Navigating a Nebula:[1]
Institutional Use of the United States' Voluntary Carbon Market

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Master's Thesis

May 18, 2006

[1] An evolving star forming region defined by *Dictionary.com* as, "A diffuse mass of interstellar dust or gas or both, visible as luminous patches or areas of darkness…."

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EXECUTIVE SUMMARY

Institutions voluntarily purchasing carbon offsets in the United States face a fragmented market, a complex supply chain, and a lack of consistent standards. To navigate this diffuse, rapidly changing marketplace, institutions need both to collect information about the market and to understand their goals in purchasing offsets.

This paper attempts to assist institutions in navigating this voluntary market 'nebula' by pulling together key background information, the viewpoints shaping the market, advantages and disadvantages of various offset sources, as well as insights into evolving certification programs.

Section I is an introduction to institutions currently purchasing credits in the voluntary market and motivations behind these purchases. Section II presents important concepts and terms, the regulatory context, major categories of suppliers and an overview of prices in the U.S. voluntary market. Section III outlines the major differences, such as project size, location, and type between the sources of carbon credits. Section IV is an introduction to the voluntary standards/ certification programs available in the U.S. market. Section V explores key steps to consider and decision criteria institutions can use when deciding what type of offsets to purchase. Section VI provides two case studies of institutional purchases of carbon offsets.

I. INTRODUCTION: CARBON (SELF) CONSTRAINT

In October 2005, Yale University committed to a reduction in its greenhouse gas (GHG) emissions by 10% below 1990 levels by the year 2020. The first priority was to reduce the school's emissions via investment in energy conservation and alternate energy sources. However, Yale's Energy Task Force was also considering purchasing carbon offsets from the voluntary market as one aspect of its GHG mitigation plan. Venturing into the voluntary carbon market, the first question for Yale was how to purchase carbon credits. At first glance, this question and potential answers seem relatively simple. Already the university had made some efforts at offsetting its energy use. In the spring of 2006, in response to student interest and energy conservation accomplishments, Yale purchased renewable energy credits (RECs) for the undergraduate dorms.

Like regulated or certified RECs, or sulfur dioxide (SO_2) pollution credits, carbon offsets can be considered a commodity. However, at the broadest level of the U.S. voluntary carbon market, the definition of what exactly a 'carbon credit' commodity is has yet to be agreed upon. Like the regulated carbon market (further discussed in Section 2.2), the voluntary market is new, quickly evolving, and complex. Unlike the regulated market, as a whole, the voluntary market is without regulation, consistent standards, or widely available impartial information. Moreover, emerging organizations offer offsets from a variety of sources/ project types, prices vary dramatically, the supply chain for carbon offsets is complex and the product highly abstract. Hence, the market operates under the principle of *caveat emptor*, let the buyer beware.

Despite the challenges of such a *caveat emptor* marketplace, Yale's interest in navigating the voluntary carbon market is representative of an example of the growing interest of numerous institutions in voluntarily offsetting their emissions. For example, Yale's interest in offsetting follows in the low carbon footprints of several other universities, such as Tufts University and MIT. However, going "carbon neutral" reaches beyond the perch of ivory towers. Concerned about their GHG emissions, a rapidly increasing number of organizations and individuals are choosing to offset the carbon emissions of

their vehicles, flights, gatherings, and day to day operations utilizing the voluntary carbon offset market. For example, both the Republican and Democratic 2004 Conventions in New York City declared carbon neutrality. The National Football League offset the 2006 Super Bowl in Detroit. Nike has a partnership with Delta Airlines to ensure that carbon credits are included in all employee flights. Ford recently partnered with the retail offset company, Terrapass to offer carbon credits for customers purchasing new vehicles.[2] Marketing terminology to describe this process includes, becoming "climate neutral," "Climate Cool™" "net zero," or "climate friendly."[3] These examples of U.S. based organizations voluntarily offsetting emissions, portray both the heightened public awareness of climate change and the recent rapid growth in the market for voluntary carbon offsets.

Since GHGs are not nationally regulated in the United States, unlike in industrialized (Annex 1) Kyoto signatory countries, these purchases are voluntary, and these institutions are most often purchasing credits from the voluntary carbon offset market. U.S. institutions are usually involved with this market for a variety of often interacting motivations, including preparing for potential regulation or illustrating that industry can voluntarily reduce emissions without regulation, a sense of moral responsibility, reputation, stakeholder concerns/ satisfaction and public relations or marketing benefits.[4] This paper focuses on the perspective of those institutions for which regulation is not the key concern. Such institutions are not regulated under the EU system, and are unlikely to be under a GHG 'cap' in the near future under U.S. regulation.

To 'stay the course' in the voluntary marketplace institutions, purchasing offsets ideally understand the market and have gathered details about the problem and options, actors involved, and the influences affecting the outcomes.[5] Collecting such critical information

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[2] Diploma, Anthony. "Gas Guzzlers Find Price of Forgiveness." *The New York Times.* 22 April 2006.
[3] Trexler, Mark C., Kosloff , Laura H., Silon, Kyle. "Going 'Carbon Neutral': The Retail Carbon Offset Market and How It Can Further Global Warming Mitigation Goals." Draft Version. January, 2006.
[4] Butzengeiger, Sonja. *Report No. 1: Voluntary Compensation of GHG- emissions: Selection criteria and implications for the International Climate Policy System.* HWWI. 2005.
[5] Saaty, Thomas. *What is the analytic hierarchy process?.* Springer-Verlag New York, Inc:

is currently not a simple process for most buyers in the voluntary market. The goal of this paper is to pull together fragmented research on the voluntary market and outline relevant information for institutions seeking to purchase offset credits in the voluntary market.

New York, NY. 1988.

II. THE WILD WEST: OVERVIEW OF THE U.S. VOLUNTARY CARBON MARKET

2.1 The Emissions Market Concept

The term 'carbon market' refers to the buying and selling of carbon trading credits that have been generated by greenhouse gas (GHG) emissions reductions or sequestration projects. Traditional, regulatory-driven emissions markets are created through cap- and-trade schemes, in which the regulatory authority caps the quantity of emissions that participants are permitted to emit and issues an amount of tradable allowance units equal to the cap. Participants who reduce their emissions internally beyond required levels can sell unused allowances to other participants unable to meet their emissions quotas. Actors wishing to reduce the system's total environmental impact can purchase, and *retire,* meaning no longer trade tradable allowance units.

In both the regulatory and voluntary market, GHG emission reductions are traded in *carbon credits*, which represent the reduction of GHGs equal to one metric ton of carbon dioxide (tCO_2e), the most common GHG. For example, the GHG methane is estimated to have a Global Warming Potential (GWP) 23 times higher than CO_2, hence one ton of methane equals about 23 tCO_2e.

GHG emissions reduction credits can be accrued through two different types of transactions. In *project based transactions* emissions credits are the result of a specific carbon offset project. A*llowance based transactions* involve the trading of issued allowances created and allocated by regulators under a cap- and- trade regime. Because the voluntary market inherently does not operate under a universal cap, with the exception of credits purchases under the Chicago Climate Exchange (discussed further in Section 2.5) or retired from a regulatory market, all carbon credits purchased in the voluntary market are project based transactions.

Institutions voluntarily purchasing credits have either set their own cap, such as 10% reductions below 1990 levels, or have set emissions reductions as an important goal and

are utilizing offset purchases to help with the goal. Like in a regulated market, carbon credits ideally allow actors to indirectly reduce emissions with less expense or effort than would be required to reduce the same emissions directly. Institutions claiming to have offset their GHG emissions must retire credits purchased.

2.2 The Regulatory Context

2.21 The Kyoto Context

A total of 163 countries have ratified the Kyoto Protocol, a legally binding agreement under which industrialized countries have agreed to reduce their collective greenhouse gases by 5.4% below 1990 levels by 2012. Under Kyoto, which came into effect in 2005, a multi-national regulated GHG market has evolved. Six GHG are listed under the Kyoto: carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, hydro fluorocarbons and perfluorocarbons.

Using a cap and trade model, three major "flexibility mechanisms" were created under the Kyoto Protocol with the idea of providing more cost effective means of achieving these GHG emission reductions targets. These mechanisms are the basis for the regulated international carbon market.

- Emissions trading: an allowance based transaction system that enables developed countries and countries with economies in transition to purchase carbon credits from other developed countries and economies in transition to fulfill their emissions reductions commitments. The European Union Emission Trading Scheme (EU ETS) involves all EU member states and is the currently the world's largest multi-national, GHG emissions trading scheme.

- Joint Implementation: Allows developed countries to purchase carbon credits via project based transactions, from greenhouse gas reduction projects implemented in another developed country or country with an economy in transition. Emissions from these JI projects are referred to as Emission Reduction Units (ERUs).

- Clean Development Mechanism (CDM): The CDM is another project based transaction system from which industrialized countries can accrue carbon credits by financing carbon reduction projects in developing countries. Carbon offsets originating from registered and approved CDM projects are Certified Emissions Reductions (CERs).

The CDM, the critical link to developing countries under Kyoto, is the most commonly discussed mechanism within the context of the voluntary market. Accepted CDM projects have become a major influence on 'setting the bar' for offset projects in developing countries. CERs and ERUs can also be sold on the voluntary.

2.22 The United States Context

This paper is particularly focuses on the U.S. voluntary market because the only carbon markets in the United States are a regulatory market in Oregon and the voluntary market. The U.S. voluntary carbon market overlaps considerably at almost every level with the international voluntary market. However, there are some unique aspects of the U.S. voluntary market, such as the Chicago Climate Exchange, a voluntary, membership based emissions trading system.

The United States, the highest emitter of GHG in the world, did not ratify Kyoto and does not regulate CO_2, or other Kyoto GHGs as climate change-related pollutants. Having ratified the Montreal Protocol the U.S. does regulate ozone depleting GHGs, such as Chlorofluorocarbons (CFCs). These gases are not part of national or international cap and trade systems, but rather countries are working towards phasing out their use entirely. The United States does have successful cap and trade systems for several of its criteria pollutants, such as for sulfur dioxide (SO_2). The U.S. also has a National Voluntary Reporting Greenhouse Gases Program, established by Section 1605(b) of the Energy Policy Act, which is a public database that "provides a means for organizations and individuals who have reduced their emissions to record their accomplishments and share their ideas for action."[6] Organizations can report direct emissions reductions or offset projects, such as sequestration activities.[7]

To compensate for the lack of national CO_2 regulation, several states have initiated their own regulatory processes, alone or in conjunction with others. In 1997, Oregon enacted

[6] "Voluntary Reporting of Greenhouse Gases." Energy Information Administration website. http://www.eia.doe.gov/oiaf/1605/2nd_broc.html . Viewed: 3 May, 2006

[7] Sampson, Neil. "Issue Paper on Inclusion of Terrestrial Carbon Sequestration Activities in Voluntary GHG registries and Market Trading Programs." EPA Task 4 Working Draft. April 25, 2006.

the Oregon Standard, the first regulation of CO_2 in the United States. The Oregon Standard requires that new power plants built in Oregon reduce their CO_2 emissions 17% below the most efficient combined cycle plant or offset these emissions.[8] Plants may propose specific offset projects or pay mitigation funds to The Climate Trust, a non profit created by the law to implement projects that avoid, sequester or displace CO_2 emissions.[9]

Similar to the national 1605 (b) Voluntary Reporting Program, the state of California created the California Climate Action Registry (CCAR), a non-profit voluntary registry for emissions reductions. Like for the 1609 (b), sequestration activities, but only forestry projects, can be recorded in the registry.

On the East Coast, nine states are developing the Regional Greenhouse Gas Initiative (RGGI), a regional strategy to reduce CO_2 emissions utilizing a cap and trade system. Initially RGGI will focus on reducing CO_2 emissions from power plants, however the program may be extended to include other GHGs and offsets from projects and project based transactions.[10]

2.3 Green (house gas) Washing?

The Yale Center for Environmental Law and Policy conducted two focus groups in March 2006, with the goal of gaining insights into local resident's perceptions of carbon offsets in the voluntary market. After learning about the market, one participant skeptically responded, "So, in essence, buying a carbon offset is equal to a cigarette company building a cancer hospital."[11] This comment reverberates with other criticisms of the concept, especially in the voluntary and retail market. One major concern is that by buying 'atonements' for GHG emissions, institutions and individuals will take their own GHG emissions less seriously or purchasing offsets can be a way to distract from the

[8] "Marketplace." Ecosystem Marketplace website. http://ecosystemmarketplace.com. Viewed: April 26, 2006.
[9] "About Us." The Climate Trust website. http://www.climatetrust.org/ . Viewed: April 26, 2006.
[10] Regional Greenhouse Gas Initiative website. http://www.rggi.org/about.htm. Viewed: 6 April, 2006.
[11] "Environmental Attitudes and Behaviors: Environmental Perceptions and Purchasing Focus Groups." Yale Center for Environmental Law and Policy. 21 March, 2006.

main impacts. For example in early 2005, the international bank HSBC purchased carbon credits to offset the estimated 550,000 tons of GHG resulting from the bank's operations in 2004. Peter Knight, of Context, a London-based corporate responsibility consultancy commented on the bank's effort, "Its real environmental impact is the result of loans it makes to big projects, such as dams, oil exploration and mines… Let's hope the next step will be to deal with its indirect impacts as creatively as it is tackling its own housekeeping."[12] Institutions purchasing offsets should be aware of such concerns.

