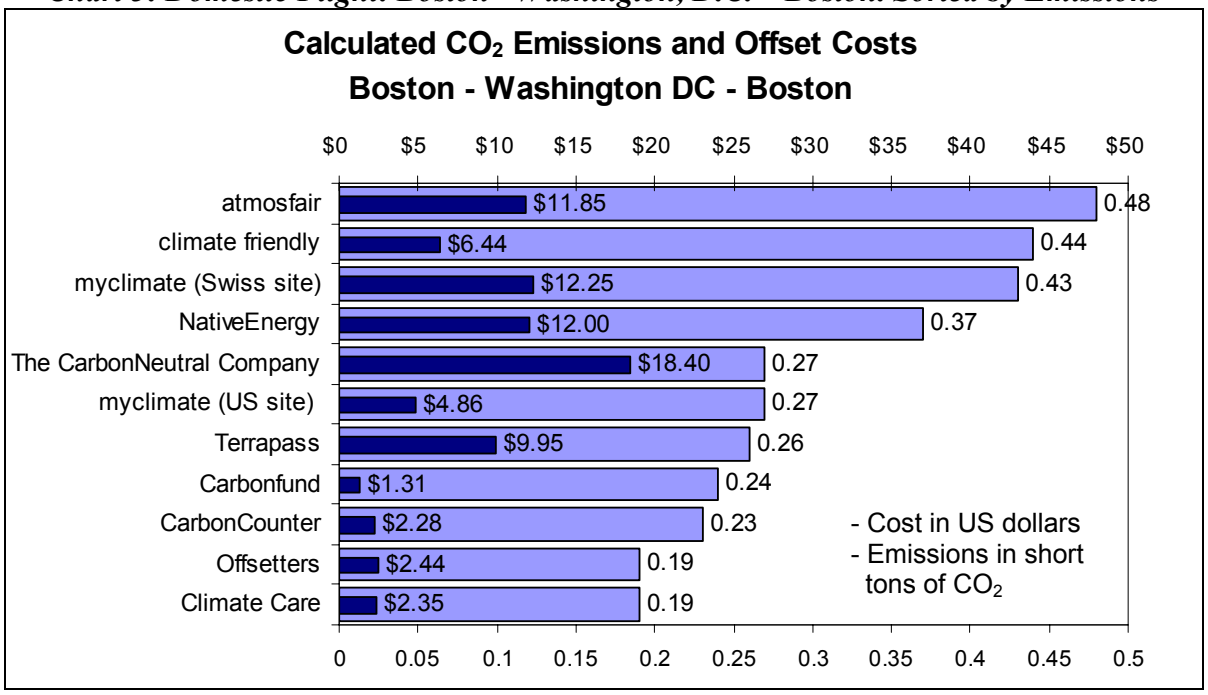
Better World Club does not have a carbon calculator on its site but also has a link to http://www.earthfuture.com/climate/calculators/ . For each flight booked through BWC, BWC donates $11 to the ***Tides Foundation*** which administers the funds.

Cleanairpass focuses on offsets from vehicle emissions. The site offers no easy way to purchase carbon to offset air travel. It was therefore not included in this example.

Table 3: Domestic Flight: Boston - Washington, D.C. – Boston. Sorted by Emissions

Company	***Distance (miles)***	***Emissions (tons)***	***Cost to offset***
atmosfair	889	0.48	$11.85
climate friendly	797	.44	$6.44
myclimate (Swiss site)	824	.43	$12.25
NativeEnergy[2]	*822*	.37	$12.00
myclimate (US site)	NA[3]	.27	$4.86
The CarbonNeutral Company[2]	824	.27	$18.40
Terrapass	824	.26	$9.95[4]
Carbonfund[1]	*822*	.24	$1.31
CarbonCounter[1]	*822*	.23	$2.28
Climate Care[1]	*822*	.19	$2.35
Offsetters	824	.19	$2.44

Chart 3: Domestic Flight: Boston - Washington, D.C. – Boston. Sorted by Emissions



