Voluntary Carbon Offsets

IEA GREENHOUSE GAS R&D PROGRAMME

International Energy Agency

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Report compiled by Deborah Adams

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INTRODUCTION

The Clean Development Mechanism (CDM) and Joint Implementation (JI) are processes authorised and controlled by the UN as part of the Kyoto Protocol. Both CDM and JI projects aim to reduce global greenhouse gas (GHG) emissions. By the CDM or JI one country can claim to have reduced its total GHG emissions by implementing a project in another country, where it is cheaper and easier to effect a substantial emissions reduction. Typical projects involve renewable energy schemes, or energy efficiency measures. Credits are awarded to the organising country for the emissions reduction.

The EU Emissions Trading Scheme (EU ETS) is a formal cap-and-trade system whereby the member countries have a quota of emission allowances. The participants then reduce their emissions to gain credits which they can sell. If it is cheaper for them to buy credits they can take this route. It depends on the carbon market and the cost of measures to reduce their emissions. As the cap is set lower, emissions reduction activity is encouraged.

There is a third way to trade carbon, which does not operate at the government level. This is known as voluntary carbon offsets, and is the subject of this report. It is voluntary as it is not a cap and trade system introduced by government, and it is not part of the Kyoto Protocol.

Organisations and individuals can counteract their greenhouse gas emissions by the purchase of carbon offsets. An offset avoids an equal amount of pollution, usually at another location, or sequesters an equal amount of carbon dioxide (CO_2) to that emitted. Unlike most air pollutants, greenhouse gases mix thoroughly in the atmosphere so it doesn't really matter where a reduction takes place, from the global warming perspective. The use of carbon offsets can take advantage of the radically different costs and practicalities of achieving greenhouse gas emission reductions by sector and geography. Carbon offsets are typically measured in tonnes of CO_2 equivalent (CO_2e) and can be traded through a number of international brokers, online retailers and trading platforms.

Carbon offsets may be an important tool for those seeking to become 'carbon neutral' or 'climate neutral', as it may not be practical to actually reduce emissions to zero through the use of renewables or energy efficiency measures. Legislation may also encourage the use of carbon offsets. For example, Oregon state law requires that new energy facilities avoid, sequester, or displace, a portion of their carbon dioxide (CO_2) emissions.

The retail market for voluntary carbon neutrality is relatively new and so still developing. As yet, there are no widely accepted standards as to what qualifies as an 'offset', for the purpose of making consumers carbon neutral, for example. But the offsets market is growing rapidly. Several dozen companies and organisations now offer the public the chance to purchase offsets. These entities generally encourage consumers and small companies to offset their

entire personal or business greenhouse gas (GHG) footprints, or to offset specific activities, such as flights, car travel or conferences.

It is not easy to describe accurately the retail offsets market. The number of participants in the market is growing, and the organisations already involved in the market provide widely disparate marketing and consumer messages. It is not known how many offsets have been sold. Many marketers of retail offsets provide little information about where the money is being spent or what criteria are used to select the reductions they sell to consumers.

This paper discusses the advantages and disadvantages of voluntary carbon offsets as a mechanism for reducing GHG emissions. It defines offsets and explains what makes a 'quality offset'. It describes the various standards for offsets, explains how the market operates, and lists the main providers and purchasers.

ADVANTAGES OF OFFSETS

Offsets have a number of advantages over other systems of emissions reduction. The main one is that they allow companies to reduce or avoid carbon emissions in a less costly way than purely internal emissions reduction options.

Good carbon offset projects do not necessarily promote other environmental objectives, but many do have supplemental benefits. They may benefit the communities in which they take place by spurring economic development, improving the quality of life, or increasing recreational value. For example, Aviva funds a project to distribute treadle pumps in India that reduces emissions and gives people access to clean water. Another Aviva project funds the distribution of more efficient cooking stoves in Swaziland which reduce indoor air pollution as well as GHG emissions. Sequestration projects may protect existing forests or entail reforestation. Although extra environmental benefits are desirable in a carbon offset project, they are not a substitute for technical quality. However, consumers often prefer the projects that do have extra benefits.

Another advantage is that if a company sponsors offset projects near or within communities which produce or consume its products, it can raise its profile and consolidate its ties with the key constituencies.

There can be economies of scale as well. Many large offset projects are underwritten jointly. This means that companies can pool their resources, both financial and otherwise, to achieve projects of a scale that no company could or would, undertake independently.

Offsets can offer flexibility. Companies that invest in offsets through intermediary organisations can adjust the degree of involvement from year to year, just as one would an investment portfolio, to meet changing needs, goals and aspirations.

CRITICISMS OF OFFSETS

Ideally carbon offsets are used after a company has introduced as many energy efficiency measures as are feasible, and has reduced its emissions by internal action as far as possible. However, if a company has done little to streamline its own operations, offset projects may be dismissed as 'greenwash', or an attempt to 'buy' a good emissions profile. Thus offsets projects should be a complement, not a replacement for, internal reduction efforts.

Some critics challenge the premise that everyone stands to benefit from international offset projects. They view such projects as another example of companies from the richest countries finding quick, inexpensive fixes abroad, rather than focusing on domestic solutions.

There is some concern that offsets can act as a perverse incentive to actually increase emissions. It is possible that individuals may opt for a more 'carbon extravagant' lifestyle and then buy a few offsets in the hope of mitigating their emissions. For example, when buying a car, a less economic model may be chosen, and a few trees planted as well, instead of buying a car which uses less fuel. It is obviously simpler to measure and guarantee the environmental burden of the car, if offsets are not involved.