However, even for the sweater wearing, hybrid driving type eco- conscious institution, completely eliminating GHG emissions resulting from their own operations is not currently an option. Ideally carbon credits are not utilized to offset "Hummer SUV" emissions policies, but instead buyers will purchase carbon credits after they have considered and implemented emissions reductions and are at a point where they can no longer feasibly directly reduce their emissions. Moreover, many see the voluntary carbon market as a means to educate Americans about climate change and GHG producing activities.[13] For example, one organization, The Climate Neutral Company has partnered with a range of celebrities, including Brad Pitt and Cameron Diaz to promote the offset concept. The company's founder Dan Morrell states, "Essentially we are exploiting these actors' popularity to get a critical message to Middle America and to other parts of the world where people still do not understand how serious the climate crisis facing us is." [14]

However, due to lack of standards and the range of carbon credit quality factors, inexpensive, non- additional, or 'business as usual' carbon offsets are easy to claim in the voluntary market. Hence, some offset purchases range significantly in their 'shades of green' and some offsets have more of an environmental impact than others. As non-profits, watch dog groups and consumers become more familiar with the concept, 'greenhouse gas washing' may become more readily identifiable. Until then because of the range of credits being offered, institutions looking for inexpensive but legitimate and

[12] "HSBC Bank to go Carbon Neutral." BBC News. 6 December, 2004, http://news.bbc.co.uk/1/hi/business/4071503.stm .
[13] Trexler, Mark C., Kosloff , Laura H., Silon, Kyle. "Going 'Carbon Neutral': The Retail Carbon Offset Market and How It Can Further Global Warming Mitigation Goals." Draft Version. January, 2006.
[14] Mckie, Robin, "Stardom is a Gas for Brad and Leo." *The Observer*. 23 May, 2004.

credible GHG offsets currently face the risk that their offsets will be irrelevant to actual GHG mitigation efforts. Several standards and registration programs, discussed in Section IV have been developed with the intentional of helping institutions mitigate this risk and their GHG emissions.

2.4 What's in a name? Verified Emission Reduction, Carbon Credit, Greenhouse Gas Offset…

Diagram 1 outlines the various terms used in the voluntary market.

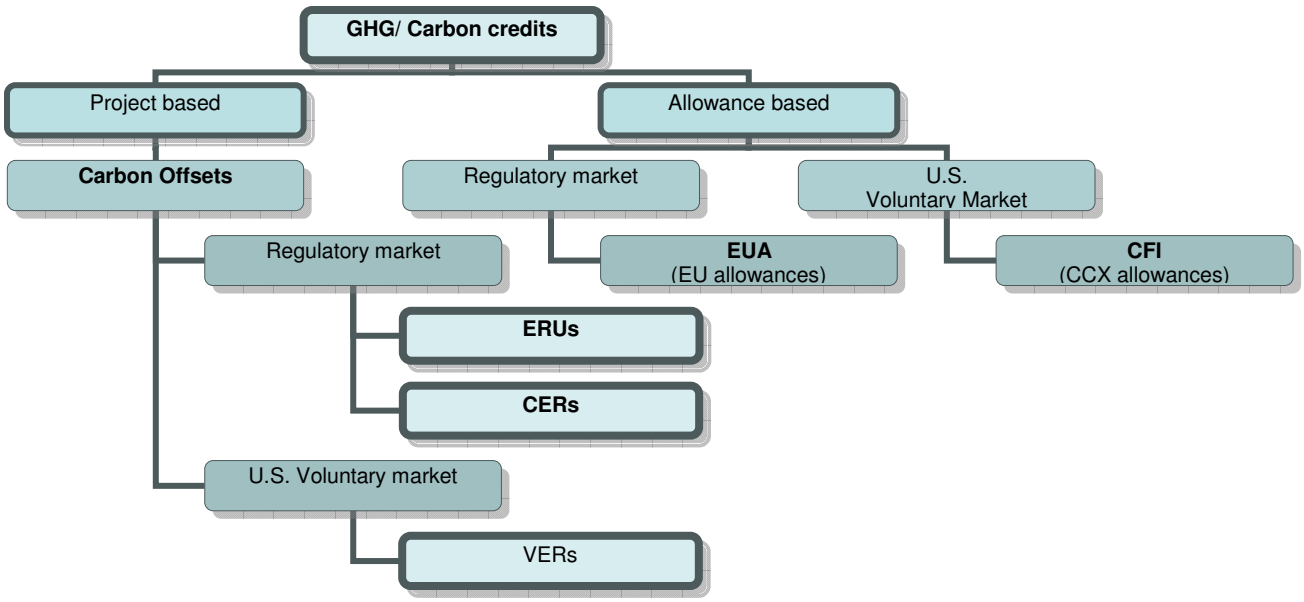

Diagram 1: Carbon Credit Terms and Categories

The terms most frequently used in the voluntary market are carbon credit, carbon offset, CER, and VER. While credits produced from CDM projects are referred to as CERs, credits purchased in the voluntary market are often referred to as *Verified Emissions Reductions* (VERs). These credits (theoretically) have been third party verified, as their name implies. However, they have not been certified by the CDM process.[15] Because there is no overall cap in the voluntary market VERs are also only from projects.

[15] Climate Biz website. http://www.climatebiz.com. Viewed: 6 April, 2006.

Because the voluntary market is so fragmented, no organization has a completely accurate account of the number of VERs traded in the international or US voluntary market, and few publicly available estimations exist.[16],[17],[18] However, the Word Bank estimates that around 140 million VERs were traded from 1998 to 2004 with an average transaction size of 1.2 million tCO_2e.[19] The carbon broker, Point Carbon estimated that carbon trades occurring outside of the Kyoto and EU ETS markets (which includes Oregon CO_2 Standard and the New South Wales GHG Abatement Scheme) were worth more than $60 million in 2004.[20]

According to a study from the Hamburg Institute of International Economics, which surveyed 16 different global retail offset suppliers in 2002, around 94.6% of the offsets sold were VERs, CERs accounted for only 3.7%, and the remainder (1.8%) were ERUs. Since the voluntary market is rapidly growing, such a small survey has become highly dated in the past 4 years. The Katoomba Group Ecosystem Marketplace is in the midst of developing a Voluntary Carbon Marketplace Report, to be released in 2007.[21]

2.5 A Balancing Action: Qualifications of Legitimacy and Quality

In the both the voluntary and regulated carbon markets, policy makers and environmental institutions are investing extensive energy in defining a legitimate carbon offset. For example, due to strict standards and high levels of debate, relatively very few projects have been accepted by the CDM authority, despite a long list of applicants and high demand. Those that have been accepted are not free from controversy. The following issues are key challenges for those working to establish legitimate offsets in both regulated and voluntary markets.

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[16] Butzengeiger, Sonja. *Report No. 1: Voluntary Compensation of GHG- emissions: Selection criteria and implications for the International Climate Policy System. HWWI. 2005.*
[17] Bayon, Ricardo. Managing Director, Ecosystem Marketplace. "A World Beyond Carbon: Other Emerging Environmental Markets." GreenT Forum: Raising the Bar for Voluntary Environmental Credit Markets. New York, New York. 2-3 May, 2006.
[18] *State and Trends of the Carbon Market: 2005*. IETA and World Bank Carbon Finance. 9 May, 2005.
[19] Ibid
[20] "Marketplace" The Katoomba Group Ecosystem Marketplace website.
[21] Bayon, Ricardo. Managing Director, Ecosystem Marketplace. "A World Beyond Carbon: Other Emerging Environmental Markets."

2.51 Additionally.

A major criterion applied to carbon credit projects is that to create "offsets" the reductions in GHG cannot be "business as usual" and hence are additional to a determined baseline. While the concept is simple, the reality of implementation is not. Debates around additionality have been considered pivotal to the integrity of various sources of carbon credits and the market as a whole.[22] While most stakeholders agree that the goal of the market is to reduce total GHG in the atmosphere, the different perspectives on how this is best accomplished are most acutely illustrated in the additionality and 'quality' debates.

An important concept for most additionality requirements is what is considered to be the *baseline***:** the "hypothetical description of what would have most likely occurred in the absence of any considerations about climate change mitigation."[23] In order to establish that a GHG offset project has reduced emissions beyond those expected in the baseline, a variety of "tests" for additionality are used. Five tests are outlined by the World Resources Institute (WRI) /World Business Council for Sustainable (WBCSD) Development Greenhouse Gas Protocol for Project Accounting, a widely accepted standard for project accounting.

- *Investment*: GHG reductions would have not occurred without financing from carbon credits and those funds from GHG reductions were a decisive reason for implementing a project that otherwise would not be an attractive investment.
- *Technology*: The primary benefit of the project technology is to reduce GHG emissions.
- *Regulatory*: The GHG project reduces emissions below the level required by law.
- *Common Practice*: The project reduces GHG emissions more than is the 'common practice' in similar projects
- *Timing*: The GHG project was initiated after a specific date, such as a date after GHG incentives were in place.[24]

[22] Trexler, Mark. "A Statistically Driven Approach to Offset Based GHG Additionality Determinations: What Can We Learn."

[23] *GHG Protocol Initiative: For Project Accounting.* World Business Council for Sustainable Development and World Resources Institute. http://www.ghgprotocol.org . pp. 130

[24] *GHG Protocol Initiative: For Project Accounting.* World Business Council for Sustainable Development and World Resources Institute.

Which tests should be 'The Tests' for legitimacy is debated by stakeholders in the voluntary market. The WRI/ WBCSD Protocol states "setting the stringency of additionality rules involves a balancing act."[25] For example, additionality criteria that are too lenient and lead to a large number of "non additional" credits may undermine the GHG Program's effectiveness. Conversely, overly stringent criteria could place burdensome limitations on creating valid GHG emissions, potentially excluding otherwise worthy and 'additional' project activities.[26]

Because there is no "technically correct" answer to the question of additionality, opinions on the ideal stringency of additionality in the voluntary market range dramatically. Many practitioners argue that additionality is not a critical factor at this stage in the development of carbon markets and that the key goal should be creating financing incentives for reducing GHGs. Some would add that the additionality argument is actually counter productive and that excessive concerns about additionality are reducing the effectiveness of the market by increasing of gridlock on the path to establishing effective trading frameworks and that a benefit of the voluntary market should be an arena where projects can be utilized without passing strict additionality requirements. For example, Toby Janson-Smith, Director of the Climate, Community & Biodiversity Alliance, expressed the opinion that some of the best projects, that generate both offsets and numerous co-benefits, can't pass many of the tests utilized in the market, such as those outlined by WRI/WBCSD.[27]

Others feel that strict adherence to additionality is an essential piece of developing credibility in the market and that strict adherence to additionality is especially important in the voluntary market, where organizations and individuals are trusting that the money they've used to purchase offsets will make a difference in the market. Moreover, proponents of carefully considering additionality, such as Mark Trexler, president of Trexler Climate + Energy Services, note that because the U.S. voluntary market is so

[25] Ibid
[26] Ibid
[27] Janson-Smith, Toby. Director, Climate, Community & Biodiversity Alliance. Personal Interview: 7 May, 2005.

small, it's demand could be met by 'false positive' or non- additional offsets, leaving little incentives for investing in truly additional offsets. If consumers can't tell the difference between offsets, they'll purchase the less expensive choice… "But you can't get real, additional GHG offsets for $1/ ton."[28]

2.52 Accounting and Verification

The term Verified Emissions Reductions embodies the ideal of legitimate third party verification in the voluntary market. To be traded on the GHG market, the benefits of projects ideally are measurable and verifiable. Quantifying and verifying benefits requires significant technical expertise, and monitoring throughout the project life span. Accounting questions include issues such as how many years the project is expected to generate offsets, the 'pay back time' of various technologies (60 kW photovoltaic array must produce electricity for 3.7 years before it is carbon-neutral[29]), and amount of GHG destroyed, displaced or stored.

There are a wide variety of standards, protocols, and verification methods used to establish carbon credits in the voluntary market. Some are self developed by project managers, others are developed by a third party verifier, and others match specific certification standards.

As discussed previously, the wide variety of verification methods, while providing flexibility, also leads to challenges for consumers wishing to purchase carbon credits that they view as "valid" or meeting their needs. Moreover, third party verification varies as much as the offsets themselves. Some organizations, such as the retailer Drive Neutral which purchases all its credits from the Chicago Climate Exchange rests on the laurels of the CCX verification process, described in the CCX rulebook. Others like the Climate Trust, which uses third-party verification but also has its own offset verification requirements, published on its website.

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[28] Trexler, Mark. Personal Interview. 7 May 2006.

[29] Murray, M.E. and Petersen, J.E. (2004). Payback and Currencies of Energy, Carbon Dioxide and Money for a 60kW Photovoltaic Array. Technical Report. Oberlin College. Oberlin, OH.

2.53 Leakage

Connected with additionally is also the issue of "leakage." Leakage occurs when emissions are reduced at one site, or at one point of time, by a project and then increased by another activity outside of the project boundary. For example, if a forestry project limits logging in one area, the possibility that deforestation would simply occur elsewhere should be considered.

2.54 Double Counting

Connected with the question of additionally is the dilemma around *double counting.* Double counting can occur when more than one organization takes credit for owning or retiring offsets. For example, organizations may take credit for direct emissions reductions, such as a company reducing their own use of fossil fuels, or indirect emissions reductions, such as buying renewable energy. When taking credit for indirect emissions reductions it is critical that they have not already been claimed as direct emissions reductions by the energy supplier. Accurate and publicly available inventories can help resolve this problem. For example, direct and indirect emissions should be inventoried and reported separately. In the EU- ETS trading system this issue has been solved by allocating emissions reductions only to direct emitters.

2.55 Co-Benefits

While the primary goal of carbon credits is to offset GHGs, many types of projects provide additional benefits, such as reductions of other pollutants, contributions to local communities, or habitat for biodiversity. Co- benefits range dramatically between project types, but are an important factor for many institutions voluntarily purchasing emissions. For investors co- benefits may also represent additional revenue streams, such as electricity sales, sales of other pollution credits or timber. However, it is important that customers understand which co-benefits have been parceled off and which will remain 'bundled' with the carbon offset. Currently, different attributes of carbon credits are unclear. As the voluntary market evolves, the parceling of these various attributes will, ideally, become clearer.