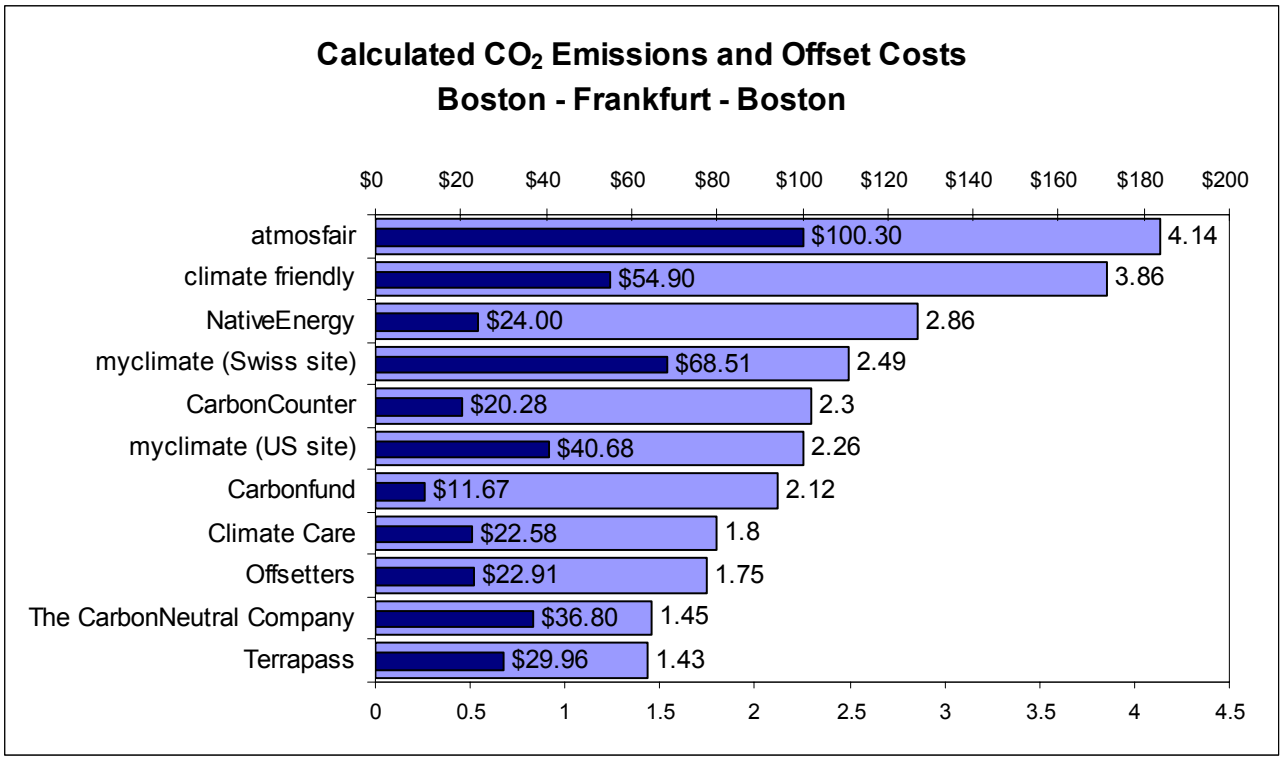
Notes:
Calculations and currency conversions made on 7/3/06 and on 10/31/06, using online converter found at: http://www.xe.com/ucc/

Italic numbers indicate that the information was taken from a separate webpage:
[1] These companies either required the customer to enter mileage flown or did not offer the distance after the calculation was made. Therefore the distance of 822 miles for the domestic flight and 7320 miles for the international flight were used. These estimates were provided by an airport mileage calculator found at: http://www.webflyer.com/travel/milemarker/
[2] These companies only sell offsets on a per ton basis. Therefore the cost used is to offset one ton of carbon.
[3] The US site for **myclimate** does not display the number of miles traveled.
[4] This is the price for the *TerraPass Puddle Jumper* which offsets 2,500 lbs of CO_2 emissions
[5] This is the price for the *TerraPass Intercontinental* which offsets 7,500 lbs of CO_2 emissions

Table 4: International Flight: Boston - Frankfurt – Boston. Sorted by Emissions

Company	***Distance (miles)***	***Emissions (tons)***	***Cost to offset***
atmosfair	7384	4.14	$100.30
climate friendly	7317	3.86	$54.90
NativeEnergy[1, 3]	*7320*	2.86	$24.00
myclimate (Swiss site)	7312	2.49	$68.51
CarbonCounter[1]	*7320*	2.30	$20.28
myclimate (US site)	NA[3]	2.26	$40.68
Carbonfund[1]	*7320*	2.12	$11.67
Climate Care[1]	*7320*	1.80	$22.58
Offsetters[4]	7152	1.75	$22.91
The CarbonNeutral Company[3]	7318	1.45	$36.80
Terrapass	7310	1.43	$29.95[5]

Chart 4: International Flight: Boston – Frankfurt -- Boston. Sorted by Emissions



Notes:
See previous page.

The calculated distance between the place of origin and destination is relatively similar across the different calculators. The difference in tons of carbon emitted is more significant. For the domestic flight it ranges between 0.19 to 0.44 tons; for the international flight between 1.45 to 4.43 tons. The companies that calculate the highest emissions for the domestic and international flights all use a multiplier to account for full radiative forcing (**atmosfair, climate friendly**, **NativeEnergy** and **myclimate**). **atmosfair, NativeEnergy** and **myclimate** account for fuel efficiency differences depending on flight distance. Except for **NativeEnergy**, these companies use the airport method to calculate emissions (as opposed to the mileage method) Also, **atmosfair** and **myclimate** include additional factors in their calculations.

Myclimate has two separate sites, one for its European customers and one for its American customers. These sites use separate calculators and the results are noticeably different in their carbon calculations as well as their pricing[23]. In the evaluation of the calculators we have focused on the Swiss site (www.myclimate.org).

Two of the companies with the lowest calculations (**Offsetters** and **CarbonCounter**) do not clearly explain the assumptions under which their calculators operate. Interestingly, **Climate Care** accounts for radiative forcing, uses the airport method of calculation and accounts for airplane type and still has one of the lowest estimates for these flight examples. It is not clear why this calculator varies in this way.

