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Greening Research Networks: Carbon Offsetting

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[1] *The views expressed are attributable only to the author in a personal capacity and not to any institution with which they are associated.*

Executive Summary

This paper seeks to answer the question of how to 'green' an academic research network through carbon offsetting. Conventional strategies for greening organizations (understood as lessening the organization's *carbon footprint* to the point of *carbon neutrality)* propose a series of 'steps' for organizations to follow in order to ensure the process remains standardized, in terms of quantifying impact, and exhaustive, in the sense that organizations do all that is possible to reduce their own footprint before investing in the activities of others to compensate for their remaining impact (the process known as 'offsetting'). Because of their unique organizational structure and operational environment, research networks may be limited in their abilities to quantify their total footprint or significantly reduce their footprint by adjusting their own activities.

Offsetting, as such, is an integral tool in the overall process of greening these organizations. This paper provides an overview of the features of carbon offsets and offset markets that determine the degree to which purchasing offsets effects lasting reductions in greenhouse gas emissions (the measure of a carbon footprint) and promotes meaningful steps towards sustainable development. It then makes suggestions on how research networks can most effectively and efficiently offset their conferences and workshops, including how to appropriately utilize network resources, which types of offsets to purchase, and from where to purchase them. In practice, this entails distinguishing between a role for the network administration and the individual participants in quantifying and offsetting their activities, and then selecting and purchasing, from the retail market, offsets that were produced by projects verified to be truly 'additional' by internationally recognized verification regimes like the Gold Standard or the Voluntary Carbon Standard 2007. In the final section the paper comments on particular offset retailers available in the Canadian context to guide the choices for research networks.

Introduction[2]

The Social Sciences and Humanities Research Council of Canada (SSHRC) launched the *Strategic Research Clusters Design Grants* funding program in 2004 in order to encourage cooperation, networking, and collaboration in the social sciences.[3] SSHRC defines a strategic research cluster as "a national or international network of researchers in the social sciences and/or humanities that fosters collaboration and contributes to knowledge mobilization."[4]

One such cluster is the *Canada-Europe Transatlantic Dialogue: Seeking transnational solutions to 21st century problems*, first established in 2004 and based out of the Centre for European Studies at Carleton University in Ottawa, Ontario, Canada. This Cluster seeks to promote research on relations between Canada and the European Union, and on policy challenges of common concern to Europe and Canada within five 'thematic research groups': the environment and sustainable development; immigration and social policy; economic cooperation, competition and international law; 'democratic deficits' and policy coordination in multi-level systems; and the EU and Canada as global actors in international conflict management and security.[5] One question that the research group on environment and sustainable development has sought to answer is what would it take to 'green' an organization such as itself? (Hereafter, this paper will refer to organizations such as strategic research clusters as *research networks*).

Greening any organization is a complex and multistep process. The first step is to define what it means to be 'green', preferably in a fashion that allows for quantitative measurement of one's success in meeting this goal. One such measurement is *carbon neutrality*; a state at which

[2] Research funded by *Canada-Europe Transatlantic Dialogue* (www.carleton.ca/europecluster)
[3] David Graham (2005) "Very Well Connected: Frameworks for Strategic Research Clusters: A Report on the Clusters Design Grants Process", available from http://www.sshrc.ca/web/apply/background/clusters_report_e.pdf
[4] SSHRC, "Strategic Knowledge Clusters", available from http://www.sshrc.ca/web/apply/program_descriptions/knowledge_cluster_e.asp
[5] See the website for the "Canada-Europe Transatlantic Dialogue", Carleton University, available from http://www.carleton.ca/europecluster/index.html

one's *carbon footprint* (the environmental impact of one's activities measured in emissions of greenhouse gases, or GHGs) is reduced to the point of net-zero emissions. After quantifying its initial or 'baseline' carbon footprint, the organization would then try to change or alter its typical business practices so as to reduce as much as possible the emissions generated directly in the production or delivery of its goods or services, or indirectly through the organization's procurement practices or electricity purchases (such as the emissions associated with materials purchased from non-environmentally friendly sources or electricity produced by coal plants, for example).

The fourth step, and the focus of this paper, is to 'offset' the remaining emissions by purchasing and retiring carbon credits. Given their non-hierarchical, decentralized structure and the fact that they typically operate out of multiple, larger institutions (namely, universities), research networks may be limited in their ability to carry out fully all of the steps for attaining carbon neutrality. Offsetting, however, is a convenient and accessible tool for these organizations to reduce their overall carbon footprint, provided they take steps to ensure they are purchasing 'quality' offsets. After reviewing the features of offsets and offset markets that determine their overall quality and investigating several of the controversies surrounding offsets' actual contribution to reducing greenhouse gas emissions this essay suggests some simple guidelines and practices that networks can follow to ensure their investments in offsetting are effective in combating climate change, and gives several examples of Canadian retailers who provide such quality offsets and services.