2.46 Relative Rigorousness

Lack of regulation has created both opportunity and risk for the US voluntary market. Offsets may be utilized in the US voluntary market that do not meet CDM standards or are use a CDM approved methodology. There are many benefits to this flexibility, such as potentially lower transaction costs, the ability to support worthy projects that don't meet regulatory standards, as well as lower costs in general because there is a smaller demand for non-compliance based credits. Due to such benefits, the majority stakeholders interviewed for this paper expressed that the voluntary market should remain more flexible than the regulated market. However, as illustrated by the additionality debate, the balancing act on rigorousness remains a challenge for the voluntary market. Likewise an important question for buyers is fining a balance between price, project type and rigor.

2.6 Key Suppliers in the Voluntary Market

There are a range of transaction types, buyers and sellers within the U.S. voluntary carbon market. An institution has the option to purchase offsets from four major types of sellers.

2.61 Retail Offset Providers

A rapidly growing sector of the voluntary market is retail providers, which generally target individuals purchasing smaller amounts of carbon credits. For example, almost half of the retail organizations in the United States market themselves as providing carbon credits to offset travel emissions from car or air travel. However, many retail providers also actively advertise their availability to offset events or entire business operations. Most retailers sell offsets by providing website "carbon calculators" where customers determine the amount of carbon tons created by the activity they wish to offset, often referred to as the organizations *carbon footprint*. Some retail companies are new organizations created to capitalize on the voluntary market and previously existing organizations capitalizing on the carbon market to fund their conservation initiatives.

An international survey of retailers, by the HWWI Research Program on Climate Policy estimated that there were about 30-40 retail providers in the world in 2005.[30] While the HWWI survey suggested that all of the organizations HWWI could locate were currently based in developed countries,[31] at least one organization, Women for Sustainable Development, based in India and responsible for the FIFA World Cup's offset project, is selling offsets directly from a developing country. Research for this report found about 16 retail providers based in the United States and selling offsets online (Annex 1). Numerous other organizations selling Renewable Energy Credits (RECs) (see Section 3.3.1.1) also advertise the GHG and regulated pollutant emission reduction benefits of their products, but do not directly advertise the sale of carbon offsets.

Retail providers utilize a range of projects to generate offsets, from purchasing and retiring credits from the Chicago Climate Exchange, to selling RECs, to selling credits from emission reduction projects they manage directly. Retailers may also be non- profit or for- profit. A few provide tax benefits to organizations or individuals purchasing offsets but most do not.

A few initiatives have been created to simplify the process of purchasing carbon offsets from the retail market. In particular, the Environmental Defense "Fight Global Warming Campaign," offers suggestions for how to "neutralize the rest" of the individuals' GHG emissions after they have already (as suggested by the website) reduced emissions from driving and electricity use. The organization's website endorses five retail offset organizations. As noted by Environmental Defense, "shopping for offsets can be confusing. If you're not an expert, it can be hard to tell how much pollution is really being reduced or removed."[32] Five carbon offset sellers were selected in 2006 after Environmental Defense issued a request for proposal (RFP) to identify organizations interested in submitting high-quality offsets. Environmental Defense evaluated the various organizations against their offset criteria, published on the Environmental

[30] Butzengeiger, Sonja. *Report No. 1: Voluntary Compensation of GHG- emissions: Selection criteria and implications for the International Climate Policy System.*

[32] Environmental Defense website. http://www.fightglobalwarming.com/ . Viewed May 2, 2006.

Defense's website. The ones that matched the organization's requirements were selected to endorse. For an individual or institution that trusts the Environmental Defense criteria or has similar criteria as Environmental Defenses' listed online, such endorsements could reduce transaction costs. Such endorsements also can simplify the process of purchasing offsets for individual buyers.

2.62 Offset Project Developers

For bulk purchases institutions can also purchase offsets directly from project developers, which can be considered a wholesale transaction. Like retailers, these organizations, which may be non- profit or for- profit, have been created in response to the carbon market or are utilizing carbon credits to finance long standing conservation projects. For example, Native Energy produces its own credits via small wind and methane trapping projects and then sells these offsets directly to the carbon market. Alternatively, Conservation International, a long standing non-profit, has recently entered the carbon market by receiving carbon financing from their projects, not from the retail level, but from other institutions such as The Climate Trust.[33]

2.63 Brokers

Brokers facilitate transactions between institutions and offset project developers. Most frequently, brokers match buyers and sellers for CERs, however in the voluntary market they can also provide trading services for VERs. These services charge a commission, generally around 7.5% for their services.[34] Brokers in the U.S. market include Natsource, CO2e, and Point Carbon.

2.64 Chicago Climate Exchange (CCX)

Operating within the greater U.S. carbon market is CCX, "North America's only voluntary, legally binding rules-based greenhouse gas emission reduction and trading

[33] **"**Oregon Power Companies Offset Carbon Through Investment in Ecuador's Rainforest." Conservation International website. http://www.conservation.org/xp/news/press_releases/2002/111302.xml

[34] Taiyab, Nadaa. "Exploring the Market for 'Development Carbon' through the voluntary and retail sectors." International Institute for Environment and Development. 2005.

system." [35] CCX was created by Richard Sandor, a former chief economist at the Chicago Board of Trade and known as the "father of financial futures."[36] Like the carbon market in general, CCX trades 6 different types of GHGs converted to tCO_2e, referred to as Carbon Financial Instruments (CFIs). Like the regulated EU-ETS trading system. CCX credits come from both allowance based and project based transactions. The trading price of a tCO_2e, or CFI is currently around $4.50.

Members join CCX and sign up to its mandatory reductions policy voluntarily. During the pilot phase (2003-2006) members committed themselves to each reducing GHG emissions 1% a year from a baseline that is determined by their average emissions during 1998 to 2001. The current goal (Phase II) is for members to reduce their total emissions by 6% below the baseline by 2010. Hence, members who have been participating for the past four years only need to reduce an additional 2%, while new members need to reduce 6% during this time. [37]

While CCX represents a major step for initiating and providing venue to develop a GHG cap and trade system within the United States, and also recently opened the European Climate Exchange (ECX), the system is not without critics. For example, several NGO's have noted that the 1% is hardly a laudable goal. According to Michelle Manion, a senior analyst with the Union of Concerned Scientists, the goal is "insignificant." "The companies might do that without even trying, so there's not a lot at stake financially."[38]

However, many members have reduced beyond this cap, in 2003, CCX's first year, members cut overall emissions by 9 %, citing reductions of 20 million tons of CO_2. Companies who reduce more than the required amount of reductions may then sell additional offsets as credits on the CCX market to participants who have not met their quota. A second set of criticisms is based around how CCX deals with verification and

[35] Chicago Climate Exchange website. http://www.chicagoclimatex.com/
[36] Margolis, Jason. "My Kind of Down: Chicago Climate Exchange Paves the Way for U.S. Emissions Trading." Grist Magazine 14 June 2005.
[37] Ibid
[38] Ibid

additionality concerns. Some critics describe CCX criteria as lax or inconsistent and the system more focused on building a market than environmental integrity.

2.7 Prices in the voluntary market

The range of carbon credit 'commodities' sold on the voluntary market is illustrated by the huge range of prices. From the wholesale to the retail level, credits can be found for less than $1.00 to around $35.00. In the EU- ETS market prices at the beginning of May 2006, were around $15.50. Tax benefits from purchasing offset credits also varies. For example, the Climate Neutral Network's website describes its efforts to help members benefit from "a proactive tax treatment for Climate Cool investments."[39] However, most retailers' websites, such as for-profit providers, state they cannot offer tax benefits for purchasing offsets since they are selling a commodity rather than taking donations.

Prices can be compared at two levels: the cost of the offset project and the market price of the credit sold. Project cost is influenced by three major factors: technical reduction costs (influenced by factors such as project type, size, location, upfront costs vs. length of return, profits from co- benefits and additionality), transaction/ administration costs, and seller's profit.[40] Market price is also influenced by several factors. For example, steps between the project and the buyer such as brokers, retail sellers, and certification may increase the price. Similarly, like many commodities, price often varies by the amount of credits purchased. Prices will also evolve in the voluntary market with changes in supply and demand. For example, regulation could increase the price of carbon credits in the United States. Because the attributes contributing to credit quality are only one factor influencing price, 'better' credits and price do not always correlate. However, a 'non-additional' or business as usual credit can cost nothing, or only the transaction costs involved with claiming the credit. Table 1 attempts to compare the range of project prices. Examples of the range of prices offered in the retail market are listed in Annex 1.

[39] Climate Neutral website . http://www.climateneutral.com/pages/standards.html
[40] Butzengeiger, Sonja. *Report No. 1: Voluntary Compensation of GHG- emissions: Selection criteria and implications for the International Climate Policy System*. pp 26

III. THE ROOTS OF A CREDIT: OFFSET SOURCES

Carbon credits in the voluntary market may differ at several levels: price (see Section 2.6), means of assuring GHG reductions (see Section 2.4), project size, project location, and project type. These differences have not been cohesively, publicly outlined for consumers in the voluntary market. This section attempts to summarize the major differences between sources. Consumers in the market would benefit from additional research and transparency in this area, especially in the comparison of the advantages and disadvantages of different project types.

3.1 Project Size

Offset projects in the voluntary market range from large-scale anaerobic digesters used to reduce methane emissions from industrial farming to small biogas stoves used in village huts. These different project sizes each have advantages and disadvantages to meet different buyers' interests. Generally project types are defined as 'small' or 'large.' CDM definitions illustrate the range of projects in the regulation and voluntary markets. CDM projects that generate less than 15 kilotons of carbon dioxide annually are categorized in the small project category, all others in the large project category.[41]

For the majority of project developers 'big is beautiful' and large projects have by far dominated the regulatory and voluntary markets.[42] Large projects have lower transaction costs per credit, and hence result in more GHG mitigation, higher profits and lower cost credits. For example, even at the retail scale, a low price credit from a large scale project can be purchased for around $4.25, while a low price credit from a smaller scale project runs about $10.

In reaction to the disparity between investments in large and small projects, several organizations have begun focusing on smaller projects. For example, in 2006 the FIFA World Cup invested a large amount of money into offsets from small projects, following

[41] The Clean Development website. http://cdm.unfccc.int. Viewed May 3, 2006.
[42] Clarke, Donna. "Scaling Down Carbon Finance." Environmental Finance. December 2002- January 2003.

The Gold Standard protocol, a certification system developed to encourage sustainable development benefits beyond the CDM norm (see Section 4.3).

In 2002 The World Bank created the Community Development Carbon Fund, which focused on generating carbon credits from small projects in the world's least developed countries.[43] According to Gus Hellier at the Edinburgh Centre for Carbon Management, "small scale activities in developing countries, while likely to yield local development benefits, have traditionally had higher risks and transaction costs and hence have been unattractive to project investors."[44] Plan Vivo works to reduce this risk for investors while implementing renewable energy and forestry projects in areas such as Mexico, Uganda, and India. The majority of Plan Vivo projects create VERs. Hellier describes VERs originating from Plan Vivo projects as fitting "neatly with corporate social responsibility objectives." [45] Because of such CSR type objectives driving VER purchases, many stakeholders see the voluntary market as a particularly appropriate venue for small projects and a means to avoid "the bureaucratic procedures and high transaction costs of the CDM registration process."[46] Others note the urgency of supporting projects that will lead to large scale reductions in emissions of GHGs.

3.2 Project Location

Offset projects can and are happening all around the world. If the only goal of a buyer is to support the mitigation of GHG emissions, project location could be considered irrelevant. However, to mange risk, reduce costs, or increase co- benefits in a specific area, the location of a project may be important to a buyer. For example, least developed countries (LCDs) are often considered risky areas for investment. For this reason, a buyer may specifically choose to support, or not support, a project in a LDC. In many cases, projects are far less expensive if implemented in a developing country.

[43] Ibid
[44] Ibid
[45] Ibid
[46] Taiyab, Nadaa. "Gatekeeper Series 121: The Market for Voluntary Carbon Offsets: A New Tool for Sustainable Development." pp 13.

A huge amount of attention has been given to the role of offset projects in contributing to sustainable development. While some early critics of CDM referred to the idea as "carbon colonialism,"[47] ideally the majority of offset projects, such as CDM projects, based in developing countries will provide additional benefits such as technology transfer, income, reduced co-pollutants, etc. Hence, supporting a project in a developing country has appeal for numerous credit buyers. Alternatively, U.S. buyers may want to support co- benefits closer to home. For example, supporting a local renewable energy project may contribute to improved local air quality, jobs, reduced domestic dependence on fossil fuels etc. Finally, buyers may want to support a project in an area specifically relevant to their customers or project. For example, a company selling Costa Rican coffee could find it particularly appealing to purchase credits from a project based in Costa Rica.[48]

3.3 Project Types (update)

One of the key differences between carbon credits is the mechanism used to produce the offset. This section aims to outline the mostly widely used VER generating projects and the potential benefits, disadvantages and debates surrounding the offset origins. Clearly, many of the different advantages and disadvantages are project based. However, the goal of this section is to generalize for the purpose of comparison. It is important to note that there are other means of generating carbon credits and developing technologies such as the multiple forms of oceanic and geographic sequestration that may lead to GHG sequestration and carbon credits in the future. However, this section focuses on the most widely used sources of offset credits in the voluntary market. The choices available to an institution wishing to offset reductions are summarized in Diagram 2. Table 1 summarizes these comparisons.