7.4 Calculator Evaluation

Table 5: Comparison of Calculators

Company	Information sources for emissions calculators	Multiplier for full Radiative Forcing	Flight Distance	Occupancy Efficiency	Business versus Economy	Airplane Type	Additional Variables
atmosfair	German Federal Environment Ministry, EU, UN, German Aerospace Center, and IPCC	2.7	X	X	X	X	X[1]
Better World Club	*No air travel emissions calculator*	NA					
CarbonCounter	*Source not listed on webpage*	None					
Carbonfund	US Department of Energy¬ Energy Information Agency	None					
The CarbonNeutral Company	UK Department for Environment, Food and Rural Affairs	None	X				
Cleanairpass	*No air travel emissions calculator*	NA					
Climate Care	UK Department for Environment, Food and Rural Affairs	2				X	
climate friendly	IPCC and the Greenhouse Gas Protocol	2.7					
myclimate (CH)	IPCC	2	X		X		
NativeEnergy	SafeClimate.net, a project of the World Resources Institute	2	X				
Offsetters	*Source not listed on webpage*	None					
SELF	*No air travel emissions calculator*	NA					

[23] According to an e-mail communication with R. Heuberger from **myclimate** on 2/14/06, the price difference is a result of different projects: US customers automatically fund projects of their 'balance' portfolio, whereas Swiss customers fund projects of their 'sustainable' portfolio, which is more expensive (see section 9, p.30.)

TerraPass	*Source not listed on webpage*						

Because of all the variables and uncertainties involved in calculating the climate impacts of air travel it is difficult to say with certainty which is the most accurate calculation. Yet calculators that take into account a greater number of air travel factors seem to be the most accurate. For example, it is safe to assume that those calculators that do not include a multiplier for full radiative forcing are underestimating the impact of air travel (RCEP, 2003).

As the table above illustrates, in our evaluation, **atmosfair** has the most detailed and best documented calculator. When we rated the calculators, we considered the following amounts most accurate: Domestic flight: minimum 0.35 tons per passenger; international flight: minimum 3 tons per passenger. We rated as acceptably accurate: Domestic flight: minimum 0.25 – 0.35 tons per passenger; international flight: 2.5 - 3 tons per passenger.

Table 6: Rating of Calculators

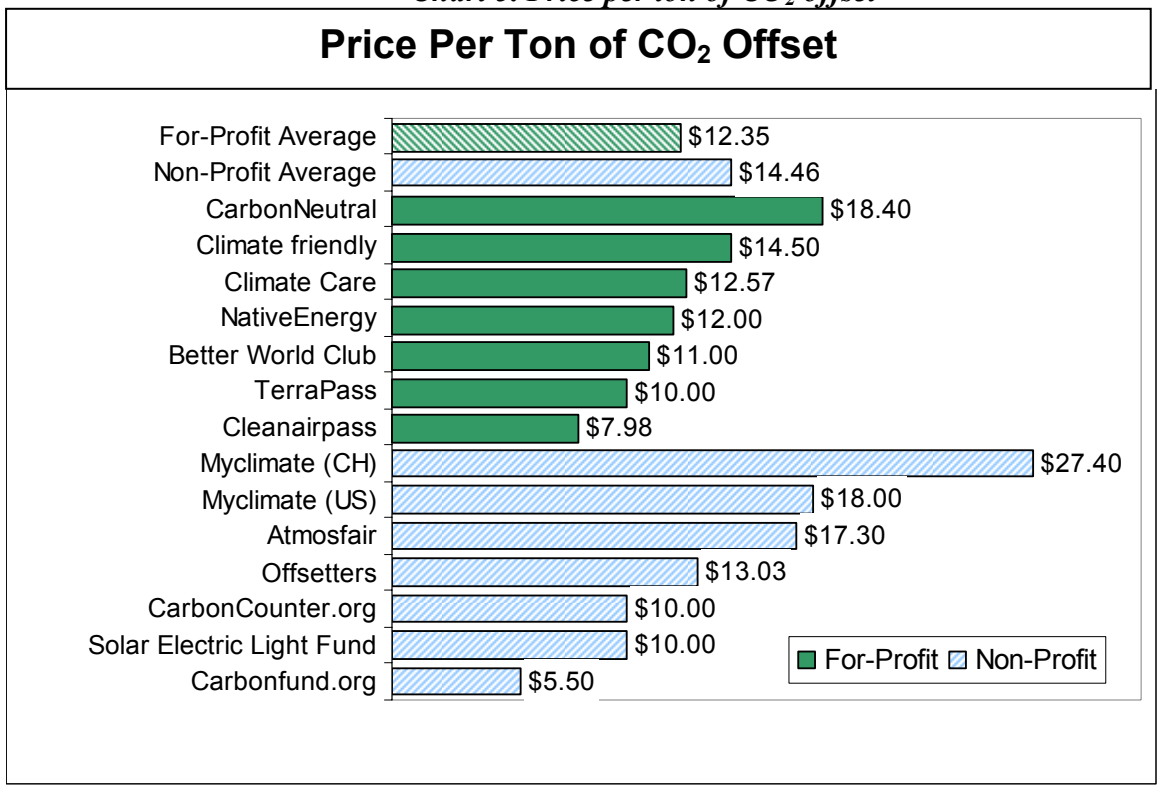
Company	***Calculator accuracy***
atmosfair	Excellent
climate friendly	Excellent
myclimate (Swiss site)	Very good
NativeEnergy	Very good
myclimate (US site)	Acceptable but emissions likely underestimated
CarbonCounter	Emission calculations too low
Carbonfund[1]	Emission calculations too low
The CarbonNeutral Company	Emission calculations too low
Climate Care[1]	Emission calculations too low
Offsetters	Emission calculations too low
Terrapass	Emission calculations too low
Better World Club	No air travel emissions calculator
Cleanairpass	No air travel emissions calculator
Solar Electric Light Fund	No air travel emissions calculator

With the voluntary carbon market expected to grow, it would be helpful if emissions calculations for air travel would be standardized by an independent third party. Such standardized emissions parameters would streamline the calculations and lend greater credibility to the offset companies much in the same way verifications standards are used to guarantee the quality of offset projects (see section 3.3, p.12).