To account for a project's impact, one must predict what would have happened in its absence. This is difficult to do and leaves companies open to accusations of biased forecasting, unless they work with a reputable organisation and invest in a certified project. It is also difficult to quantify and verify the impact of a project once it has begun. Accounting concerns are probably the most contentious aspect of the field of offsetting, and are discussed in more detail below.

CRITERIA

A number of criteria have been developed as guidelines for offset schemes and to counteract some of the criticisms described above. The widely accepted criteria relate to the 'additionality' of a project, its emissions baseline, monitoring and verification. The criteria are applied rigorously to CDM projects, but are also important for the voluntary carbon market.

ADDITIONALITY

An offset project is considered additional if it is not part of business-as-usual activity. Typically, this means that the project can only happen because of the extra funding from the sale of offsets. Business-as-usual emissions are generally referred to as the emissions 'baseline'. If the reduction in emissions would have happened anyway under business-as-usual the project is not 'additional' as defined under the Kyoto Protocol. This is a complex and controversial area. For example, industrial efficiency projects where energy use is reduced and credits are received may be viewed as not additional by some. Others argue that these reductions are valid, because the credits provide an incentive to ensure the reductions take place. Disagreements over additionality testing underlie most disputes about the quality and environmental benefit of offsets.

The evaluation of additionality can become highly subjective, and no additionality standard is perfect as it is hard to know if a project would have taken place or not, in different circumstances. A variety of tests have been proposed to ascertain the additionality of offset projects, which aim to answer these questions:

- Does the project go beyond legal requirements?
- Is the project economically viable without offset revenues?
- Are there significant non-financial barriers that a project needs to overcome?
- Does the project go beyond common business practice?
- Was the project started after a given date?

Each test has its own advantages and disadvantages, and none is universally applicable. As a result, determining the additionality of a project is often best done by a third party with experience in the field. This is one of the strengths of CDM projects, which are assessed by Designated Operating Entities (DOEs), described below.

BASELINE

Once additionality is confirmed, the emissions baseline for a project is established. The baseline is the emissions that would have occurred in the absence of the project. An inflated emissions baseline can make it look as if a project is generating more offsets than are actually being achieved.

The quantifying of the GHG emissions reductions or sequestration resulting from an offset project, relative to baseline emissions, should reflect key potential uncertainties, as well as the potential for leakage, that is the possibility that GHG emissions increase elsewhere as a result of the project.

MONITORING AND VERIFICATION

Offset projects need to be professionally monitored and verified over time. The UN maintains a list of verifying companies, called Designated Operating Entities (DOEs) that meet its criteria. The market leaders in carbon verification are the SGS Group, TUV and Det Norske Veritas. Ideally, companies should not have their projects verified by the same company that advised on how to set up the project, as that could lead to a conflict of interest.

OWNERSHIP

Ownership of reductions should be clear, to reduce the chances of the same offsets being claimed and sold a number of times. This is easier with direct on-site reductions, than with indirect ones, such as when renewable energy generation displaces emissions at another power plant. Registration invokes a paper trail and reduces the chance of the same offsets being sold repeatedly.

PERMANENCE

The offsets should not be subject to potential reversal in the future. This can be an issue with carbon sequestration. If the trees die or burn for example, there needs to be a contingency plan to replace them. There also needs to be a plan for the use of the resulting timber so that it remains a carbon store for the long term.

OFFSET TIMING

Offsets may be sold on an 'as you go' basis or they may be sold in advance of the actual creation of the offset. The advance sale of offsets creates certain project performance risks relating to whether the offsets will ultimately be generated, but can be central to the pursuit of 'additional' offset projects. The media company Sky, for example, has chosen to ensure that all of its credits come from projects that reduce emissions in the same year as the emissions which the company is offsetting, rather than projects that will only bear fruit in the future.

PROJECT TYPES

Three main types of project exist that produce offsets: those that prevent the release of CO_2, those that reduce non-CO_2 greenhouse gases, and those that sequester carbon in vegetation or soil. Thus, carbon offsets can be generated from energy efficiency projects, by renewable energy installations which displace fossil fuels, methane capture from landfill or livestock, destruction of potent greenhouse gases such as halocarbons, and carbon sequestration projects, such as reforestation.

ENERGY EFFICIENCY

There are various energy efficiency projects operating around the world that use carbon offsets. Carbon Footprint runs one in India which involves the installation of technologies in hotels that are at least 25% more energy efficient than those used under business-as-usual, such as the installation of compact fluorescent lamps (CFLs).

An energy efficiency project has been organised in Eritrea by the Carbon Neutral Company which also aims to address the problems of deforestation, rural poverty and rural energy shortage in Eritrea. Traditional indoor cooking stoves are replaced with improved ones that use half the amount of wood fuel. The project aims to benefit over 500,000 households in Eritrea over a 7 year period, replacing the inefficient stoves currently in use. It is estimated that the reduction in emissions for each household using the new stove will amount to 0.6 tCO_2/y.

RENEWABLES

A biomass project has been set up in Hungary which involves the installation of a 5 MWth capacity biomass-fired boiler at the boiler house in the town centre of Mátészalka. It is a substitute for gas-fired boilers, and will be run mainly on woodchips, sourced from sustainably-managed local forests. The project aimed to save 8,000 tCO_2 between 2003-05. The partners are the Carbon Neutral Company, Siemens Building Technologies and the Municipality of Mátészalka.

METHANE CAPTURE

Animal manure is often stored in open-air lagoons, where the waste decomposes and releases methane and other GHGs into the atmosphere. The DrivingGreen project in the USA collects animal waste from local farms and processes it in the closed environment of an anaerobic digester. The GHGs are destroyed by flaring, which also generates electricity to be used for farm operations. This project has additional benefits including a reduced risk of groundwater and land contamination, and a reduced odour problem for nearby communities.