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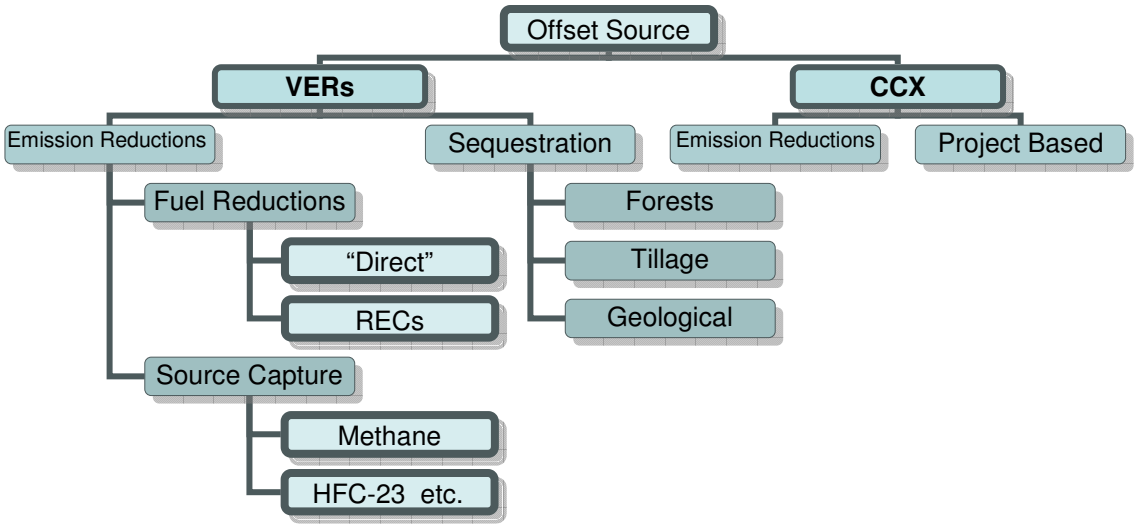
[47] "Recipe 1: Reversing Global Warming: Offsetting Carbon Dioxide Emissions." *The Stoneyfield Farm Environmental Cookbook.* Stoneyfield Farm. 1997.
. pp 14.
[48] Ibid

Diagram 2: Sources of Offset Credits in the U.S. Voluntary Market



3.3.1 Emission Reduction Projects

Offset projects can be categorized into two main categories: those reducing GHG emissions reduction at the source and those that reduce GHG levels in the atmosphere by sequestration. Projects in the GHG emissions reduction category can be classified by type of gas reduced or destroyed into two categories: fossil fuel substitution/ reduction projects and GHG destruction projects. In general, emission reduction projects have several major advantages. First it is clear that reducing the emission of GHG into the atmosphere is probably the most critical piece of GHG mitigation. These reductions are also permanent unless 'leakage' occurs in time or space. Due to such advantages emissions reduction projects have become a widely accepted form of generating carbon credits.

3.3.1.1 Fossil fuel reduction projects

The burning of fossil fuels is the leading cause of climate change. Hence, reducing the use of fossil fuels is a critical piece of GHG mitigation. Projects may reduce the use of fossil fuel '*directly*' or '*indirectly*.' Projects reducing emissions directly generate carbon dioxide emission reductions through activities such energy efficiency projects, fuel

switches, power plant upgrades, and off- grid renewable energy projects, such as small hydro, wind, and biomass. Credits generated from grid connected renewable energy projects create what are often considered 'indirect' emissions reductions. The specific advantages of fossil fuel reduction projects include environmental and human health co-benefits from the reduction of other air pollutants like carbon monoxide, nitrogen dioxide, particulate matter, and sulfur dioxide. These projects also include national security benefits from decreasing dependence on fossil fuels, incentives for improving and transferring renewable energy technology, and job creation. However, these projects primarily reduce CO_2 emissions. Compared with flaring methane or destroying HFC- 23 (with a GWP 11,700 times that of CO_2),[49] generating credits via fossil fuel reductions is relatively inefficient from a return on investment point of view.

Direct Fossil Fuel Emissions Reductions

Off grid projects reducing fossil fuel emissions with the purpose of creating VERs have been developed in U.S. and around the world. For example, Mercy Corps sells offsets to retire from a Climate Trust truck stop electrification project in Oregon. The Solar Electric Light Fund (SELF) sells solar energy projects that replace diesel generators in countries such as Nigeria. My Climate sells credits from replacing coal with biomass burning.

An advantage of these projects is that there is a clear link to the reduction of GHGs into the atmosphere and the reduced use of fossil fuels can be relatively easily quantified. There are numerous co-benefits associated with only these types of projects. For example, energy efficiency projects may lead to long term cost savings. Small off- grid renewable energy projects, especially those in rural areas or developing countries, may lead to reduced indoor air pollution and potentially reduced deforestation for wood fuel sources.

One important consideration for consumers may be whom the project is assisting. For example, for many investing in cleaner technologies for rural villagers may have more appeal and a greater level of additionality than purchasing credits from a corporate energy efficiency project. Due to the high level of social benefits associated with this

[49] Natsource website. http://www.natsource.com/buycredits/index.asp?co2tons . Viewed May 5, 2006.

type of project, the Gold Standard (further described in Section 4.3), a standard focused on sustainable development benefits, currently only certifies "non-fossil fuel energy projects."[50]

Renewable Energy Credits (RECs)

RECs, also referred to as Tradable Renewable Certificates (TRECs) or Green Tags, are a hotly debated source of carbon credits in the U.S. voluntary market. They are tradable certificates representing the environmental attributes from the generation of one kilowatt hour (kWh) of on-grid renewable energy.[51] Because RECs result from grid connected renewable energy projects, the energy electrons from renewables are mixed with energy electrons from other generators. Hence, it is impossible for consumers purchasing renewable energy to consume only electrons from renewable energy. However, RECs were designed to facilitate support of renewable energy projects "free of the constraints of the energy grid."[52]

According to EPA's Green Power Partnership, voluntary (unbundled) RECs account for 25% of renewable energy currently sold to commercial and industrial customers.[53] They are a separate commodity from the power itself and environmental attributes packaged in a REC are essentially the benefits of displaced pollution. In theory, this includes benefits from fossil fuels 'backed off' the energy grid by renewable energy added to the grid. Hence, they are referred to as "indirect" emissions reductions, rather than "direct" emissions reduction, such as from flaring methane. RECs are measured in kilowatt hours (kWh). RECs are generally converted to carbon offsets by finding the amount of CO_2 generated by local fossil fuel burning power plants per kWh and then assuming that a REC kWh replaces that amount of CO_2. For example, Native Energy describes its calculations for a RECs coming from the Schrack Family Farm methane project:

[50] The Gold Standard website. http://www.cdmgoldstandard.org/. Viewed: 3 May, 2006.
[51] Harmon, Robert. Vice President, Renewable Energy Programs, Bonneville Environmental Foundation. Personal Interview: 9 December 2005.
[52] Leahy, Patrick and Hathaway, Alden. "Renewable Energy Certificates and Air Emissions Benefits: Developing an Appropriate Definition for a REC." Environmental Resources Trust. April 2004.
[53] Green Power Partnership website. http://www.epa.gov/greenpower/ . Viewed May 3, 2006.

> We assume that the Project's electricity offsets the average system mix of fossil-fueled power plants on the local power grid, and we assume that the emissions from that system mix will improve over time. Specifically, we have applied a 0.8% annual improvement in CO_2 emissions rates to the control area average fossil rate, and averaged the resulting fossil rate (which represents existing facilities whose energy will be displaced) with the emission rate for combined cycle gas plants of 1,000 lbs/MWh (which represent the new facilities whose capacity might be displaced). The combined result of the deemed improvement rate and averaging it with the combined cycle rate is 1,365 lbs/MWh over the 20-year period… We will be receiving ongoing meter data from the Project that will tell us exactly how much electricity your share of the Project generates. With this information, we'll use the most recent data on the Environmental Protection Agency's E-Grid database to generate updated estimates of how much CO_2 that electricity kept out of the air.[54]

In the United States, RECs are traded in both state regulated and voluntary markets. In the voluntary market there are currently over 40 companies selling RECs at the retail or wholesale level. Regulated RECs are used in 14 of 18 states that have legislated Renewable Portfolio Standards.[55] These standards require that certain percentages of electricity distributed in the state be produced from renewable resources, and to national emissions standards. RECs sold at the retail level are generally sold "unbundled" and also include the attributes of regulated pollutants such as NOx and So_2. Alternatively, in the regulated market these pollutants are traded separately from the environmental attributes of a REC.[56]

One reason RECs are one of the most debated sources of VERs is because it is difficult to measure exactly how much fossil fuel is backed off the grid and hence to what extent the production of renewable energy actually offsets fossil fuel use. The debate has intensified as the price of RECs has decreased to become more competitive with other sources of carbon credits. While RECs were traditionally priced at $20-30/MWh

[54] "How We Calculate the CO_2 Reductions." Native Energy Website. http://www.nativeenergy.com/CH.html . Viewed May 24, 2006.
[55] Hold, Edward and Bird, Lori. *Emerging Markets for Renewable Energy Certificates: Opportunities and Challenges.* National Renewable Energy Laboratory. January 2005. http://www.eere.energy.gov/greenpower/resources/pdfs/37388.pdf
[56] Holt, Edward. "Expanding markets for renewable energy credits; progress and challenges." Green Trading Markets: Developing the Second Wave.

electricity, today REC prices range significantly—in some cases prices are as low as $1-2/REC in the voluntary market.[57]

Investments into large on- grid renewable energy sources are clearly critical for reducing dependence on fossil fuels and reducing GHG emissions. Hence, in the long run carbon credits and RECs may both contribute to GHG reductions. However, because the REC and carbon credit markets were created with different intents, there is considerable concern about 'tangling' two currently incompatible markets.[58] Trexler described the REC and carbon offset markets, as "very different animals."[59] For example, in the EU RECs and carbon credits are regulated separately. Because the differences in the markets, critics of using RECs as credits are raising questions about issues such as additionality, project accounting, and compatibility between the REC and carbon offset markets.

Proponents of using RECs as carbon offsets note that unlike most other VERs, RECs represent an easily quantifiable unit—megawatt hours of electricity produced from a qualifying renewable energy technology. Hence, messy monitoring and quantification questions common in the carbon market are avoided. According to Robert Harmon, a proponent of using RECs from new renewable energy sources as offsets and Vice President of Renewable Energy Programs at Bonneville Environmental Foundation, all carbon offsets mechanisms "are nebulous. The least nebulous are RECs." [60] Like Harmon, most proponents of using RECs as credits focus on using RECs from new plants. If RECs were a critical component in allowing these renewable energy projects to exist, these RECs could be considered additional. However, not all RECs currently being sold as carbon offsets are from new renewable energy facilities. Hence critics, such as Trexler, of using RECs as carbon offsets have challenged if credits from RECs can be considered additional "We can supply a lot of RECs from largely 'business as usual' renewables.

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[57] Trexler, Mark. "Are renewable energy credits (RECs) and carbon offsets exchanged in totally different markets, with little crossover potential for project developers and investors?" http://www.climatebiz.com/
[58] Bogomolny, David, Felder, Frank, and Weiner, Scott. "Untangling Environmental Markets>
[59] Trexler, Mark. Personal Interview. 6 April 2006.
[60] Harmon, Robert. Vice President, Renewable Energy Programs, Bonneville Environmental Foundation. Personal Interview: 9 December 2005.

Selling 'non- additional' RECs into the carbon offset market undercuts the additionality requirement that is at the heart of carbon offsets, and could devalue the voluntary carbon offset market."[61]

Critics of RECs as credits also note that while it is relatively simple to measure the amount of renewable energy produced, it is far less simple to estimate the amount of fossil fuel energy "backed off" the grid due to renewable energy production.[62] Models have been created to help with these measurements, but those questioning RECs note that such estimates are far from an exact science and that actual emissions reductions are not actually measured case by case but based on a few models demonstrating the amount of fossil fuels backed off the grid. For some "double counting" is another concern when overlapping the REC and carbon markets. Since, the legalities of ownership for GHG rights are still unclear, it is possible that in some cases both the REC producer and purchaser count themselves as owners of the GHG reduction benefits.[63] Tracked emissions, clear contracts and reporting could eliminate this issue.

For the institutional purchaser of RECs, a conservative means of dealing with the debate is to purchase RECs only for 'neutralizing' electricity use and utilize other sources of carbon credits to offset other types of GHG emissions.

3.3.2 GHG Destruction Projects

Unlike carbon dioxide, emissions from gases such as methane can be captured and flared. Methane projects are the most common project, especially in the retail market. However, credits from HFC-23 and SF6 destruction are also available.

3.3.2.1 Methane Projects

Currently, both CERs and VERs have been produced by capturing and flaring methane from landfills, livestock manure 'lagoons,' and coal mines. Methane capture offset

[61] Trexler, Mark. "Are Renewable Energy Credits (RECs) and carbon offsets exchanged in totally Different Markets with little crossover potential for project developers and investors?"
[62] Wilmington, Matt. Natsource. Personal Interview. 6 December 2005.
[63] Leahy, Patrick and Hathaway, Alden. "Renewable Energy Certificates and Air Emissions Benefits: Developing an Appropriate Definition for a REC."

projects have become extremely popular due to methane's high GWP leading to relatively high volume of carbon credits from methane projects. Methane flaring also may be used to generate renewable energy for on or off-grid purposes. Hence, in some areas of the world, a methane project may reduce two sets of potential offsets, one from the direct methane destruction and the other from RECs.

In many circumstances trapping and flaring this methane is legislated and required, such as in active coal mines and large landfills in the United States. To be considered additional and generate VERs, even on the more flexible side of the additionality spectrum, legitimate offset generating projects cannot simply be a response to such regulation. The need to carefully consider local regulations could be considered a disadvantage of methane projects. The fact that renewable energy can also be created from some projects is generally considered an advantage of these projects. However, in some cases it may mean projects would happen with or without carbon credits. For some this potential lack of financial additionality is a major issue. For others it is critical to encourage investment in the destruction of this powerful GHG, and hence they consider these projects an excellent source of offset credits. The different types of methane projects have unique advantages, disadvantages, and co-benefits.