8. Price per ton of carbon offset

8.1 Comparing carbon prices among the offset companies

Chart 5. Price per ton of CO_2 offset



The price to offset one ton of CO_2 varies substantially.[24] The prices for the companies in this study range from $5.50 (**Carbonfund**) to $27.40 per ton (**myclimate,** Swiss site), eight of the thirteen companies have prices within $10 to $15. The price differences do not seem to coincide with the percent of overhead each company charges (see section 6.3, p.19). There also does not seem to be a clear correlation between price and for-profit versus non-profit companies. Excluding **myclimate** (CH)'s very high price, non-profit companies and for-profit companies charge the same average price per ton ($12.35).

Some companies purchase offsets on the international market through institutions such as the ***Clean Development Mechanism (CDM)***. CDM offsets are more expensive than VERs. Therefore it is not surprising that two of the three highest priced offsets are sold by companies that purchase carbon offsets through the CDM (**atmosfair** and **myclimate**).

[24] All tons have been converted into short tons.

Table 7: Companies Sorted by Cost per ton of CO_2

Company	Cost per ton of CO_2	For or non-profit
Carbonfund	$5.50	Non
Cleanairpass	$7.98[2]	For
CarbonCounter	$10.00	Non [1]
Solar Electric Light Fund	$10.00	Non
TerraPass	$10.00	For
Better World Club	$11.00	For
NativeEnergy	$12.00	For
Climate Care	$12.57	For
Offsetters	$13.03	Non
climate friendly	$14.50	For
atmosfair	$17.30	Non
myclimate (US)	$18.00	Non
The CarbonNeutral Company	$18.40	For
myclimate (CH)	$27.40	Non

Note: All currency conversions made on 7/3/06 using online converter found at: http://www.xe.com/ucc/
[1]CarbonCounter is a project of two non-profit companies.
[2]Cost based on calculated average. Actual cost varies by ton of carbon emitted. e.g to offset 1 ton costs $19.95 Canadian Dollars, to offset 40 tons costs $195.95 Canadian Dollars, which is $4.9 Canadian Dollars per ton.

High-cost carbon offsets might be cost prohibitive for consumers and low priced carbon offsets might be an indication of lower quality offsets. Yet there does not necessarily have to be a correlation between price and offset quality. A very successful company will find lower cost ways to reduce emissions so its price might be low. On the other hand, such low costs may reflect low quality projects just as for any product in the market place. There is no readily available metric to evaluate these issues.

Even though cost will clearly play a part in a consumer's decision making process, the quality of the offset projects and not cost should be the determining factor. It is more important to invest in high quality offsets than to buy as many offsets as possible.

8.2 Comparing Carbon Prices to the European Trading Scheme (ETS)

The European Trading Scheme (ETS) came into force in 2005 and covers heavy industry and power generation. It is mandatory and includes 12,000 sites across all the 25 European Union member states. Each participating country proposes a National Allocation Plan (NAP) including caps on greenhouse gas emissions for power plants and other high emitting industries. The NAP must subsequently be approved by the European Commission.

Since the start of the European Trading Scheme (ETS) the price per ton of CO_2 has fluctuated between $12 and $34[25]. When making these price comparisons, it has to be taken into account that ETS is a cap and trade

[25] In its first year, 399 million tons of CO_2 were traded on the ETS market for a total of $9.2 billion. The price of allowances increased more or less steadily to its peak level in April 2006 of ca. $34 per ton CO_2, but came crashing down in May 2006 to under $12/ton when it became clear that many countries had given their industries such generous

system whereas voluntary offsets are mostly created by project based transactions. Also, ETA is not yet a mature market (Henrik Hasselknippe, 2006) and the voluntary offset business too is a very new trade. Yet it is interesting to note that the prices per ton of CO_2 offsets are more or less in the same range. Comparing the offset companies' prices with ETS, however, shows that the offset companies tend to charge less for offsets than what their value would be on the ETS market – over half the offset companies charge $12 or less per ton of CO_2 offset. This might indicate that carbon prices on the voluntary carbon market are currently under valued.

9. Recommendations and Ratings

As illustrated above, there are a number of ways in which carbon offset companies can be compared, reflecting the diversity in approaches to addressing issues of climate change. TCI has chosen the following criteria as most important in evaluating an offset company:

Calculator: The air travel emissions calculator should be accurate, include a multiplier for radiative forcing and account for flight variables.

Project Type: Project portfolios should have little or no bio-sequestration projects; rather they should be mainly or entirely renewable energy and energy efficiency projects.

Project Location: The advantages and disadvantages of projects in developing nations depend very much on how projects are designed and implemented. Because there are also major concerns with projects implemented domestically, we do not recommend one over the other.

Project/Offset Quality: Projects should ideally be additional, permanent, account for leakage and contribute to the long-term goal of a carbon free, highly energy efficient economy. They should be planned and implemented with excellent standards and verification. Additional benefits such as capacity building or protected biodiversity are a plus. High standard and verification requirements such as the Gold Standard and the Voluntary Gold Standard help maximize the benefits of projects implemented in non-Annex 1 countries.