HALOCARBON DESTRUCTION

HFC-23 is a by-product from HCFC-22 production which is used as a refrigerant and as a feedstock for the production of Teflon (polytetrafluoroethylene). HFC-23 is a GHG of low toxicity, but with a global warming potential about 11,700 times greater than that of CO_2. Most HFC-23 is emitted to the atmosphere from HCFC-22 production plants in China, India, South Korea and Brazil. HFC-23 can be burnt cheaply, which is a profitable activity in global carbon markets, because of its high global warming potential. Thus destroying a small amount of HFC-23 can earn a large amount of carbon credits. Most of the largest CDM projects registered are for HFC destruction.

Cookware coated with DuPont(TM) Teflon® non-stick makes life easier in the kitchen. *DuPont Photo*

Offset projects based on the destruction of halocarbons such as HFC-23 have sustained numerous criticisms, including a project run by a DuPont production facility in Kentucky, with offsets offered by Natsource LLC. Natsource is selling the offsets for $\$4/tCO_2e$, but the equipment required to destroy HFC-23 is relatively cheap. To date DuPont has declined to reveal its earnings from the project. It has been suggested that these projects actually result in a perverse incentive, due to the sheer volume of offsets, and profits, that they generate, for more ozone-depleting gases to be created. In addition, the price of offsets from these projects is very low, due to the high global warming potential of the gas, so they tend to flood the market to the detriment of other offset projects, such as solar and wind.

FORESTRY

The carbon sequestering capacity of forests has made forestry projects popular for use as carbon offsets. They have a number of advantages:

- Land use change causes 20-25% of GHG emissions, so it is helpful if mitigation projects address land use and deforestation;
- Forestry projects can also have additional socio-economic and environmental benefits, such as biodiversity conservation and employment opportunities;
- Some forestry projects may provide the only means for the very poor, particularly in Africa, to access the carbon markets.

However, there are concerns about the extent trees can be used to offset carbon emissions. In general, trees in tropical regions are regarded as better at storing carbon than trees in temperate forests, because they grow faster. Trees have to grow to maturity, which may take 70 years or more, in order to store the carbon, and there are concerns about how this can be ensured, and what happens to the trees on reaching maturity. If trees burn down, are cut down or die, there needs to be a strategy to ensure they are replaced. Another issue with forest preservation is 'leakage'. This is about whether preserving a forest in one place simply displaces loggers who move on and fell another parcel, negating the environmental benefit. In addition, it is difficult to measure accurately the carbon sequestered by trees. And there can be negative environmental effects and displacement of local populations caused by large mono-culture plantation projects.

In some carbon sink forestry projects carbon reductions for the next 100 years are sold before they actually occur. This practice carries a risk. It is defended on the basis that most of the costs of a forestry project are incurred in the early years so the offsets need to be sold before the carbon has been stored for economic reasons. Good screening and monitoring should reduce the risk of project failure.

Some offset providers (e.g. Future Forests, now called the Carbon Neutral Company) have sold offsets from tree planting projects in the UK that were already subsidised by government grants, which has led to questions about the financial additionality of the project. The counter-argument is that the government grants do not cover the full costs of tree planting. It is also argued that most projects do not depend solely on carbon to fund all their costs. For example, renewable energy offset projects generate revenue from both the carbon credits and from the sale of electricity.

As a result of these concerns, the share of forestry projects in the CDM market has shrunk dramatically in recent years. The EU ETS does not permit emissions reduction credits from forestry sink projects to be used to meet emissions targets in Phase 1 of the scheme.

OFFSET PROJECTS AND THEIR QUALITY RANKING

Most sectors can generate both high and low quality offsets. Thus, it is almost always useful to review projects individually (Trexler Climate and Energy Services, 2007).

An example of a top quality project is the capture and flaring of methane, where generating offsets is the only motivation for the project and there is no ambiguity about additionality. Such projects can be accurately quantified and verified in terms of the amount of methane being flared and the ownership of the reductions.

A high quality project could be one that avoids the production of methane from animal manure at farms that clearly lack the information or the capital to install the needed equipment, even if the project might appear economically worthwhile for the farmer. In this instance overcoming key barriers, both informational and financial, is the source of the project's quality. There are some challenges with this project: some anaerobic digesters make economic and environmental sense and are happening anyway, making it difficult to differentiate between additional and business-as-usual projects; and it can be difficult to estimate the baseline methane emissions from existing manure piles or settling ponds.

Paying for the installation of more efficient light bulbs or motors to reduce energy consumption and GHG emissions is an example of a medium quality project. Many factors affect decision-making about equipment and efficiency upgrades, including energy prices, discount rates and the availability of more efficient technologies. It can be difficult to differentiate between efficiency measures that would have been pursued anyway and those that occur because of the carbon offset market. Energy efficiency based reductions can also pose ownership issues as the emissions reductions occur at a power plant, not where the light bulbs are installed. This means that the reductions may be double counted.

Low quality projects include those where people are paid for practices in which they are already engaged. For example, farmers may be paid to maintain their existing no-till agricultural practices.

STANDARDS

As has been illustrated in the previous section, there are some concerns about carbon offset projects. To allay these concerns, a number of bodies have developed standards. Some of the principles of the Kyoto Protocol are included in these standards, such as additionality and third party verification, to ensure that they are genuine. The two main standards are the 'Gold Standard' which is endorsed by numerous environmental charities and the Voluntary Carbon Standard which is being developed by the International Emissions Trading Association (IETA), The Climate Group and the World Economic Forum. However, market acceptance of these standards is still limited.

In addition to standards, having the emissions credits entered in a registry helps to guard against any possibility of double counting. The Bank of New York operates a registry for carbon credits and the emerging voluntary standards will also use a registry in the future.