Livestock

In large- scale livestock, especially hog and dairy farming, animal manure is liquefied and stored in large, often open, lagoons. These lagoons emit strong odors, methane, and ammonia (a precursor to PM10).[64] It is estimated that manure from livestock represents 30% of U.S methane emissions.[65] The manure is often spread on fields for fertilizer, which often results in emissions of carbon dioxide and nitrous oxide, as well as excessive nutrient discharges in local water.[66] Techniques for recovery include covered anaerobic

[64] Kunz, John. EcoPower Analyst, ERT. Personal Interview. 7 May, 2006.
[65] National Energy Information Center website. http://www.eia.doe.gov/oiaf/1605/gg98rpt/methane.html. Viewed 4 May, 2006.
[66] Amey, Allan. "Manure Power: Capitalizing on Manure." http://www.climatechangecentral.com/resources/c3views/c3Views200309.pdf . 23 September, 2006.

lagoons and a range of anaerobic digesters.[67] Methane is flared and then sometimes used by the farmer to help fuel operations, a potentially major advantage of capping methane.

The numerous co-benefits resulting from this type of operation, and resulting improved waste management practices, are a clear comparative advantage for flaring methane from lagoons.[68] A major social co- benefit is reduced odor. Environmental benefits include reduced ammonia, and a reduced risk of lagoons overflowing manure into local water supplies. If the manure is spread on fields post methane removal, benefits of the methane trapping process include further reduced groundwater contamination.[69],[70]

Landfills

According to the Methane to Markets partnership, landfills account for 13% of global methane emissions.[71] In the U.S. and Europe covering large landfills and flaring methane is often required by law. However, for smaller landfills and landfills in many developing countries, this is not the case. Open dumps/ unmanaged landfills are especially prevalent in developing countries. While sealing these landfills is an overall more environmentally preferable option, the process actually leads to more methane released. Decomposing matter emits land fill gas (LFG), which is about 50% methane, and about 50% carbon dioxide. Like livestock operations, trapped and flared methane can be a source of energy.[72] The co-benefits from landfill projects include some level of reduced odor and often a reduced likelihood of pollutants leaching into groundwater.[73] Like methane from livestock, energy produced from the process may pay for the process.

[67] Methane to Markets. http://www.methanetomarkets.org/ag/index.htm
[68] Barbour, Wiley. Environmental Resources Trust. Personal Interview. 6 May 2006.
[69] Kunz, John. EcoPower Analyst, ERT. Personal Interview. 7 May, 2006;
[70] "Manure Power- Capitalizing on Manure." Climate Change Central Newsletter. http://www.climatechangecentral.com/resources/c3views/c3Views200309.pdf .
[71] "Landfill Methane Recovery and Use Opportunities." www.methanetomarkets.org
[72] Ibid
[73] Carbon Finance website. http://carbonfinance.org/Router.cfm?Page=Projport&ProjID=9615

Coal Mines

Globally, coal mining accounts for 8% of total methane emissions resulting from human activities.[74] Methane is released from both active and abandoned mines.[75] Due to safety concerns, and the potential for built up methane to cause explosions, around the world it is required that this methane is removed from active mines. The least cost method is to vent this methane and release it into the air. However, this methane can also be trapped and flared to generate electricity.[76] Compared to landfill and livestock operations, the co-benefits from this process are fairly minimal.[77] However, in developing countries methane capture projects may lead to updated safety mechanisms.[78]

3.3.2.2. HFC-23 Destruction

Due to the incredibly high GWP of HFC-23, the process generates offsets quickly and effectively and could be considered an important 'low hanging fruit' offset project. However, only a few companies in the world, such as DuPont, create HFC-23 and hence there are few projects connected with its destruction, compared to a gas like methane. There are few to no social or environmental co- benefits connected with the destruction of this gas. However, as noted by Wiley Barbour of Environmental Resources Trust (ERT), an exciting aspect of HFC-23 destruction is having a major chemical company, DuPont, on board with this GHG mitigation effort and actively researching alternatives.

3.3.2 Sink Based Projects

While the above list of project types avoids the release of emissions into the air, a second major category of projects is carbon 'sinks,' such as forests, oceans, and agricultural soils, that sequester carbon out of the air.[79] The idea behind sequestration based projects is to increase the number and productivity of carbon sinks. Within the sinks category, two types of projects are currently a source of credits in the voluntary market, land use projects (forestry and no-till farming) and geological sequestration projects. Land use

[74] Methane to Markets website. www.methanetomarkets.org
[75] Ibid
[76] Carbon Finance website. http://carbonfinance.org/Router.cfm?Page=Projport&ProjID=9615
[77] Kunz, John. EcoPower Analyst, ERT. Personal Interview. 7 May, 2006.
[78] "China: Jincheng Coal Mine Methane." The World Bank Carbon Finance website. http://carbonfinance.org/Router.cfm?Page=Projport&ProjID=9603
[79] EPA website. http://www.epa.gov/sequestration/faq.html . Viewed: 24 April, 2006.

projects can also be considered 'biological' projects, and geological sequestration "technology' projects. Because of the relatively new technology used in geological sequestration, land use projects, especially forestry projects are far more common sources of VERs.

3.3.2.1 Land use based projects

The major issue with land sequestration projects is permanence, or how long the carbon is stored. The role of land based projects is highly debated at both the regulatory and voluntary level. For example, the CDM board has approved some forestry mechanisms but has not approved any tillage projects. Proponents of land based projects note that while sequestration projects are not permanent, providing incentives for establishing and maintaining these projects is important in changing the size of the earth's GHG reservoir, and represents an opportunity to slow down the amount of GHG entering the atmosphere. Describing the importance of using land based projects, Patrick Zimmerman, Director of the Institute of Atmospheric Sciences at the South Dakota School of Mines and Technology stated, "Is it permanent, no. Is it important? You bet it's important." [80]

Forestry projects

Currently the most common type of carbon sequestration advertised in the GHG market is created by agroforestry, afforestion, reforestation, and forest conservation projects. An estimated 20—25% of anthropogenic GHGs in the atmosphere results from deforestation.[81] Hence, projects that lead to more global forest cover clearly play a role in GHG mitigation. However as Erica Graetz, program and operations manager for The Climate Trust, states "There are a lot of co-benefits to using carbon money to fund reforestation as far as air, biodiversity and water quality goes… but there's also a lot of risk associated with it."[82] This uncertainty is reflected in the type of offsets sold at the retail level. The once named Future Forests, a 'grand-daddy' of retail offsets, has not only changed its name to The Carbon Neutral Company but has also decreased the number of

[80] "The Quality Challenge: Are All Credits Created Equal?" Green-T Forum: Raising the Bar for Voluntary Environmental Credit Markets. 1-2 May, 2006. New York, New York.
[81] Conservation Finance Guide
[82] Biello, David. "Speaking for the Trees: Voluntary Markets Help Expand the Reach of Climate Efforts."

forestry projects it is working on. "Last year, the split between forestry and technology based projects was about 50-50" explained operations director Bill Sneyd. "We reckon that within about two years it will be 80% to 20% technology to forestry."[83] Such changes could be due to the controversy surrounding forestry and the lower prices of other projects.

Denis Slieker, director of Netherlands- based offset provider Business for Climate, notes that "One reason people want forests is because it is tangible… It also has an emotional aspect. It not only helps the climate, it's also a nature, a home for the animals and community development."[84] Proponents of forestry projects in the voluntary market cite numerous benefits for forestry such as the strong potential for a variety of co-benefits, ease of understanding/ tangibility for consumers, and the contributions VERs from forestry could make to the scientific understanding of forestry in sequestration. For example, well managed projects could contribute to biological diversity, increased forest productivity, reduced erosion, hydrological benefits, stable income streams to local communities and ecotourism opportunities.

However, the question of permanence has had a major influence on confidence levels in forestry projects. As My Climates, Moser stated, "Planting trees, to us, is quite a dangerous thing. You cannot guarantee that the trees will still be there in 40 years if there's a forest fire or logging."[85] Such uncertainty becomes particularly important for carbon accounting. Forestry projects usually use 70- 100 year 'ex-ante' accounting for forestry projects and to finance the initial costs of a forestry project many organizations sell reductions before they occur, a risky practice if the offsets do not occur.[86] If forests are logged, carbon storage depends partially on the end use of the trees, since rarely is the carbon trapped permanently in products. Forestry sinks also pose questions of leakage. For example, it is difficult to measure if transforming agricultural land into a plantation,

[83] Ibid
[84] Ibid
[85] Biello, David. "Speaking for the Trees: Voluntary Markets Help Expand the Reach of Climate Efforts."
[86] Burnett, Michael. "Buying Greenhouse Gas Offsets: Choosing Between Emissions Reduction Projects and Carbon Sequestration Projects."

or avoiding deforestation in one area, could lead to clear- cutting of a forest elsewhere to provide land for farming or grazing.

A second issue is the uncertainty of how much carbon various forests sequester. There are still fundamental questions concerning the amount of carbon stored in various forests and evolving understanding of the process. For example, a recent study in *Nature* suggested that plants may actually contribute to global methane emissions. However forestry scientists have noted that the sources of methane could be from numerous sources, such as decomposing plants or termites.[87] Moreover, Thomas Rockman, co-author of the original study, noted that, "Climatic benefits gained through carbon sequestration by reforestation far exceed the relatively small negative effect (of methane production.)" [88] While some critics cite such uncertainty as a strike against forestry, some proponents of trees cite such scientific uncertainty as a reason to utilize forestry projects to create carbon credits.[89]

Another major concern is that forestry projects such as large monoculture projects may sequester carbon but will not include the co- benefits provided by a more diverse or indigenous forest. Mono-crop plantations, especially those in the tropics that can support fast growing trees such as Deglupta, are attractive for creating carbon credits relatively cost- effectively and quickly. However they contribute less to biodiversity, may reduce water supplies, and some projects have been sited as having negative social impacts. Such concerns were expressed by Brett Orlando, climate change advisor at the IUCN-World Conservation Union in Switzerland, "The question is, will sequestration be maximized to the expense of other social and environmental objectives? Carbon sequestration is just one of services that forests provide."[90]

[87] Kenny, Alice. "New Science: Should Carbon Credits Grow on Trees." The Katoomba Group's Ecosystem Marketplace.
[88] Ibid
[89] Bayon, Richard, "Carbon Sinks and Emissions Trading; Room for Optimism?"
[90] Nicholls, Mark. "Credits for Sinks: Understanding the Case Against." Ecosystem Marketpalce.

Agricultural Sequestration projects

Carbon offsets from soil sequestration are far less common in the carbon market. In fact, none of the retail offset organizations researched for this paper cited soil sequestration as a source of offsets. However, the CCX recently included soil sequestration due to low-till and no- till farming, along with grass planting, on their list of verified offset projects.[91] In no-till farming the soil is left intact and crop residues are left in the fields and can increase the amount of carbon stored in soils. Co- benefits include reducing soil erosion, potentially reducing emissions from farm equipment and potentially higher levels of soil organic material.[92] One of the main criticisms of the projects is that because so little carbon is stored per acre, carbon financing is clearly not the main factor influencing a change in farming practices. Moreover, the carbon sequestered can be quickly lost in a season when a farmer changes tilling practices.[93] However, like forests, the soil represents a major carbon sink and deep plowing techniques can be equated to "mining the soil for carbon." Hence, proponents of obtaining offsets from tillage believe it is important to send the price signal to farmers that no/low-till farming is important.[94]

Geological Sequestration: Enhanced Oil Recovery

There are a variety of evolving geological and oceanic sequestration technologies. This section discusses only one type of such sequestration, enhanced oil recovery. This type of sequestration is relatively rare in the non-regulatory driven, voluntary market. For example, in the retail market only one organization, Blue Source in partnership with Natsource, is selling credits from capturing waste CO_2 that otherwise would have been vented into the atmosphere, injecting it into fields to access hard to reach oil reserves and to store the gas in the underlying bedrock. The big advantage of such processes is the huge potential for GHG storage. For example, IPCC estimated in 2005 that more than 2,000 $GtCO_2$ could be stored in geological formations.[95] This process also leads to

[91] Trexler, Mark. Personal Interview. 7 May 2006.
[92] http://www.epa.gov/sequestration/ag.html
[93] Barbour, Wiley. Environmental Resources Trust. Personal Interview. 6 May 2006.
[94] Ibid
[95] IPCC (Intergovernmental Panel on Climate Change) (2005), Carbon Dioxide Capture and Storage, B. Metz, O. Davidson, H. de Coninck, M. Loos, M. Meyer (Eds.), Cambridge Univ. Press.

domestically produced oil and may substitute for an alternative process of purposefully mining CO_2 to recover oil.

Along with this potential, come major disadvantages for using this technology to create carbon credits, especially in the voluntary market. First is the possibility that this type of sequestration may be profitable without carbon finance and hence fails the investment additionality test. Second, the process enables the U.S. 'addiction to fossil fuels.' The process also burns fossil fuels itself. Finally, there are few environmental or social benefits associated with the effort outside of the increased supply of domestic energy.

3.4 Chicago Climate Exchange (CCX)

As described in Section 2.5, operating within the U.S. voluntary offset market is the CCX. Institutions interested in purchasing offsets (CFIs) and willing to operate under the trading cap, may become Members or Associate Members. Members "are corporations, municipalities and other entities that emit greenhouse gases from facilities in the United States, Canada." Associate Members, "are entities that have small or no direct emissions, and commit to comply with CCX rules by offsetting the greenhouse gases associated with a selection of business-related activities."[96] Hence, an institution wishing only to purchase CFI's would become an Associate Member. Those with potential emission reductions to sell would become a member. According to Michael Walsh, Senior Vice President of CCX, costs to join are negligible.[97]

CFIs come from both allowance based and project based transactions. However, project based allowances represent only about 1/50 of the CCX market and only 5% of emissions reductions may be purchased through offsets. [98] CCX project based transactions include:

- Methane destruction from landfills and livestock operations
- Renewable Energy in the United States

[96] "CCX Membership." Chicago Climate Exchange website. http://www.chicagoclimatex.com/ . Date viewed: 16 April 2005.
[97] Michael Walsh, Senior Vice President of CCX. Personal Interview: 1 May, 2006.
[98] Ibid

- GHG Emissions Reductions in Brazil via fuel switching and renewable energy generation from solar, wind, small hydroelectric and biomass systems
- Sequestration via no-till and low-till farming and grass cover planting
- Forestry practices (forestation and forest enrichment projects, combined forestation and forest conservation projects, and urban tree planting.)[99]
- Clean Development Mechanism Eligible Projects

Quality of Offset Projects

CCX sets standards for their offset projects, such as the requirement of a CCX approved third party verifiers that are described in their rulebook. One key question for institutions to consider when deciding if "CCX is right for them" is if the quality off CCX offsets, meet their quality goals.