Transparency: The company should clearly state all their procedures, verification schemes, financial arrangements and partnerships.

Overhead: The off-set company should have a relatively high percentage of sales going directly to project implementation.

We chose to group the evaluated companies in three groups:

1. **Recommend** (atmosfair, climate friendly, Myclimate, NativeEnergy)
2. **Recommended with Reservation** (CarbonCounter, Carbonfund, CarbonNeutral, Climate Care, Offsetters, TerraPass)
3. **Not Recommended** (Better World Club, Cleanairpass, Solar Electric Light Fund)

Within each category, the companies are listed alphabetically.

Table 8: Summary & Ratings of Companies

emission caps that there was no need for them to reduce emissions. Consequently, NGO's have accused national governments of abusing the system under industry pressure, and have urged for far stricter caps in the second phase (2008-2012). (Henrik Hasselknippe, 2006; http://www.emissierechten.nl/marktanalyse.htm)

Company	Calculator accuracy	Standards & Verification	Project Location	Project Type	Percentage of sales going to project implementation.	Price per ton of CO_2 offset	For or non-profit	Overall Recommendation
atmosfair	Excellent	CDM, Gold Standard	International	Renewable, Energy Efficiency	80%	$17.30	Non	**Yes**
climate friendly	Excellent	Green Power, Gold Standard	International, Domestic	Renewable	66%	$14.50	For	**Yes**
Myclimate	Very good (Swiss site) Acceptable but emissions likely underestimated (US site)	Gold Standard	International	Renewable, Energy Efficiency	80%	$18.00 (US site) $27.40 (CH site)	Non	**Yes**
NativeEnergy	Very good	Green-e Gold Standard for some projects	Domestic	Renewable	N/A	$12.00	For	**Yes**
CarbonCounter	Emission calculations too low	Climate Trust	International, Domestic	Renewable, Energy Efficiency, Sequestration	90%	$10.00	Non	**With Reserva-tions**
Carbonfund	Emission calculations too low	CCX, Green-e	International, Domestic	Renewable, Energy Efficiency, Sequestration	93%	$5.50	Non	**With Reserva-tions**
CarbonNeutral	Emission calculations too low	NA	International, Domestic	Renewable, Energy Efficiency, Sequestration	15-30%	$18.40	For	**With Reserva-tions**
Climate Care	Emission calculations too low	NA	International	Renewable, Energy Efficiency, Sequestration	60%	$12.57	For	**With Reserva-tions**
Offsetters	Emission calculations too low	Gold Standard	International	Energy Efficiency, Sequestration	65%	$13.03	Non	**With Reserva-tions**
TerraPass	Emission calculations too low	Green-e, CCX, CRS	Domestic	Renewable, Energy Efficiency	N/A	$10.00	For	**With Reserva-tions**
Better World Club	No air travel emissions calculator	N/A	Domestic	Energy Efficiency	N/A	$11.00	For	**No**
Cleanairpass	No air travel emissions calculator	CCX	International, Domestic	Renewable, Energy Efficiency, Sequestration	25%	$7.98[2]	For	**No**
Solar Electric Light Fund	No air travel emissions calculator	N/A	International	Renewable	N/A	$10.00	Non	**No**

Recommended:

Atmosfair

http://www.atmosfair.de

Atmosfair is a German non-profit offset company focusing on offsetting air travel. Atmosfair was initiated in 2003 as a joint project of ***forum anders reisen*** (http://www.atmosfair.de/index.php?id=11&L=0), a consortium of travel agencies and the NGO Germanwatch (www.germanwatch.org).

Atmosfair has an excellent air travel emissions calculator and detailed information on the underlying assumptions. Atmosfair reports that 80% of their sales go to project implementation.

Atmosfair has excellent on-line documentation of its projects. All of its projects have to meet the Gold Standard. Atmosfair's project portfolio includes four renewable energy and energy efficiency projects planned and/or implemented in India, Thailand, Brazil and South Africa. Atmosfair does not invest in domestic projects or sequestrations projects. All projects are third party verified by TÜV[26]. All verification reports can be downloaded directly from the website.

The projects in India (large scale solar cookers) and the

CarbonCounter / Climate Trust

http://www.carboncounter.org/

CarbonCounter.org is a collaborative non-profit project started in 2002 by The ***Climate Trust*** (http://www.climatetrust.org) and ***The Mercy Corporation*** to offers offsets to individuals. The ***Climate Trust*** provides offsets to power plants, regulators, businesses and individuals and ***Mercy Corps*** (http://www.mercycorps.org) is an international relief and development agency.

CarbonCounter's emissions calculator underestimates the emissions from air travel. They do not list any of their sources on the underlying assumptions. They report that 90% of their sales go to project implementation. Their price is relatively low at $10 per ton of CO2 offset.

The CarbonCounter.org website does not give any specific information about the projects it invests in. More information can be found on The Climate Trust's website (http://www.climatetrust.org):

> "The Climate Trust's current portfolio will offset 1.9 million metric tons of carbon dioxide from $4.9 million invested in offset project contracts-- making us one of the largest and most experienced offset buyers in the U.S. and world markets." (http://www.climatetrust.org/offset_projects.php, last accessed 11/27/06)

Climate Trust invests in domestic and international efficiency, renewable energy and sequestration projects. According to their 2-page project standards summary[29] available on their website: "The Trust requires state-of-the-art monitoring and verification of its offset projects." Yet, they do not state who their certifiers and verifiers are. All of their projects seem to produce VERs and RECs.