GOLD STANDARD

The Gold Standard
Premium quality carbon credits

The Gold Standard is an international standard for carbon offsets that was developed as part of the CDM to distinguish high quality offsets. It ensures that key environmental criteria have been met by the projects that carry its label. Offsets from energy efficiency and renewable energy projects may qualify for the Gold Standard, as they encourage a shift away from fossil fuels and have an inherently low environmental risk. Tree planting projects are excluded. Gold Standard certification is limited to projects that have received approval through the CDM process. All Gold Standard projects are independently verified by a third party to ensure integrity.

A voluntary market version of the Gold Standard has been developed for projects that are not part of the CDM. Again, it is restricted to renewable and energy efficiency projects. The voluntary standard seeks to apply a standard of review similar to the CDM version.

UK CODE OF BEST PRACTICE

A Code of Best Practice for Carbon Offsetting is being introduced in the UK. Initially, the Code will be based on the use of certified credits from the established Kyoto market, through sources such as the CDM. To date (May2007) only four out of the many carbon offset schemes being offered to the general public comply with the requirements of the Code. The four are PURE - the Clean Planet Trust, Global Cool, Equiclimate and Carbon Offsets, which all offer Certified Emission Reduction (CER) credits for their offsetting products.

An unregulated market currently supplies most offsets and is less expensive: The UK Department of the Environment (DEFRA) estimates that the right to emit 1 tonne CO_2 costs roughly £8 ($16) on an unregulated market, compared with £17 of UN-type carbon credits. UK officials say unregulated markets will not qualify for the new scheme because they cannot guarantee a standard. The UK code of practice proposes that offset providers supply consumers with clear information and transparent prices. DEFRA plans to support the standard by providing guidance to consumers on offsetting.

VOLUNTARY CARBON STANDARD

The Voluntary Carbon Standard (VCS) is a new standard proposed by The Climate Group and the IETA for carbon offsets bought and sold in the voluntary market. It is still under development (May 2007). It hopes to ensure that all project-based voluntary emission reductions that are independently verified to meet its criteria, defined as Voluntary Carbon Units (VCUs) represent real, quantifiable, additional and permanent project-based emission reductions. The VCS will provide the protocol and criteria to certification entities and emission reduction project developers on the specifications for creating, verifying and registering VCUs. The framework will be guided by a Climate Disclosure Standards Board (CDSB). A number of offset providers and travel companies who want to offer their customers offsets in line with the Code of Best Practice have expressed their support. A number of City firms including Man Group plc, Grant Thornton and Every Investor, all donors to PURE, would use the standard, by using CERs themselves for their offsets and also by offering them to employees and possibly their clients.

OTHER STANDARDS

A group called the Climate, Community and Biodiversity Alliance, convened by the Center for Environmental Leadership in Business, has developed a Gold Standard equivalent for Land Use, Land Use Change and Forestry (LULUCF) projects, called the Climate, Community and Biodiversity Standards. LULUCF projects include reforestation, conservation, agroforestry and bioenergy projects growing wood for fuel. The initiative aims to encourage the development of projects that have biodiversity and community benefits. Projects must satisfy 15 criteria to be accepted, and they are evaluated by independent auditors.

In the USA the closest thing to a consumer 'stamp of approval' is the Environmental Defense (ED) Fund's Fight Global Warming website (www.fightglobalwarming.org) where consumers are pointed to a small number of carbon offset projects from which they can purchase offsets. These offset projects (but not the providers themselves) have gone through an informal quality review by ED's sister organisation, the Environmental Resources Trust.

At the Carbon Expo in May 2007, TÛV SÛD, an established verifier in the carbon market, announced their new standard for voluntary carbon credits, VER+, for verified emissions reductions. This new standard is linked to the CDM. TÛV SÛD also launched BlueRegistry as a platform for managing verified emissions and green certificates. The registry will be a transparent, internet-based system designed to accept credits from programmes such as the Chicago Climate Exchange (CCX) or the Voluntary Carbon Standard, along with VER+ certified credits.

The majority of retail providers adopt self developed standards and verification procedures, which are difficult to judge, and are audited either internally or by a third party.

MARKETS AND CURRENCIES

The main formal offset market is that established by the Kyoto Protocol and CDM.

The CDM established greenhouse gas trading between developing countries (those without emissions reduction targets) and industrialised countries (those with emissions reduction targets). The Kyoto Protocol runs from 2008 to 2012. Other markets include the EU Emissions Trading Scheme (EU ETS), and the New South Wales GHG Abatement Scheme in Australia.

EU ETS

The EU ETS is an EU-wide pilot scheme which aims to help EU nations meet Kyoto targets, and allows credit from CDM and JI projects to be imported into the market. The first phase runs from 2005-2007. Phase 1 demonstrated that a carbon price signal in Europe succeeded in stimulating emissions abatement both within Europe and in developing countries. However, it was evident that the 2005-07 emissions cap had not been set at an appropriate level relative to actual emissions in that period, which led to volatility in the market. According to the EC Commission, Phase1 was 'a learning phase' and it assured the market that Phase 2 plans would be assessed 'in a manner that ensures a correct and consistent application of the criteria in the Directive and sufficient scarcity of allowances in the EU ETS'. There is a consensus emerging that the expected shortfall in Phase 2 of the EU ETS is likely to be in the range of 0.9 - 1.5 billion tCO_2e. The prospect of a Phase 3 and the ability to bank allowances across the second and third time periods gives a longer time planning horizon for market players.

NEW SOUTH WALES GHG ABATEMENT SCHEME

The New South Wales GHG Abatement scheme (2003-12) in Australia is regulated by the state of New South Wales. It creates emissions benchmarks for electricity retailers.