Offset Prices

In 2004 around 2,250,000 tCO2e, valued at about $2 million, was traded through the CCX. During that initial year, prices ranged from $0.71 to $2.06 per tCO2e, with most trades occurring around $1/ CFI. However, in the past year prices have risen, ranging from $2.00 to $4.70.[100] For offset buyers these prices are some of the lowest prices in the market. However, like the rest of the market, such low prices in the future are uncertain. For example, CCX's announcement in April 2006, that it will accept European Union CO_2 emission allowances to be used in compliance with CCX (the first linkage between CCX and another market system) signals a hope that it the future CCX prices will be of equal or higher prices than EU-ETS prices. Currently, CCX prices are significantly lower than EU-ETS prices, and hence such a trade is unlikely.

Name recognition- CCX Umbrella

A frequently cited benefit of being part of CCX is the assurance and name recognition associated with membership and credits purchased from CCX. Moreover, as the only formal cap and trade system in the U.S. voluntary market, if regulation would at occur at a national level in the United States, CCX would be a likely candidate for becoming part

[99] "Offsets projects." CCX website. http://www.chicagoclimatex.com/
[100] The Ecosystem Marketplace website. http://ecosystemmarketplace.com

of the regulated marketplace. [101] CCX's recent (March 14, 2006) announcement that it plans to open two regional trading schemes, the New York Climate Exchange (NYCX) and the Northeast Climate Exchange (NECX), signals a potential link between CCX and the Northeast Regional Greenhouse Gas Initiative (RGGI). CCX members also cite the benefit that joining CCX strengthens the only GHG cap and trade existing in the United States.

However, becoming a CCX member also has its risks. Critics of CCX credits cite lack of enforcement of accurate efficiency reporting, and verification of additionally.[102] Offsets purchased under CCX are only as high quality as determined by CCX needs and consumers have little choice in the type of projects they can support. For example, for organizations interested in specific co-benefits CFI's may not be a particularly good match.

Retail Offerings

Individuals and organizations purchasing small batches of offsets also have the opportunity to purchase CCX credits at the retail level. Two retail offset organizations utilize, Terrapass and Drive Neutral, utilize CCX credits as retail credits. These companies are members of the Exchange, who purchase and then "retire" blocks of credits. Such a process ideally provides liquidity in the CCX market, theoretically contributing to the incentive for companies to further reduce their emissions. Jason Smith, CEO of Drive Neutral commented, "We'd like to be part of the movement that drives the prices of credits up to the point where investors and traders look the [CCX] as a viable market."[103] Of course, purchasing CCX credits from the retail market increases the price. For example, offsets from the retailer Terrapass cost about $8.00/ ton.

[101] Lovins, Hunter. Personal Interview. 16 April, 2006.
[102] Wood, Susan. AgCert International. Personal Interview. 9 December 2005.
[103] Biello, David. "A Drive to Offset Emissions." The Katoomba Group's Ecosystem Marketplace.

Table 1: Common Offset Project Types

	Project Type	Social & Environmental Co-Benefits	Price Range	Advantages	Disadvantages
Methane Capture				- Efficient means of reducing emissions - Captured methane can be used as fuel - Few leakage concerns	- Additionality concerns should be carefully considered
	Landfill	- Some what reduced odors - Reduced risk of ground water contamination	Low		
	Livestock	- Reduced odors and co-pollutants - Reduced risk of ground water contamination	Low		
	Coal Mines	- Potential for improved safety	Low		
HFC- 23 & others		- Minimal	Very Low	- Very efficient - Highly additional	- Few companies involved
Direct Fossil Fuel Reduction		- Direct reductions of co-pollutants (ex. Sox, PM, VOCs) - Reduced fossil fuel dependency - Strong potential for small projects with high social benefits	Low-High	- Supporting clean technology - Cost savings from some types (ex. efficiency) projects	- Less efficient means of GHG reductions
RECs		- Indirect reductions of co-pollutants from fossil fuel	Low-High	- Already established market with certification/verification systems - Supporting on-grid renewable energy important for decreasing reliance on fossil fuels	- Current lack of compatibility between REC and carbon credit markets - Concerns about additionality
Forestry				- Deforestation part of the climate change problem	- Lack of permanence - Potentially influenced by climate change - Less efficient for mitigating GHG

	Forestry native/mixed species	- Biodiversity	*Protection:* Low-Medium *Reforestation:* Medium-High	- Large number of co-benefits	- Less efficient than many mono-crop/ non-native species
	Forestry monoculture	- Fuel wood, potential incomes for locals	Low	- Trees with high sequestration rates can be selected - Often lower cost	-Concerns about water consumption -Relative lack of social and environmental co-benefits
Tillage		- Reduced erosion	Low		- Questions of additionality, permanence - Potentially influenced by climate change
Enhanced Oil Recovery/ Geo storage		-Decreased dependence on foreign oil -Alternative to 'mining' for CO2	Net gain-low	- Huge potential for storage - Domestic fuel source	- Enables fossil fuel use, leading to more CO2 emissions

IV. FROM HOT AIR TO TRANSPARENCY: CERTIFICATION IN THE VOLUNTARY MARKET

In response to the high transaction costs and confusion caused by the wide range of offerings in the voluntary market, several organizations have developed, or are developing certification programs at the U.S. and at the international level. Certification, defined as a widely recognized label and uniform standard, could be an extremely beneficial tool to ensure a consistent level of quality, reduce transaction costs for buyers and build consumer trust. However, due to the various number of certification programs in the market and discord between the systems, currently certification is only partially reducing confusion. At the 2006 GreenT conference on, "Raising the Bar for Voluntary Environmental Credit Markets" various stakeholders discussed the role and conflicts between various standards and certification systems. Erin Kelley, Manager of Environmental Affairs at Interface, Inc, described her position as a buyer of VERs, "I'm not going to weigh in on the different standards, but I can say there are way too many… causing a tremendous amount of confusion."[104]

This section outlines the major certification programs in the U.S. and then compares several elements of the systems. The systems have a range of purposes and roles, but each of the listed organizations is similar because it has its own label and utilizes consistent standards. It is important to note that CCX has its own standards and hence represents a certification system within the CCX market. CCX standards are compared with others, but not discussed again in this section. As illustrated in Table 2, the WBCSD/WRI GHG Protocol Initiative is utilized by several certification systems. The GHG Protocol is not a certification system within itself but, "aims at harmonizing GHG accounting and reporting standards internationally to ensure that different trading schemes and other climate related initiatives adopt consistent approaches to GHG

[104] "Quality and Standards in the Environmental Market." GreenT Forum: Raising the Bar for Voluntary Environmental Credit Markets. New York, New York. 2-3 May, 2006.

accounting."[105] The GHG Protocol includes standards for corporate accounting and reporting, as well as project accounting.

4.1 The Voluntary Carbon Standard (VCS)

In March 2006, The Climate Group, the International Trading Association (IETA), and the World Economic Forum (WEF) sent the First Version of the VCS for Consultation out to selected stakeholders. The VCS aims "to provide a credible but simple set of criteria that will provide integrity to the voluntary carbon market and underpin the credible actions that already exist." [106] At the GreenT conference, Mark Kenber, policy director at the Climate Group, described the standard as creating a basic "quality threshold" in the market.[107] The standard follows the existing CDM approvals framework and the WBCSD/WRI GHG Protocol. A goal for this Voluntary Carbon Standard is for it to co-exist with other standards and "reinforce those that are robust and already exist (e.g. WBCSD/WRI GHG Protocol for Project Accounting, Gold Standard, and CCX) and give confidence to actors in this emerging market about the integrity of their investments. The second version of the VCS is planned for release on May 10th, 2006. Hence, elements currently described in the standard may be changed by the June 2006 planned public release.

4.2 ISO 14064

ISO 14064 is a global GHG accounting, reporting and verification standard. The standard is part of the ISO 14000 'family' of standards, which includes ISO14001, a well known environmental management system, "implemented by more than 90, 000 organizations in 127 countries." The goal of the standard is, "to provide a set of unambiguous and verifiable requirements or specifications to support organizations and proponents or GHG

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[105] *GHG Protocol Initiative: For Project Accounting.* World Business Council for Sustainable Development and World Resources Institute.

[106] The Voluntary Carbon Standard Verification Protocol and Criteria: Version 1 for Consultation. International Emissions Trading Association, The Carbon Group, and The World Economic Forum. 27 March, 2006.

[107] Kebner, Mark. "The Voluntary Carbon Standard." GreenT Forum: Raising the Bar for Voluntary Environmental Credit Markets. New York, New York. 2-3 May, 2006.

emissions reductions projects."[108] However, unlike the other certification programs ISO can be a 'process based' certification system, rather than a means of verifying a specific end product. On ISO's choice of additionality tests, ISO guidelines state that organizations can "select establish, justify and apply criteria and procedures for demonstrating that the project results in GHG emissions reductions or removal enhancements that are additional to that what would occur in a baseline scenario." Hence, the standard requires some test of additionality but does not require a specific test.[109]

4.3 The Gold Standard

While the VCS aims to set a quality threshold, the Gold Standard seeks to define the high- end market of carbon credits. The standard was an initiative of the World Wildlife Fund (WWF) and developed with variety of other NGOs, businesses and governmental organizations, in response to the concern that the majority of CDM projects do not have significant sustainable development aspects, despite the approval of sustainable development benefits by host country governments. Despite Kyoto Protocol language noting the role of CDM is providing such benefits, these NGO's believed that sustainability was not being prioritized since most project developers were drawn to the least expensive reduction activities. [110] While the CDM board has screened all projects for sustainable development benefits, according the Michael Schlep, Director of the Gold Standard, described only 34% of the CDM credits as contributing to sustainable development and the transition to sustainable energy technologies.[111] While the standard was originally created to supplement CDM projects, it now also certifies voluntary offset projects.

Credits certified by the Gold Standard have passed through three screens:

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[108] Kook Weng, Chan., Boehmer, Kevin. "Launching of ISO 14064 for greenhouse gas accounting and verification." ISO Insider. March- April 2006.
[109] Boehmer, Kevin, Secretary, ISO TC207 Working Group 5, Climate Change Canadian Standards Association 5060. Email correspondence. 7 May, 2006.
[110] "Realizing the Development Dividend: Making the CDM Work for Developing Countries." p. 25. And Schlup, Michael. "The Gold Standard: Linking the CDM to Development and Poverty Reduction." Paper presented at the Climate or Development, Hamburg Institute of International Economics 2005.
[111] Schlup. "The Gold Standard: Linking the CDM to Development and Poverty Reduction."

- **"***Project Type screen* – supporting non-fossil energy sources in order to contribute to the long-term change of the energy sector.
- *Additionality screen* – providing assistance in evaluating whether or not a project leads to a real net reduction of global emissions beyond a business-as-usual scenario.
- *Sustainable Development Screen* – giving guidelines and frameworks for a transparent sustainable development impact assessment, meaningful stakeholder consultations involving local communities and NGOs and potential Environmental Impact Assessments."[112]

After passing through these screens, CDM credit serial numbers are linked into the Gold Standard database. The standard is in the midst of creating registry procedures for VERs to ensure the quality of the credits, and that they cannot be sold multiple times.[113]

Along with providing incentives for sustainability, the Gold Standard also aims to reduce buyer's risk. According to a BASE and Gold Standard Press Release, "Gold Standard credits mean less risk for investors and fair carbon prices for project developers whilst directly supporting sustainable development strategies in host countries."[114] Matt Spannagle, a member of the standard's Technical Advisory committee, describes the Gold Standard as aiming to avoid the "grey areas" of carbon credit quality, and notes that some organizations do have a higher willingness to pay to avoid the risk of purchasing low quality credits. A number of major voluntary Gold Standard certified purchases are validating this point. For example, the FIFA World Cup has initiated a "Green Goal", which includes offsetting an estimated 100,000 tons of greenhouse gases predicted to be emitted due to event activities, mainly due to vehicle traffic. About 1/3 of these credits bought are CDM Gold Standard carbon credits.[115]

The Green Goal project seems to exemplify the Gold Standard mission. The offset project is being carried out by an Indian organization, Women For Sustainable Development and is using "Family Clean Energy Packages," biogas systems which run on fermenting cow

[112] The Gold Standard website. http://www.cdmgoldstandard.org/how_does_it_work.php?id=42 . Viewed May 1, 2006.
[113] The Gold Standard website. http://www.cdmgoldstandard.org/how_does_it_work.php . Viewed May 7, 2006.
[114] Ibid.
[115] Muenzing, Tim. "Scoring the Green Goal." September 2004. http://www.greenbiz.com/news.

dung. According to the Green Goal website, these biogas systems will replace the current use of kerosene and wood, saving about 30,000 tons of CO2 emissions over the duration of the project and providing social and environmental benefits. "The new technology will protect both local timber resources and the health of women and children. More women die of respiratory illnesses through smoke from open stoves in India than they do from malaria." The price paid to support this project is around €10/ton.[116]

4.4 Climate, Community, and Biodiversity Alliance Standards

One distinct feature of the Gold Standard is that it does not certify sequestration projects. In contrast, the Climate, Community, and Biodiversity (CCB) Alliance's Standards only evaluates land-based carbon mitigation projects.[117]

The CCB Alliance is based in D.C. but focuses on international projects. The Alliance was formed by a group of companies, NGOs and research institutes, such as The Nature Conservancy, The Center for Environmental Leadership in Business (created by Conservation International), British Petroleum, Intel, and Hamburg Institute of International Economics (HWWA), with the goal of promoting, "integrated solutions to land management around the world."[118] The CCB Standard was created to support land management projects that sequester GHG, support sustainable development, and conserve biodiversity. A goal of the standard is also to mitigate risks for investors and increase funding opportunities for project developers.[119]

4.5 Climate Neutral Network

Numerous U.S. based companies have linked with the Climate Neutral Network, a non profit with the goal of "helping companies, communities and consumers achieve a net zero impact on the Earth's climate."[120] Rather than directly certifying credits, the organization certifies products, events, or organizations with its *Climate Cool* logo as a

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[116]"FIFA World Cup tournament to be 'climate neutral' for the first time ever" 10 March 2006. http://fifaworldcup.yahoo.com/06/en/060310/1/69mb.html

[117] CCB website. http://www.climate-standards.org/standards/index.html . Viewed: 5 May, 2006.