Since they do not list clear third party verifiers or certification, we are concerned that neither additionality nor double counting issues are fully addressed. For example, the Climate Trust buys offsets from the City of Portland for two of their building energy efficiency programs. Yet, in 1993, the city of Portland became the first U.S. city to adopt a strategy to reduce emissions of carbon dioxide (CO2). Their Local Action Plan on Global Warming calls for a reduction of carbon dioxide emissions to 10 percent below 1990 levels by 2010. According to their webpage:

> "Local greenhouse gas emissions are now less than 1 percent above 1990 levels – a key benchmark of the international Kyoto Protocol – and emissions have declined in each of the past four years."
>
> "On a per capita basis, Portland and Multnomah County emissions have fallen 12.5% since 1993, an achievement likely unequalled in any other major U.S. city." (http://www.portlandonline.com/osd/index.cfm?c=41896, last accessed 11/27/06)

The Climate Trust does not state how they make sure the carbon offsets they buy from the City of Portland are not also counted in the cities' greenhouse gas inventory.

Climate Trust is one of the largest offset businesses. Although we cannot comment on their main carbon and consulting projects, we recommend them for offsetting individual air travel emissions with the above mentioned reservations.

The CarbonNeutral Company

http://www.carbonneutral.com/

This UK for-profit company, originally known as *Future Forests,* was founded in 1997 focusing on providing carbon credits generated from forestry projects. The company has expanded its services and now offers offsets from a variety of projects (not exclusively forestry). It also offers marketing and consulting services.

[29] http://www.climatetrust.org/pdfs/CT%20offset%20criteria.pdf, last accessed 11/28/06.

CarbonNeutral's emissions calculator underestimates the emissions from airtravel. They report that only 15-30% of their sales go to project implementation. This is the lowest percentage of all the companies we reviewed. Their price is high at $18.40 per ton of CO2 offset.

The CarbonNeutral Company invests in renewable energy, energy efficiency as well as sequestration projects in developed as well as developing nations (e.g. US, Germany, India, Mexico, etc.). It is unclear what percentage of their offsets comes from sequestration projects. One page PDF document summaries are available on their webpage.[30] It is unclear how they avoid double counting for projects that are implemented in Annex 1 countries.

So far, the CarbonNeutral Company has invested in projects outside the Kyoto Mechanisms - which generate Verified Emissions Reductions (VER's). The company is planning to offer Certified Emissions Reductions (CER's) some time in the near future[31].

The CarbonNeutral Company is a large consulting, marketing and offset business. Although we cannot comment on their other carbon and consulting projects, we recommend them for offsetting individual air travel emissions only with the above mentioned reservations.

Climate Care

http://www.climatecare.org/

Climate Care is a for-profit company that offers offsets to individuals and businesses. This UK company was founded in 1997.

Climate Cares's air travel emissions calculator does use a factor of 2 to account for full radiative forcing and yet in our examples, their calculator underestimated emissions from air travel. They report that 60% of their sales go to project implementation. The price per tone of CO_2 offset is of $12.60.

In 2005, 80% of Climate Care's offsets came from energy projects and 20% from sequestration projects. All projects are implemented in developing countries. Climate Care explicitly states that this is to avoid double counting emissions reductions in Annex 1 countries. Climate Care does not clearly state which standards and verifications they employ. They mention that a baseline report is written by a third party for each project. On their webpage and in their 2005 annual report, we find the following statements:

> "We will only fund a project if we can be confident that it would not have gone ahead without our assistance." (http://www.climatecare.org/projects/index.cfm?content_id=E17E5E13-0AFA-DB60-5640550B1039396A, last accessed 11/30/06)
>
> "Climate Care is scrutinised by our Environmental Steering Committee, which includes eminent environmentalists and NGOs, including WWF and Forum for the Future. To ensure that our projects achieve the CO2 emissions that we claim, our committee requires us to meet three criteria for each project. These are:
>
> - that a third party report be obtained
> - that the CO2 reductions be monitored on an ongoing basis
> - that any shortfall is made up in other projects."
>
> (http://www.climatecare.org/_media/documents/pdf/Climate_Care_Annual_Report_2005.pdf, last accessed 11/27/06)

[30] http://www.carbonneutral.com/pages/projectlocations.asp last accessed 11/29/06

[31] The CarbonNeutral Protocol does contain requirements regarding additionality. More information about their project requirements can be found at: http://www.carbonneutral.com/uploadedfiles/CNP2006%20v1%202.pdf#CNP, last accessed 11/30/06

Although they contributed to the development of the voluntary Gold Standard, they do not currently offer Gold Standard certified offsets, but expect to do so in the future. All their listed projects tend to be small scale and decentralized.