UK ETS

In the UK there was a voluntary ETS created to give participants experience in carbon trading. Companies joined in exchange for a 90% discount on their climate change levy. There were only 38 participants. The trading units were allowances in tCO_2e. In 2004, only 524,000 tCO_2e were traded. In the first quarter of 2005 the market shrank to 107,000 tCO_2e. Prices ranged from £1.68-£3.80. Over the lifetime of the scheme (2002-2006) 11.8 $MtCO_2e$ emissions releases were avoided. The scheme was superseded by the EU ETS.

The volume and value of each market is shown in Table 1.

Table 1 Volume and value of the carbon market in 2005-06 (Capoor and Ambrosi, 2007)

	2005		2006	
	Volume ($MtCO_{2e}$)	Value (MUS$)	Volume ($MtCO_{2e}$	Value (MUS$)
Allowances				
EU ETS	321	7 908	1 101	24 357
New South Wales	6	59	20	225
Chicago Climate Exchange	1	3	10	38
UKETS	0	1	Na	Na
Sub Total	328	7 971	1 131	24 620
Project-based transactions				
Primary CDM	341	2 417	450	4 813
Secondary CDM	10	221	25	444
JI	11	68	16	141
Other compliance	20	187	17	79
Sub Total	382	2 894	508	5 477
TOTAL	710	10 864	1 639	30 098

CHICAGO CLIMATE EXCHANGE (CCX)

The table also gives information on the Chicago Climate Exchange (CCX) which operates a voluntary GHG cap-and-trade programme in the USA. It is a pilot programme for members to gain experience and to test how a domestic GHG cap-and-trade system might function. A small fraction of the CCX market consists of project-based reductions. Recently it has branched out into Europe and other countries.

The CCX is open to municipalities, businesses, universities, and others who commit contractually to reduce their GHG emissions relative to their historic baseline. Members can purchase the CCX's own fungible commodity, Carbon Financial Instruments (CFIs) to help meet their emission targets. CFIs are created when members reduce emissions more than required and can then sell the excess to other members. CFIs can also be created by external emissions reduction projects that have been approved by the CCX. Currently, CFIs are entering the retail offsets market as carbon offsets from two sources:

- Corporate over-compliance. As the CCX is essentially a voluntary programme, it has tended to attract companies that are already on an emissions reduction path, or which can move onto that path relatively easily. The result is that CCX member companies have over-complied with their targets.

- External reductions. The CCX allows offsets from external projects to be registered and sold into the CCX as CFIs. The CCX offset protocols, however, are not publicly available. As a result it is difficult to judge the quality of CCX project-based reductions.

Although CFIs are legitimate commodities in their own right, they do not correspond to carbon offsets in terms of the qualifying criteria. It is likely that moving CFIs and RECs into the retail offset market would undercut the environmental integrity of the market and disrupt the ability of the market to deliver carbon neutrality.

CURRENCIES

Companies have two choices when purchasing emissions credits to offset their emissions: the regulated or 'compliance' market under the CDM of the Kyoto Protocol or the EU Emission Trading Scheme (EU-ETS), and the voluntary, unregulated market.

The CDM uses the currency of Certified Emissions Reductions (CERs). A CER is a tradable certificate that reflects the reduction or avoidance of one tonne of CO_2e. Buying CERs through the CDM is more expensive than buying them on the voluntary market, but ensures that the emissions reductions satisfy stringent criteria. However, some companies prefer the voluntary market as less money goes on administration fees this way. The UN bureaucracy also means that small projects are less likely to gain CDM approval as the owners may not be able to afford the fees. For example, the company Silverjet chose the voluntary market for their offset scheme, as they were concerned about the administration costs under the Kyoto Protocol.

Renewable Energy Certificates (RECs) represent the environmental attributes of 1 MWh of electricity from a renewable energy source. RECs can be used to satisfy regulatory mandates (such as renewable portfolio standards) or to supply voluntary green energy markets. The use of RECs as the equivalent of carbon offsets represents a direct claim to the emission reductions resulting from renewable energy generation. However, the linkages between (voluntary) RECs and CO_2 emission reductions are not necessarily straight forward. For example, RECs cannot be assumed to be additional to business-as- usual. A renewable energy project can qualify for REC generation if it was built after 1997 and the REC is not already being used to satisfy a mandatory renewable portfolio standard. To qualify as a carbon offset requires more. However, if a project can satisfy REC criteria as well as GHG additionality requirements, the project has the option of selling its environmental benefits either as RECs onto the REC market, or as carbon offsets onto that market. RECs and GHG offsets both have important and complementary roles to play in carbon neutrality efforts. However, RECs and carbon offsets are fundamentally different environmental commodities, subject to different qualification criteria that prevent them from being mixed and matched.

A White Tag is a certificate equivalent to 1 MWh of energy savings. White tags have the goal of turning energy efficiency into a commodity, much as RECs have done for renewable energy generation.

Some retail offset suppliers sell other commodities as CO_2 offsets, without necessarily clarifying for consumers what they are buying. This sometimes occurs in the sale of renewable energy certificates (RECs). The CCX Carbon Financial Instruments are also used in this way, and energy efficiency credits, or white tags, are likely to become more common. However, these commodities arose in different markets and contexts, and generally are not expected to meet the same criteria as carbon offsets, particularly with respect to additionality. Thus, often they do not reflect a comparable environmental commodity in helping a consumer achieve carbon neutrality.

VALUE OF CREDITS

The costs of emissions credits on the voluntary market vary widely, from a few dollars per tonne of carbon to $20 or more. Carbon neutral websites sell offsets that range from $5-25/t, averaging about $10/t. Price competition in the retail offsets market is starting to develop. However, while there is no necessary causal link between the cost of producing a carbon offset and its quality, there probably is a general correlation between price and quality in the retail offset market.