[118] The CCBA website. http://www.climate-standards.org/index.html Viewed May 3, 2006.

[119] Janson-Smith, Toby. Director, Climate, Community & Biodiversity Alliance. Personal Interview: 7 May, 2005.

[120] Climate Neutral Network website. http://www.climateneutral.com . Viewed: 4 May, 2006.

brand trademark. Climate Neutral Network certifies projects and also works directly with institutions to become "net zero" emitters or to create products for the consumer market.[121] According to the organization's website, "A principal goal of the Network is to completely offset the greenhouse gases generated at each stage of the life-cycle of a product or service: the sourcing of its materials; its manufacturing or production; and its distribution, use, and ultimate end-of-life disposition. Companies or institutions that offset all of the gases resulting from the full spectrum of their internal operations can also receive Climate Cool enterprise certification."[122]

The Network seems to be a hybrid between a consultant and a certifier. For example, the Network's standards are based on its "Design Principles," which is a list of key services such as certification at any point in the supply chain, creating new 'climate cool' products, "empower new Climate Cool enterprises," "maintaining integrity of the climate cool brand," and "encourage tax benefits."[123] After working through Climate Neutral Network standards, the "Climate Cool" logo is licensed to Climate Cool certified companies to utilize for their own company or product branding.[124] Examples of events and products certified include: The rock band, Dave Matthews Band, certified a recent band tour as Climate Cool. Shaklee US, a product company, offset emissions for their entire business operations, earning the title of the "first Climate Neutral Enterprise." And Interface carpet has created the option of buying Climate Cool carpet. Two organizations selling retail offsets, Bonneville Environmental Foundation, and Triple E Better World Travel, also cite Climate Neutral Network as a certifier. [125]

4.6 Green-e

Green-e is the most widely accepted certifier of RECs in the United States and is currently creating a third party verification standard for RECs as carbon offsets and a registry for other types of offsets verified under approved third party verification

[121] Hall, Sue. Climate Neutral Network. Personal Interview. 19 May, 2004.
[122] Climate Neutral Network website. http://www.climateneutral.com/pages/standards.html . Viewed 3 May, 3006.
[123] Ibid
[124] Ibid
[125] Ibid

standards.[126] Lars Kvale of Green-e describes the goal of the offset registry to be a similar system to the registry the organization uses for RECs, and "to make sure things match up at the back end and to protect buyers from issues such as double counting,"[127] After 8 years in operation, the organization has managed to secure a wide REC market segment and high levels of confidence.[128] Describing Green-e, Rob Harmon, Vice President of Renewable Energy Programs at Bonneville Environmental Foundation, states, "I trust these people."[129]

Green-e's steps toward certification of REC's for carbon credits are driven by the fact that numerous retailers are offering GreenE certified RECs as carbon credits, but that these RECs where not certified with the purpose of being carbon offsets. Because of Green-e's wide acceptance in the REC market, Tom Arnold, of the retail organization Terrapass, asked GreenE to act as third party verification for Terrapass, whose offsets include a combination of CCX and REC credits. [130] This request led to Green-e's 'pilot' venture into carbon credit certification. This third party verification process includes addressing and confirming the following issues:

- "Balance of supply and sales: Terrapass REC and carbon purchases are in balance with our consumer and business sales obligations.
- Carbon content on RECs
- All purchased RECs meet Green-e criteria
- Purchases are adequately contracted, documented and have matching attestations."[131]

The REC certification process and registry is still in the midst of development. A first draft of the project will be distributed for stakeholder comments this summer.[132]

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[126] Kvale, Lars. Measurement & Verification Services Analyst, Center for Resource Solutions. Personal Interview, March 16, 2006.
[127] Ibid.
[128] Various interviews
[129] Harmon, Robert. Vice President, Renewable Energy Programs, Bonneville Environmental Foundation. Personal Interview: 9 December 2005.
[130] Arnold, Tom. Chief Environmental Officer, Terrapass. Personal interview: 9 December, 2005.
[131] Terrapass website. http://www.terrapass.com/verification.html#greene .

Table 2: Major Certification Programs/ Standards Available or Soon to be Available for the U.S. Voluntary Carbon Offset Market

	Gold Standard	The VCS	Climate Neutral Network	Green-e	CCB Standards	CCX	ISO 14064 Standard
Additionality Tests			**Technical, Financial & Environmental**				**Org can choose which type of test**
Env. & Social Co- Benefits			**Strongly Encouraged**				
Beyond credits: Org emissions reductions							**A process based certification**
Requires Monitoring							
Reporting/ Registration	**For VERs in development**						
WBCSD/WRI Protocol						**Only corporate accounting not project accounting**	
Certification Outside the U.S.			**Orgs certified in UK, Australia and Canada**			**Offsets from Canada, Mexico, Brazil**	
Compatible with other standards						**Only CDM standards**	
Sequestration					**Only Forestry**	**Only Land-based projects**	**Does not specify project types**
Off-grid Renewables							
Energy Efficiency							
Methane		**Only municipal waste**					
RECs							
Other Project Types		**Waste gas capture/ recovery (N20, HFCs, PFCs, SF6,)**					

[132] Kvale, Lars. Measurement & Verification Services Analyst, Center for Resource Solutions. Personal Interview, May 8, 2006.

4.7 The Road Ahead

The vast majority of representatives of offset providers and buyers interviewed for this paper cited consistent standards and certification as a critical component of decreasing the confusion involved in navigating the voluntary carbon offset market. Like market mechanisms themselves, certification processes will need to be flexible enough to adapt to the evolving offset market.

V. DECISION PROCESS & CRITERIA

When choosing to purchase carbon credits, institutions, in addition to understanding key components of the voluntary market, need to understand their own needs and goals. This section outlines a suggested decision process and utilizes tools from decision theory and the Analytic Hierarchy Process.[133]

5.1 GHG Footprint

Since offsetting an event or activity is a major components of most organizations' goals in offsetting, whether an institution is planning to offset a single event, a single type of activity (such as flights), or a percentage of their operations, institutions must first determine the scope at which to measure an estimate of GHG emissions. Like many aspects of purchasing offsets in the voluntary market, organizations calculating emissions must determine in relationship with their needs the balance between accuracy and efficiency. To offset relatively simple activities, such as flights, vehicle travel, or energy use, numerous online calculators are available; most of them sponsored by retail carbon offset organizations. Customers provide relevant input, such as number of miles they drive per year, and their car make and model. Calculators translate input into amount of carbon tons generated by the activity—and the hence carbon credits customers need to buy to offset the activity.

Like offsets themselves, most organizations' calculators represent a compromise between quality (accuracy) and cost (customers time). However this compromise means that with the same input calculators have a range of results. For example, a customer wishing to offset driving 6,000 miles a year in a vehicle averaging 22 miles, uses relatively similar inputs in various calculators but comes up with a range of "footprints." The calculators of Certified Clean Car and Native Energy estimate about 2.5 metric tons of carbon dioxide emitted. However, according to Driving Green the same vehicle emits 2 metric tons.[134] As the complexity of the activity increases, website calculators generally represent

[133] Saaty, Thomas. "How to Make a Decision: The Analytic Hierarchy Process."
[134] Makower, Joel. "Climate Neutral Driving Gets in Gear." Joel Makower website. http://makower.typepad.com

rougher and rougher estimates of the GHG impact. For example, many calculators determining the footprint of an event utilize national averages of gas mileage etc. to simply the input process. Depending on the demand side needed level of legitimacy, such estimates may or may not be appropriate.

Calculating more complex activities, such as large events or institutional operations, generally requires a more complicated GHG inventory that may be done internally or by consultants. Ideally such calculations would include wide considerations of scope. However, due to time and money constraints at some point, various emissions must almost always be estimated. For example, when calculating emissions from an event, transportation of guests to the event, and electricity use at the event is relatively simple. However, examining issues such as the amount of emissions resulting from food consumed at the event involves examining emissions from an extremely wide geographical and temporal perspective.

5.2 Gauge Ability to Reduce Emissions

Ideally, purchasing carbon credits should be pursued only after direct emission reduction options have been considered. From an environmental perspective, directly reducing "in-house" emissions by increasing efficiency, reducing energy consumption, etc. is a critical component of GHG mitigation and results in fewer co-pollutants as well. From an economic perspective reducing emissions is often less expensive than purchasing offsets.

5.3 Understand Needs and Stakeholders

To effectively choose amongst the range of carbon credits available in the voluntary market, institutions should define their goals in purchasing offsets. As discussed in Section I, key reasons that organizations choose to voluntarily offset their emissions include a sense of moral responsibility, public relations, brand image, and stakeholder pressure/satisfaction. When choosing offsets institutions should consider such issues as:

- The values/ mission of the institution
- Relevant Stakeholders in the process
- Stakeholder interest/knowledge of the process

- Any unique interests of the stakeholders or institution
- The level attention the offsets could receive
- Purpose of purchasing the offsets

Clearly outlining these needs and goals can help an organization determine the amount of effort and money they should allocate to their offset purchase, as well as determine desirable offset characteristics. For example, in recent years the World Bank has chosen to offset its operation emissions. The decision criteria used to purchase these emissions, includes a strong emphasis on sustainable development benefits because of the mission of the organization, and an emphasis on quality emissions because of the visibility of the organization's choices.

5.4 Examine Key Risks and Benefits

Institutions purchasing carbon credits without regulatory pressure as a primary driver and with the goal of 'retiring' such credits face slightly different risk factors than companies investing in offsets due to regulation or with plans to sell the credits. Process risks include: reputational risk, the risk of overpaying for offsets, lack of stakeholder interest, or the risk of making long term promises that could become extremely expensive since the long term price of carbon credits in uncertain. Project risks include the possibility of project failure and expected offsets do not occur, the influence of climate change on sequestration, miscalculations, or the uncertainty of science and that new knowledge discredits assumptions/expectations. The benefit of voluntarily purchasing offsets, is that for most institutions, much like philanthropy donations, the risks involved with 'doing good' are often relatively low compared other risks institutions face.

5.5 Consider diversification

One option appropriate for some organizations is to balance risk via portfolio diversification. Portfolio theory is a concept based on the premise that investing in diversified assets can reduce overall portfolio risk while helping ensure a given level of

expected return.[135] In portfolio theory there are two types of risk. Systematic risk is an 'umbrella' or macro concern inherent to the investment arena. Alternatively, unsystematic risk is specific to a particular situation, country or organization. In the case of purchasing carbon credits, regulation, or the influences of climate change occurring could be considered systematic risks. Risks associate with various project types or project locations would be considered unsystematic climate risk. Institutions should consider how they can control unsystematic risk factors, which may include creating a portfolio that 'balances' various risks. For example, a project portfolio could include projects from several project types or locations. Further benefits from diversifying the portfolio include the chance to invest in variety of interests, such as a local project and a sustainable development project, and the chance to explore various options in the voluntary carbon market.

Diversification also has its challenges. Purchasing offsets from a variety of organizations often increases transaction costs. For public relations purposes a broad portfolio may take longer to explain. Institutions may prefer to establish relationships with only one or two providers. Offsets are often less expensive when bought in bulk. Hence, despite the opportunity to balance unsystematic risk, many institutions, especially for small purchases, may be best served by investing in offsets from one type of project or with one type of organization.

5.6 Define Decision Criteria

The determination of a 'good' offset is hugely determined by the goals of the buyer, market, or policy. Determining and weighing the relative importance of institutions' decision criteria is a key step for institutions carefully considering what type of offsets to purchase.

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[135] Wellington, Fred., Sauer, Amanda. "Framing Climate Risk in Portfolio Management." CERES., World Resources Institute. May 2005.

Table 3: Common Criteria Used for Selecting Offsets

Criteria	Sub- criteria/ Indicators
Additionally	- Conservative baseline calculations, and that potential leakage issues are explained. - Emissions that are tracked and registered (to avoid double counting & clearly demonstrate ownership) - Choice of additionality tests
Social co-benefits	- Recreation - Sustainable development vs. local (for U.S. based institutions) benefits - Improved quality of locals' life (ex. reduced odor from livestock
Environmental co-benefits	- Reduction of co-pollutants (in air and water) - Biodiversity benefits (ex. native species in forestry)
Consistent Quality Standards	- Rigorous accounting - Certification/ third party verification
Stakeholder appeal/ messaging	- Ease in communicating offset concept - Emotional appeal - Specific interests of stakeholder
Match Offset to Emission	- Purchasing RECs only for electricity use
GHG Successfully Offset	- Project likely to be successful - Conservative calculations - Offset registered to avoid double counting
Institutional/ personal factors	- Relationships, loyalties and connections

Selecting and evaluating the relative importance of these criteria plays a critical role in navigating the voluntary market. Defining such criteria can enable institutions to determine non- negotiable values than can screen projects, help with ‘pair wise’ comparisons, or be used to compare all criteria and project types at once. A tool utilizing a simplified AHA weighing process is explained in Annex 3 and attached as an Excel spread sheet.