According to Climate Care's 2005 annual report:

> "This year [2005], the first Clean Development Mechanism (CDM) projects were registered, enabling emission reductions to be bought from projects in the developing world to help developed countries to meet their Kyoto targets. However, to date the high costs and restrictions of setting up a project to sell emission reductions to this regulatory market have tended to prohibit smaller-scale community based projects that have wider sustainable development benefits.
> In contrast, the voluntary market can provide finance for projects of this type that have multiple health and economic benefits to communities, alongside the greenhouse gas reductions. So far, the voluntary carbon offset market has been able to reach areas where the regulatory market cannot – developing appropriate technology solutions for some of the poorest communities."
> (http://www.climatecare.org/_media/documents/pdf/Climate_Care_Annual_Report_2005.pdf, p. 6, last accessed 11/27/06)

It is true that the regulatory burden is larger for CDM projects than for projects that produce VERs. As pointed out earlier VER producing projects, even if they are very small, can still be implemented adhering to the Gold Standard principles, especially since the release of the Voluntary Gold Standard in spring of 2006. Smaller decentralized projects in developing countries are very difficult to plan, implement and supervise. We would therefore argue that with such projects it is especially important that additional verification (such as required with the Gold Standard) takes place.

We recommend Climate Care for offsetting individual air travel emissions with the above mentioned reservations.

Offsetters

http://www.offsetters.com/

Offsetters is a Canadian non-profit company started in 2005 that sells offsets to individuals and businesses. It has also partnered with WestJet. WestJet flights that are booked through the Offsetter webpage are made carbon neutral though offset projects.

Offsetters air travel calculator underestimates the carbon emissions. They report that 65% of sales are directly invested in projects. The price per ton of CO2 offset is approximately $13.

Projects funded by offsets purchased through Offsetters are provided in collaboration with **Climate Care**, reviewed earlier. It is unclear if Offsetters offsets are produced with Gold Standard projects. On the webpage they state Offsetters supports the Gold Standard yet since Climate Care does not currently use the Gold Standard, we assume that is true for Offsetter projects also.

We recommend Offsetters for offsetting individual air travel emissions with the reservations mentioned for Climate Care.

TerraPass

TerraPass (http://www.terrapass.com/)

TerraPass is a for-profit US company that offers offsets to individuals and businesses. TerraPass was initially created in 2005 as a project for the course "Problem Solving, Design, and System Improvement" taught at the Wharton School of Business at the University of Pennsylvania.

Terrapass' air travel emissions calculator does not account for full radiative forcing and underestimates emissions from air travel. Terrapass does not disclose information about how much of their sales go to project implementation. Their price of $10 per ton of CO2 offset is relatively low.

TerraPass funds renewable energy and energy efficiency projects that produce a combination of VERs and CERs. All projects are implemented in the US. On their webpage, Terrapass lists eight projects: Three wind facilities, three biomass projects and two energy efficiency projects. One of the windfarms is located in California. It is unclear how TerraPass will avoid double counting emissions with ***California's Global Warming Solutions Act of 2006***. It also purchases industrial energy efficiency credits through the Chicago Climate Exchange (CCX). Because of the quality concerns we stated earlier, we hesitate to recommend CCX credits as voluntary carbon offsets (see section 3.3, p. 12.)

We recommend TerraPass for offsetting individual air travel emissions with the above mentioned reservations.

Currently Not Recommended:

Better World Club

http://www.betterworldclub.com/links/offsets.htm

Better World Club's system is not based on a careful calculation. Instead, they use a loose approximation of one ton per flight, for which they donate $11 to the Tides Foundation as an offset. Better World Club (BWC) does not specialize in offsets but provides nationwide roadside assistance, insurance and travel services. BWC sees itself as a more sustainable alternative to AAA (the largest American automobile association). For each flight booked through BWC, BWC donates $11 to the ***Tides Foundation*** which administers the funds. There is no information available on the BWC nor in the Tides Foundation website on the type of projects that are funded.

We welcome this kind of one-stop-shopping, where customers can purchase offsets at the same time they buy their airline tickets. More travelers are likely to buy offsets when procedures are simplified in that way. (Yet the BWC offsite webpage (http://www.betterworldclub.com/links/offsets.htm) is hard to locate on their website. It is not accessible from the homepage and also not listed on their site map.)

Better World Club does not have a carbon calculator on its site but has a link to http://www.earthfuture.com/climate/calculators/ which lists many available calculators.

Although we applaud the mission of BWC and also welcome any organization that sensitizes the public about their carbon footprint, we recommend using offset companies that are more accurate in their calculations and their emissions offset. For emissions offsets to gain credibility and to be verifiable, they have to be calculated accurately and offset as exactly as possible.

We do not recommend the Better World Club for buying offsets.

Solar Electric Light Fund

http://www.SELF.org/

The Solar Electric Light Fund, Inc. (**SELF**) is a US non-profit organization founded in 1990 to promote, develop, and facilitate solar rural electrification and energy self-sufficiency in developing countries. It is not an offset company but offers a program where people can donate $10 per ton of CO_2 they emit.

SELF's website does not have its own carbon calculators, however, they have link to www.earthfuture.com/climate/calculators with a list of about 25 calculators.
SELF charges $10 per ton of CO_2 offset. SELF does not report what percentage goes toward direct project implementation.

SELF's project portfolio is composed of solar energy projects which include electrification of public buildings, including health clinics, schools, houses of worship and streetlights, household electrification and solar water pumps for efficient irrigation. For each project, the partner institution is clearly identified. Procedure for applying for external subsidizes and funding is mentioned but not listed, ie they talk about getting seed money from the World Bank to start certain projects.