SIZE OF THE MARKET

Although the voluntary carbon offsets market has grown steadily in recent years, as measured by the number of transactions and market value, it is still quite small compared to the market for project offsets that companies can use for compliance purposes under the Kyoto Protocol. In May 2007, the World Bank released its latest analysis of the carbon market. According to the report, the carbon market grew in value to an estimated US$30 billion (€23 billion) in 2006, three times greater than the previous year. The market was dominated by the trade in European Union Allowances (EUAs) from the EU ETS, at a value of nearly $25 billion (€19 billion). The voluntary market for reductions also grew strongly to an estimated $100 million (€80 million) in 2006. The World Bank estimated that in 2005 the market for voluntary carbon offsets made up less than 10 million tonnes (Mt) of CO_2e, or less than 1% of global carbon market transactions and less than 1% of the total market value of US$11 million (Capoor and Ambrosi, 2007).

In the past year, the New South Wales market more than doubled in value and the CCX leapt from a value of $3 million in 2005 to an estimated $38 million in 2006. For the first time, the World Bank made a conservative estimate of the value of the voluntary carbon market at $100 million, excluding the CCX. The inclusion of the value of voluntary markets in the World Bank report is one indicator of their growing relevance to the business and development communities.

The carbon market and associated emerging markets for clean technology and commodities have attracted a significant response from the capital markets and from experienced investors, including those in the USA. Analysts estimated that US$11.8 billion (€9 billion) had been invested in 58 carbon funds as of March 2007, compared to US$4.6 billion (€3.7 billion) in 40

funds as of May 2006. Fifty per cent of all capital driven to the carbon value chain is managed from the UK.

The market is experiencing significant growth as companies not subject to caps on carbon emissions decide voluntarily to offset some or all of their emissions from a variety of sources directly or indirectly related to their business activities. ICF International forecast a global demand of around 400 $MtCO_2e$ by 2010 in the market for voluntary carbon offsets. However, a variety of obstacles could impede the market's future growth.

If the voluntary carbon market is to continue growing fast, it must address the significant persistent challenges of credibility, fragmentation and overlap with the mandatory carbon emissions market. Standards are starting to emerge for projects and their verification, which indicate that the voluntary market is beginning to mature. However, it will have to adapt to develop and maintain environmental credibility.

There are a diversity of market drivers among offset buyers, including reputation, experience and principle. Some companies not subject to caps are low emitters and face inherently high costs of reducing emissions, but nevertheless wish to build a reputation for environmental stewardship and are choosing offsetting as one of the components in their climate strategy. Others recognise that participating in voluntary carbon markets is excellent preparation for future life under a mandatory cap-and-trade system. Some companies that have begun to use offsets are doing so based on the principle that it is a means of sharing the responsibility for managing emissions between producers and consumers.

Retail offset providers have a number of challenges in supplying credible, cost-effective offsets to the market. This is illustrated by the following two characteristics of the market:

- Carbon neutrality is usually sold on a year-to-year basis. There is no guarantee that any given offset purchaser will continue to purchase offsets in the future, and few consumers are willing to purchase carbon neutrality for multiple years up front.
- Offset projects generally result in a stream of emissions reductions over the life of a project. Such a multi-year credit stream usually makes an 'additional' project's reductions cost-effective. If a project's entire cost has to be covered by just the first year of offset revenues, those offsets can look very expensive to the consumer.

Thus it is difficult to find cost-effective quality offsets on a year-to-year basis. The sale of future reductions creates the risk that the anticipated offsets never actually occur. Projects can fail for any number of reasons. Offset providers may want to deal with this risk by either discounting these offsets to account for future project and delivery risk, or 'self-insure' their portfolios by purchasing more offsets that they are actually committing to deliver.

HOW OFFSETS ARE BOUGHT

1. Decide what to offset

In general companies select first a discrete element of their operations to offset, such as emissions from a key facility, staff travel, or a conference or event. Once this goal is achieved and a degree of competence and confidence is gained, they may expand their efforts.

2. Choose the offset project

Multiple options exist within each type of offset project. The emission of CO_2 may be prevented by improving the efficiency of energy supplier equipment, switching to lower carbon fuels, or preventing deforestation for example. If the company has signed up to a measuring and reporting initiative, it may have guidelines that encourage certain types of offset project more than others.

3. Choose the offset partner

Key issues to consider include a potential partner's reputation and experience, the partner's ability not only to run a project but to account for its impacts, and its ability to obtain third-party certification for the project. Companies must decide between a for-profit or non-profit partner. The for-profit partners tend to offer more flexibility, in that they have the ability to invest in a broader portfolio of projects, while the non-profit outfits tend to offer a strong and direct link that can ensure the success of a project. The choice must also be made between a domestic and international project. Domestic projects may be simpler to manage, while international ones may be less costly.

OFFSET PROVIDERS

Many organisations including NGOs, non-profit and for-profit outfits, have developed expertise in the provision of offsets and in assisting organisations in building offset portfolios. Trexler Climate + Energy Services (TC+ES) rated 30 companies on seven criteria using a 1-10 scale. The criteria included such things as the quality of the offsets, the providers' transparency in explaining how they spend their money, how well the providers understood the technical aspects of offsets, the priority each assigned to educating consumers, and their use of third-party project protocols and certification. TC+ES rated eight offset providers as 'top performing' (in alphabetical order):

1) AgCert/Drive Green (Ireland)
2) AtmosFair (Germany)
3) CarbonNeutral Company (UK)
4) Climate Care (UK)
5) Climate Trust (USA)
6) CO_2 Balance (UK)
7) Native Energy (USA)
8) Sustainable Travel/My Climate (USA)

In this section some of the main organisations that supply carbon offsets are described.