VI. CASE STUDIES

The following case studies illustrate how two organizations, Interface and the Yale School of Forestry and Environmental Studies (F&ES), have navigated the voluntary market. The Interface case is an example of a corporation's path to purchasing of hundreds of thousands of carbon offsets. The F&ES case is an example of a small purchase by an institution focused on education.

6.1 Interface and Climate Cool Carpet

Interface is a floor covering and fabrics company renowned for its proactive environmental policies. Interface describes itself as, "a resource-intensive company whose largest divisions are petroleum dependent."[136] While the company began in 1973, it wasn't until 1994 when Interface's Chairman and CEO, Ray Anderson infused sustainability into the company's core business practices. The company now focuses on "Seven Fronts" of sustainability: eliminate waste, benign emissions, renewable energy, closing the loop, resource- efficient transportation, sensitizing stakeholders, and redesigning commerce. This sustainability focus led Interface to become an institutional pioneer in the U.S. voluntary carbon market. Concerned about climate change, in the mid nineties the company first began purchasing offsets for an internal program "Trees For Travel," which purchases and retires offsets from forest sequestration to cover the GHG resulting from employee air miles.

In 2003 the company furthered its efforts in GHG mitigation and began offering customers the "Climate Cool" carpet option. Customer's who decide to purchase this option pay about 1% more to neutralize the GHG impacts of the carpet purchased from Interface. Since 2003, about 20% Interface's carpet customers have chosen to purchase more than 15 million square yards of Climate Cool carpet.[137]

[136] Interface Sustainability website. http://www.interfacesustainability.com/. Viewed 6 May, 2006.
[137] Ibid

As a leader in the sustainable business community, the company felt strongly about getting the 'right' offsets. Finding such offsets was, and continues to be a major a challenge for the company. Erin Kelley, Manager of Environmental Affairs at Interface, describes the process of learning how to buy offsets as a multi- step process. After first deciding to purchase offsets, the company sent out a request for proposal simply asking for carbon offset credits. Kelley notes, "at that point we hadn't even thought of specifying particular criteria." In response to this request, the company received offers for an enormous number and range of types of offsets. "Then we realized we didn't know enough about carbon offsets to buy offsets." So the Interface team began meeting with brokers, which Kelley describes as a second frustrating experience. "The brokers only cared about how big the transaction was… most had never heard of additionality." [138] Finally the company joined forces with Carbon Neutral Company to help guide in the process of purchasing offsets, and creating the Climate Cool carpet brand. Currently, for Climate Cool projects in the U.S. the company buys offsets directly from providers but works with a third party verifier and the Carbon Neutral Company to ensure they match the company's goals.

Interface applies two different levels of criteria to the offsets they purchase for the Climate Cool carpet versus their internal emissions. All the offsets are held to a baseline set of criteria: Interface's additionality tests (a blend of financial and 'business as usual' considerations), third party verification, and likely project success or already generated offsets.[139] Kelley stated, "We try to be as stringent as possible in to determine additionality for both the offsets for our in-house emissions."[140] Projects must pass through several layers of reviewers, Interface staff, independent third party verification, and then go through the Climate Neutral Network. To help ensure the company is receiving what it expects, offset contracts include fine and penalty clauses to help protect Interface from purchasing misrepresented offsets.

[138] Kelley, Erin. Manager Environmental Affairs. Interface. Personal Interview. 7 May, 2006.
[139] Kelley, Erin. Manager Environmental Affairs. Interface. Email Correspondence. 8 May, 2006.
[140] Ibid

For offsetting in-house emissions, in addition to the baseline quality standards, the company also strives find easily understandable carbon offsets originating from projects close to home with the goal of "employee education and engagement in our sustainability mission." Projects used to offset in-house emissions include major tree planting projects with the non- profit American Forests in California and the South (two regions where Interface has a plants) and the Northeast. Kelley notes one reason behind choosing these forestry projects, "Trees is one area of carbon sequestration that everyone understands, even little kids understand… people get it."[141]

However, as the company's website states, "Addressing the global warming impact of carpet goes far beyond planting trees to remove CO_2 from the atmosphere."[142] Hence, especially for Cool Carpet offsets, the company has also chosen to support a variety of project types. Sources of the company's offsets include: emission reduction credits through Native Energy from family owned dairy farms in Pennsylvania and Wisconsin, and wind energy projects in the Midwest; credits from Dow generated from the production of wood stalk fiber board; energy efficiency projects in South Africa; and a reforestation project in Uganda.[143]

According to the company's website they've "retired more than over 250,000 metric tons of carbon dioxide (CO_2) emissions, which equates to 58,000 cars taken off the road for a year, or over 28 million gallons of gas not consumed."[144] Due to Interface's experience in the market, Kelley describes frequent calls from other companies wishing to offset their emissions and notes that the Interface process is not for everyone. Unlike Interface, which hand picks projects to invest in, few companies can or will commit an equivalent chunk of time to the offset purchase. However, after working in the market for the past four years, Kelley is optimistic. She describes it as moving closer and closer to where it needs to be: "A buyer friendly market facilitating simple, credible transactions." She adds that the last piece is "how we're all going to agree what that looks like."

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[141] Ibid
[142] Interface website. http://www.interfacesustainability.com/ . Viewed May 6, 2006.
[143] Ibid
[144] Interface Sustainability website. http://www.interfacesustainability.com/. Viewed May 5, 2006.

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6.2 The Yale School Forestry and Environmental Studies 2006 Graduation

While walking to receive their diplomas, members of the Yale School of Forestry & Environmental Studies (F&ES) Class of 2006 also worked to 'walk the talk' on mitigating greenhouse gases and solid waste. Due to student initiatives, the graduation was both 'low waste' and 'low carbon.' The decision to offset GHG emissions and minimize solid waste resulting from graduation activities was based on trying to reduce the environmental impact of the event and seizing an opportunity to educate family and friends about means of reducing their own impact on the planet and about issues they had been studying. A brunch before graduation served as a key venue for educating about offsets through educational materials, carbon footprint calculations and speakers. The process of determining the amount of offsets needed, raising funds, and purchasing offsets was managed by a group of four graduating students.

In coordination with purchasing offsets students worked to reduce solid waste. It was estimated the luncheon before the graduation could generate over 800 pounds of waste.[145] To reduce this amount of trash headed for landfills and incinerators, virtually all waste generated was reduced, reused, recycled or composted. The luncheon utilized biodegradable corn-starch plates and cutlery, recycled napkins, and locally grown organic food and flowers. Students and guests are encouraged to bring their own mugs for drinks. As much of the waste as possible was recycled or composted at the Yale Sustainable Food Project's organic vegetable garden.

Offsetting emissions with the goal of a 'carbon neutral' F&ES graduation was a second step taken to reduce the event's impact on the environment. In March 2006, members of the Class of 2006 began collecting information on GHG emissions related to the event. The largest part of these emissions came from the travel of guests to graduation – by planes, trains and cars coming from as far away as Bhutan and as close as down the street. The organizing committee conducted a survey to find out exactly how many people

[145] Feingold, Beth. Yale School of Forestry and Environmental Studies. Email Correspondence. 15 May, 2006.

would be traveling to the event and their modes of transportation. A unique aspect of the F&ES process, connected to the idea of personal responsibility, was that each graduating student was then given an estimate of carbon dioxide emissions resulting from their guests travel. Including emissions from energy use at the event and from travel, it was estimated the class needed to offset 325 tons of carbon dioxide.

Due to time and energy limitations, factors such as the impact from food consumed, catering services (ex. biodegradable, disposable plates), and educational material was not considered. According to Catherine Schloegel, one of graduating student who organized the process, "We worked hard to be accurate, but also to be practical when calculating the emissions. For example, to manage the scope we didn't include emissions resulting from the food served, or electricity use in local hotels. Hence, it is almost impossible to be carbon-neutral in the absolute sense of the term, but our carbon footprint has been drastically reduced."[146]

Key stakeholders for the transaction were the range of students at the school, the F&ES administration, faculty, groups selling offsets to the school, and visitors. The backgrounds, interests, and concerns of students and staff played a major role in shaping the criteria for offsets purchased. For example, because the various academic interests at the school, it was decided that part of the portfolio should be from native forestry, part from a U.S. based project, and part from a project in a developing country. To purchase the offsets, students send out a request for proposal (RFP) listing specific criteria to a range of retailers.

The graduation offset portfolio combined offsets from two different suppliers, Sterling Planet and the Solar Electric Light Fund (SELF). Sterling Planet supplied wind energy for the event via renewable energy certificates and forestry-based offset credits from a native tree planting project in the Mississippi River Valley managed by The Conservation Fund's Go Zero program. The Solar Electric Light Fund provided offsets resulting from

[146] Schloegel, Catherine. Yale School of Forestry and Environmental Studies. Personal Interview. 15 May, 2006.

the replacement of diesel generators with solar panels in a village in Nigeria. Each of these projects passed criteria set by F&ES, and were chosen to create a portfolio that balanced the class values and project risks. The organizations has demonstrated how their projects generated offsets, that they have clear ownership of the offsets and the offsets are all third party verified to confirm that reductions are actually occurring. The projects chosen also met co- benefit criteria, such as reducing other air pollutants, providing habitat, or contributing to sustainable development.

Both the 'carbon neutral' and 'waste-free' elements of the graduation have been designed by students as pilot projects that will ideally contribute to the implementation of similar initiatives throughout Yale University.

CONCLUSION

Clearly, navigating the voluntary market 'nebula' is not as simple as purchasing a regulated commodity. However, institutions willing to experiment in this new market can have considerable opportunities to contribute to global GHG reductions via carbon financing. The process of defining 'what type of offset credit to purchase' can be answered in two parts. First institutions will benefit from understanding the components and dynamics of the still cloudy market. Ideally this paper and additional research working to piece together the fragments of the voluntary market will assist in this process. Second institutions need to carefully consider their place in the present state of the market place, outlining the goals of the purchasing offsets and how their purchase contributes to the shape of a developing market.

ANNEX 1: U.S. Offset Retail Organizations

Name	Website	Project Type	Project Location	Price/ tCO2e	Org Type
Mercy Trust/ The Climate Trust	http://www.carboncounter.org	Emissions Reductions	U.S./ International	$10	Non profit
Bonneville Environmental Foundation	http://www.b-e-f.org/	RECs	U.S.	$15	Nonprofit
Climate Save	http://www.climatesave.com/	RECs	U.S.	$1.68	For profit
PVUSAsolar/ Certified Clean Car	http://www.pvusasolar.com/	RECs	U.S.	$11	For-profit
Native Energy	http://www.nativeenergy.com/	RECs	U.S.	$12	For-profit (offsets via non profit)
Drive Green	http://www.agcert.com/	Livestock methane	U.S./ Mexico	$5- 7	For profit
EBlueHorizons	http://www.e-bluehorizons.net	Methane/ forestry	U.S.	$5	For profit
AtmosClear ClimateClub	http://www.atmosclear.org	Landfill Methane	Midwest	$5	For profit
Terrapass	http://www.terrapass.com/	Recs/ CCX	U.S.	$9-$11	For profit
American Forests	http://www.americanforests.org	Forestry	U.S.	unclear	Nonprofit
Drive Neutral	http://driveneutral.com/	CCX	U.S.	unclear	For profit
Natsource	http://www.natsource.com/buycredits	HFC-23, Enhanced Oil Recovery, Fuel switch	U.S.	$4	For-profit
Carbon Fund	http://www.carbonfund.org	Methane	U.S.	$5	For profit
Sustainable Travel International (credits from My Climate)	http://www.sustainabletravelinternational.org	Emissions Reductions	International	$18-30 Priced by flight	For profit
Better World Travel	http://www.betterworldclub.com	Mix		($11 or $22)	For profit (via non profit)
The Conservation Fund: Go Zero	http://www.conservationfund.org	Forestry	U.S.	$4	Nonprofit

ANNEX 2

Examples of U.S. & International Wholesale Only

Name	Website	Project Type	Project Location	Org Location	Org Type
The Nature Conservancy	http://www.nature.org/	Forestry	Int'l	Int'l	Non-profit
Conservation International	http://www.conservation.org	Forestry	Int'l	Int'l	Non-profit
SELF	http://www.self.org	Solar Energy	Int'l	Int'l	Non-profit
Reforest the Tropics	http://www.reforestthetropics.org/	Forestry	Costa Rica	Costa Rica/ U.S.	Non-profit
Plan Vivo/ ECCM	http://www.planvivo.org	Forestry	Int'l	U.K.	Non-profit

Examples of International Retailers

Name	Website	Project Type	Project Location	Org Location	Org Type
Green Fleet	http://www.greenfleet.com.au	Forestry	Australia	Australia	Non-profit
The Carbon Neutral Company	http://www.carbonneutral.com/	Mix	Int'l	U.K.	For-profit
Climate Care	http://www.co2.org	Mix	Int'l	U.K.	For-profit
Business for Climate	http://www.businessforclimate.nl	Mix	Int'l	E.U.	For-profit
Futoro Forestal	http://www.futuroforestal.com	Forestry	Panama	Germany/ Panama	For-profit
Offsetters (partner with Climate Care)	http://www.offsetters.ca/	Mix	Int'l	Canada	For-profit

ANNEX 3

Decision Criteria Excel Sheet Directions

1. Define Relevant Criteria
2. Allot 'points' in "Weighted Value" row from total score of 100 to signify weight of criteria
3. Score irrelevant criteria with a zero
4. Rate each offset option 1-5 in under each relevant criteria
5. If price is relevant, note price in the cost column
6. Excel sheet will calculate company scores, and "value/ dollar" score

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