There are no third party verifications for the projects SELF invests in. SELF states that it maintains a certain level of internal standards including ensuring social, economic and environmentally sound project outcomes. But it is unclear what their standards are.

Neither Better World Club nor SELF are offset companies in the strict sense. They were included in this report to show the diversity of offset programs that exist. Although we applaud the creativity of these two organizations and also welcome any organization that sensitizes the public about their carbon footprint, we recommend using offset companies that are more accurate in their calculations and more rigorous in ensuring additionality and permanence of their projects.

Cleanairpass

https://www.cleanairpass.com/

Cleanairpass is a non-profit Canadian offset company that focuses on providing offsets to individuals who want to offset their vehicle miles traveled. Cleanairpass was founded in 2005.

Cleanairpass does not have an air travel calculator because of their focus on vehicle emissions. They report that only 25% of sales are directly invested in projects. The price per ton of CO2 offset is approximately $8. Currently Cleanairpass does not seem to have concrete projects. According to its webpage:

> "We purchase carbon emission offsets from qualified projects that have initiated emission reduction measures. Projects may include renewable energy technologies, energy efficiency and conservation initiatives, emission capture or sequestration, and other measures which reduce or prevent emissions from reaching the atmosphere and/or eliminate the need for energy generated from coal, oil, natural gas, and other fossil fuels." (https://www.cleanairpass.com/cap/project.jsf, last accessed 11/27/06)

> "We intend to source emission offsets from local sources as they become available and anticipate the initiation of a Canadian emissions trading system late 2006. Currently cleanairpass is in the process of purchasing our first emission offsets. Be one of the first to get a cleanairpass! Return to this page to review the projects cleanairpass supports." (https://www.cleanairpass.com/cap/offsetSources.jsf, last accessed 11/27/06)

Since Cleanairpass is a very young company that does not have any concrete projects listed and since they do not have a air travel carbon calculator, we do not recommend the Cleanairpass for buying offsets to offset air travel.

10. Conclusions

The debate over the ethical validity of buying voluntary offsets to reduce ones personal carbon emissions is far from over – a recent Economist article compared offsetting to buying pardons in the Medieval Catholic Church (The Economist, 2006).

Moreover, while it reduces carbon emissions at the margins, when just a few enlightened people choose to offset their carbon footprint, it clearly would not be possible to offset all air travel related carbon emissions, either now or much less in the future, given the rapid growth or air travel.

There is much validity to the argument that offsetting simply helps us assuage our guilt, whilst we continue to fail to change out lifestyles towards patterns that are more truly sustainable. Avoiding having to fly to far-away places is still the most effective way to reduce one's personal air travel emissions[32].

Voluntary approaches to reducing greenhouse gas emissions do not capture sufficient emission sources. No voluntary approach to reducing greenhouse gas emissions should be allowed to delay or replace a mandatory federal cap on carbon emissions or a worldwide tax on jet fuel.

Reducing travel miles and living a less energy-intense lifestyle in general – e.g. living in an apartment close to work and using public transportation –and voting officials into office who enact legislation that effectively addresses the threats of climate change will ultimately be more important than buying carbon offsets.

On the other hand, carbon offsetting can genuinely reduce emissions. Even more importantly, it can help provide funds now to kick start the development of low carbon technologies, which will be vital in the more fundamental transition to low carbon societies.

Acknowledgements

The authors would like to thank Alastair Thompson, Charlie Heaps, Michael Lazarus, Sivan Karta and William Moomaw for their comments and suggestions on this paper.

[32] The argument that the air plane will fly anyway, has only limited validity, as the effects of Y2K and 9/11 on the air travel industry showed.

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ANNEX A: THE TOP 20 CARBON DIOXIDE EMITTERS

Country	*Total emissions* (1000 tons of CO2)	*Per capita emissions* (tons of CO2/capita)	*Total emissions* (rank)	*Growth* (in %, 1990-96)
United States	5,304,849.0	19.7	-1	-9.9
Peoples Rep. of China	3,365,989.0	2.8	-18	40
Russia Federation	1,580,663.3	10.7	-6	-19.2 (since 1992)
Japan	1,168,515.3	9.3	-9	9.1
India	998,110.7	1.1	-20	47.7
Germany	861,850.0	10.5	-7	-12.2
United Kingdom	557,388.3	9.5	-8	-1.1
Canada	409,651.0	13.8	-4	-0.1
South Korea	408,356.7	9.0	-11	69.2
Italy	403,524.0	7.0	-13	1.1
Ukraine	397,580.3	7.7	-12	-37 (since 1992)
France	362,083.3	6.2	-15	2.4
Poland	357,041.7	9.2	-10	2.6
Mexico	348,359.0	3.7	-17	18
Australia	306,856.0	17.0	-2	15.3
South Africa	292,959.3	6.9	-14	0.6
Brazil	273,570.0	1.7	-19	34.9
Saudi Arabia	268,026.0	14.2	-3	51.2
Iran	266,856.3	3.8	-16	25.6
North Korea	254,510.7	11.3	-5	4

Source: Marland, G., T.A. Boden, R. J. Andres. 2000. Global, Regional, and National CO2 Emissions. In Trends: A Compendium of Data on Global Change. Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, U.S. Department of Energy, Oak Ridge, Tenn., U.S.A. (available online at http://cdiac.esd.ornl.gov/trends/emis/tre_coun.htm)