AGCERT INTERNATIONAL

The Toyota Prius hybrid. Image courtesy of Toyota

AgCert International is based in Dublin, Ireland and is a major supplier of CERs into the international carbon market, based largely on anaerobic digestion projects in Brazil, Mexico, Argentina and Chile. It has a DrivingGreen programme, through which it has begun selling retail offsets online. The DrivingGreen programme focuses on educating consumers about the USA transportation sector's share of GHG emissions and what consumers can do to reduce their GHG footprints, for example by driving a hybrid fuel car, or using a bicycle more.

ATMOSFAIR

Atmosfair is based in Bonn, Germany and sells emission offsets for air travel that can be purchased as certificates through a travel agent or on its website. Listed offset projects include electricity generated from waste at the University of Rio, Brazil, solar heaters for school kitchens and temples in India and solar electricity and heating in South Africa.

Atmosfair's offset projects are approved through the CDM and all their projects meet the Gold Standard.

CLIMATE CARE

Climate Care is based in Oxford, UK. It focuses on retail offset projects that involve small-scale renewable energy and energy efficiency projects in developing countries with little access to capital. The company has sold more than 350,000 t of offsets; 20% of the reductions are based on reforestation projects. Climate Care addresses additionality in its project selection criteria and implementation procedures. Its portfolio excludes RECs or pooled credits from central registries in order to promote additionality, and it only funds 'future tonnes' as opposed to projects that may already exist. Transparency is promoted through the annual reports. It promotes the Gold Standard and states that it intends to participate in a registry that will avoid the double selling of tonnes. Climate Care has a website that provides access to illustrative case studies and a list of company participants, divided into three groups: purchases for sale to consumers; purchases to cover all or part of ongoing operations; and occasional purchases.

THE CARBONNEUTRAL COMPANY

The CarbonNeutral Company was formerly known as Future Forests and is based in London. It specialises in small-scale renewable energy projects, landfill gas collection, and energy efficiency. It has contracted for more than 800,000 t of offsets, and its portfolio consists of approximately 20% forestry-based reductions. It certifies businesses, events and individuals as carbon neutral using its own CarbonNeutral Protocol. The company addresses additionality by requiring that a minimum of 10% of a project's total capital funding must come from the sale of carbon offsets. However, the 10% test is not necessarily a particularly reliable measure of additionality.

CLIMATE NEUTRAL NETWORK

This is an alliance of companies and other organisations that are committed to developing products and enterprises that eliminate their climate impacts. The group offers assistance in building a portfolio of offset investments. The Network has created the Climate Cool certification, whereby whole enterprises, projects or services can obtain the label by reducing emissions internally and then offset the rest.

THE CLIMATE TRUST

The Climate Trust was set up in 1997 in Portland, Oregon, USA to administer funds from utilities mandated by Oregon state law to offset the impact of new projects. The main function of the Trust is to procure emissions reductions with funding provided by power plant developers. To date (May 2007) the Trust has contracted for 18 projects, worth $8.9 million, that will offset more than 2.7 $MtCO_2$. The project portfolio includes:

- restoring and protecting over 4,000 acres (1,620 ha) of forest
- saving residents and businesses over $40 million in energy savings
- generating over 37 million kWh of GHG free electricity
- saving consumers $35 million in gasoline.

Through these activities, the Climate Trust has developed a portfolio that is made available to the retail offset market. The Trust has the advantage of economies of scale, given its role in partially offsetting the emissions of new power plants under Oregon's CO_2 standard. The Trust provides specific information for each of its offset projects, including the GHG benefits anticipated over the project lifetime. The Climate Trust does not sell existing RECs or pooled emission credits. The Trust also runs a partnership programme to provide businesses with offset expertise gained through its work with local utilities.

CO_2BALANCE

CO_2balance was founded in 2003 in Somerset, UK, to help individuals and businesses to offset their carbon footprint through energy efficiency and forestry projects. It has supported three energy efficiency projects in Africa and three forestry projects in the UK, and is developing two forestry projects in France. It owns the land on which the trees are planted and conveys ownership to charitable organisations when the planting is complete. It aims to harvest the trees before they die and utilise the timber in long-term uses such as construction projects, to lock up the carbon.

EQUICLIMATE

Equiclimate is a UK based carbon offsetting service. It calculates the carbon footprint of an individual or organisation, and the amount to be offset. Then it enters the EU ETS and buys the equivalent CO_2 allowances. The bought allowances are then retired and permanently removed from the market. As a result, the overall limit on UK CO_2 emissions is reduced.

NATIVEENERGY

NativeEnergy in Charlotte, Vermont, USA, focuses on the development of new renewable energy projects that benefit Native Americans, family farmers and municipalities. The company has sold several hundred thousand tonnes of offsets, aggregating carbon offset and REC funding to fund the early stage development of small renewable energy projects that would not proceed

without the carbon offset funding. NativeEnergy also runs a CoolWatts programme which sells RECs that do not make CO_2 reduction claims. Thus it differentiates between the two commodities of RECs and offsets.

PURE – THE CLEAN PLANET TRUST

PURE supports the Malavalli power plant in India, which was the first Gold Standard project to have its CERs issued. It generates renewable electricity from crop waste such as coconut fronds and sugar cane trash. It reduces emissions by about 20,000 tCO_2/y, and has created about 500 jobs, while supplying electricity for around 10,000 people in 47 villages. PURE has also bought and retired carbon credits from projects not included in the UK government's proposed Code of Best Practice for carbon offsetting. It no longer accepts donations for this purpose.

SUSTAINABLE TRAVEL INTERNATIONAL

Sustainable Travel International is based in Boulder, Colorado, USA. It is the exclusive North American distributor of retail and wholesale offsets for MyClimate, based in Zurich, Switzerland. It states that offset funding is used specifically for the development of renewable and energy efficiency projects in developing countries. It claims to have contracted for nearly 6 Mt for the period 2007-2012.

WORLD BANK COMMUNITY DEVELOPMENT CARBON FUND

The Fund links small-scale carbon projects with companies looking to fund offset projects. The fund became operational in July 2003 and is currently reviewing potential projects in developing countries and poor communities.

OFFSET PURCHASERS

Various organisations that are using offsets to reduce their carbon footprint are profiled in this section.

AVIVA

Aviva announced in 2006 its intention to become the first global insurer to become carbon neutral for its worldwide operation. To achieve this goal, Aviva has:

- calculated its 2006 CO_2 emissions
- researched the best way to attain carbon neutrality, reflecting Aviva's needs and values
- researched carbon market opportunities
- reviewed projects proposed by carbon brokers and
- started building the carbon offset process for subsequent years.

Aviva calculated its emissions to be125,400 t for 2006 and added a 5% margin for error. The company has chosen projects from Climate Care and CarbonAided to offset its emissions. The projects are in Africa and countries where Aviva operates, with a balance between commercial and social projects. They include 'green' cement production in the Netherlands and Ireland, a biogas project in Sri Lanka, providing more efficient wood- burning stoves in Africa, treadle pumps for irrigation in rural India and wind turbines in India and China.

BP

Road transport accounts for 22% of Britain's CO_2 emissions. As part of its response to this figure, BP has launched a 'targetneutral' initiative to encourage motorists to neutralise CO_2 emissions from their vehicles. Under the voluntary scheme, drivers can go to the targetneutral website to calculate the cost of the annual CO_2 reduction needed to make their car CO_2 neutral. An average car, driven 10,000 miles a year, generates about 4 tCO_2. According to BP, it costs about £20 a year to neutralise that amount of CO_2. The money paid towards targetneutral goes towards five renewable energy projects, four in India and one in Mexico.

HSBC

On 6 December 2004, HSBC made a commitment to become the world's first major bank to achieve carbon neutrality by 2006. HSBC has a three phase Carbon Management Plan. The first phase is to manage and reduce their direct emissions. The second phase is to reduce the carbon intensity of the electricity they use by buying 'green electricity'. The third phase is to offset the remaining emissions in order to achieve carbon neutrality.

Group-wide emission reduction targets, announced in July 2005, commit HSBC to reducing its CO_2 emissions by 5% by 2007. Implementation of the plan is co-ordinated by their Carbon Management task Force which is advised by The Climate Group and ICF Consulting.

As a 'dry run', HSBC offset its Group-wide emissions for the last quarter of 2005. To offset the total emissions (about 170,000 tCO_2), HSBC bought 170,000 t of carbon offset credits from four offset projects around the world. HSBC is unusual in that it has not used intermediaries to establish the projects, but has set them up itself. The projects are a wind farm in North Island, New Zealand (125,000 tC), organic waste composting in Victoria, Australia (15,000 tC), capture of agricultural methane, in Sandbeiendorf, Germany (14,000 tC), and Vensa Biotek biomass co-generation in Andhra Pradesh, India (16,000 tC).

NIKE AND DELTA AIRLINES

Nike and Delta Airlines set up a fund with the Oregon Climate Trust to offset the emissions generated by Nike employee travel. The Trust will invest in an expanding portfolio of offset projects, including co-generation of electricity at industrial sites, building and transportation efficiency, and improvements to low greenhouse gas construction materials.

SILVERJET

Silverjet is a British business class airline that was launched in January 2007. It includes in the price of a ticket, which is typically £999 for a return trip from London to New York, a mandatory carbon offset contribution. The scheme has been set up in conjunction with the CarbonNeutral Company. The scheme has supported a project in India which replaces inefficient kerosene burners with solar panels.

DISCUSSION

This report has shown how the voluntary carbon offset market works and why and how it needs to develop. The number of organisations providing offsets is growing rapidly, as is the number of companies using offsets as part of their environmental policy. Some of these organisations and projects have been described.

Emissions offsetting is a widely used tool that is likely to gain momentum. It can be done in multiple ways and venues, so it provides an opportunity for companies to pursue independent reduction goals in ways that are meaningful to the company, its core business, and its key stakeholders.

Offsetting has the advantage of enabling organisations to look further for cost-effective ways to reduce their emissions of greenhouse gases. However, many of the internationally recognised mechanisms and rules that allow companies to count specific offsets are still being developed. There are particular challenges for sequestration projects about how to quantify the offsets and how to create assurances that carbon will be sequestered for sufficiently long time periods.

Offsetting should never be the first step in any carbon-neutral strategy. Instead, companies should seek to reduce their impact on the climate by wasting less energy and by examining their industrial processes to see if they can be made more efficient or less carbon-intensive. An energy audit assists with finding efficiency savings. Companies should only offset those emissions they cannot eliminate.

Although the retail offsets market has expanded, the information available from retail providers has not kept pace. Consumers often do not find the information they need to make effective choices among retail offset suppliers. A clear quality standard for offsets, in needed together with a reliable provider certification process and effective disclosure and verification protocols.

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IEA Greenhouse Gas R&D Programme
Orchard Business Centre, Stoke Orchard,
Cheltenham, Glos. GL52 7RZ, UK.

Tel: +44 1242 680753 mail@ieaghg.org
Fax: +44 1242 680758 www.ieagreen.org.uk