Why Offset?

Purchasing carbon offsets is one way that individuals and organizations can encourage the reduction of global greenhouse gas (GHGs) emissions. Emissions of GHGs are the main contributor to human-induced climate change which, as outlined in the latest summary report by

the International Panel on Climate Change, threatens rapid and widespread changes to global climate patterns, ocean levels, ecosystem stability and biodiversity.[6] A carbon offset is an emission reduction credit representing one tonne of avoided GHG emissions (measured in carbon dioxide equivalency),[7] that is generated by a project which leads to lower levels of GHGs than would have occurred in the project's absence. Since these projects often need the capital from offset revenues to be viable (indeed, this is a critical element in determining good quality offsets from bad ones), purchasing offsets helps to reduce our overall impact on the environment and combat global climate change.

The total impact of an organization on the environment, measured in emissions of GHGs, is known as its *carbon footprint* – a two component measure composed of a primary and a secondary footprint. The primary footprint refers to the on-site or internal emissions produced in the course of the organization's primary activities (such as the production or provision of its own goods and services). These are emissions that the organization has *direct* control over. The secondary footprint consists of all the off-site or external emissions that are 'embodied' in the products and services that the organization purchases from other organizations (such as electricity from a coal plant). These are emissions the organization has only *indirect* control over.[8] Reducing ones footprint to a level where emissions of carbon are 'net-zero' is referred to as *carbon neutrality*, which is a key element in the overall 'greening' of an organization. Achieving carbon neutrality is a multistep process, which, as noted above, begins with quantifying emissions and may end with purchasing carbon credits to 'offset' emissions that could not have been otherwise eliminated.

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[6] See the International Panel on Climate Change (2007) Climate Change 2007: Synthesis Report, Summary for Policymakers", Valencia, Spain, p. 20.

[7] There are six types of greenhouse gases (carbon dioxide, methane, nitrous oxide, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride), which have varying 'global warming potentials' – a function of the absorption of infrared radiation, the spectral location of its absorbing wavelengths, and the atmospheric lifetime of the gas in question. Global warming potential is measured in units of carbon dioxide equivalent. HFC-23, for example, has a warming potential of 12000 at 20 years (1 tonne of HFC-23 is equivalent to 12000 tonnes of C02).

[8] Carbon Footprint, "What is a Carbon Footprint?", available from http://www.carbonfootprint.com/carbonfootprint.html

Though it is conventionally seen as the fourth step, there are two arguments that can be made about the structure and operations of research networks which suggest that carbon offsetting may be a significant means of attaining carbon neutrality for these organizations. For one, the structure of a research network may not be conducive to centralized, network-wide calculation and administration of the network's carbon footprint and steps towards achieving neutrality. Networks are by definition decentralized and geographically dispersed, with many individual researchers and small groups spread out across provincial and/or national boundaries. Accounting for the day-to-day actions taken by these individuals and groups by a central 'hub' would be overly time-consuming and resource intensive. Furthermore, research networks should aim to be 'organic', in order to adjust to changing research needs over longer time periods, to be able to accommodate a diversity of perspectives while never compromising the core principles of the cluster's project, and to develop multiple communication strategies to account for various audiences.[9] A strictly hierarchical and centrally administered research network would not be supportive of such institutional flexibility and diversity.

Second, research networks typically operate in the context of a larger institution; namely, the universities at which their individual researchers and groups are based. The individual researchers and groups that compose the network have little say over where their own universities purchase electricity, the general energy efficiency of its buildings, or the contracts the university has with suppliers of other products that may have significant lifetime emissions of GHGs. This means that networks have a limited ability to reform their activities so as to reduce direct and indirect emissions of GHGs, both integral steps to achieving carbon neutrality.

Networks do one thing in particular that is especially susceptible to carbon offsetting: they hold conferences and/or workshops that involve transporting participants to a central location. Assuming the network has done all that it can to alter or change this behaviour in order

[9] Graham (2005), p. 17

to reduce or prevent unnecessary GHG emissions,[10] there are two further steps research networks could take to 'green' these events: 1) the network can centrally calculate the overall emissions produced by the conference, such as resources used in preparing reports, papers, or agendas, the electricity used during the event, and the emissions cost of the housing provided for participants, and offset these emissions in bulk, or; 2) the individual participants can calculate the emissions cost of their transportation and offset it themselves. How networks should go about doing this, and what things they need to consider in order to ensure the offsets they purchase are of good 'quality' (in the sense that they actually contribute to reducing global emissions of GHGs), is taken up in the remainder of this paper.

What is a Carbon Offset?

As noted above, a carbon offset is a credit representing the prevention of one tonne of GHG emissions, which individuals and organizations may purchase to compensate for their own emissions that could not otherwise be eliminated. Yet, behind this seemingly simple transaction is a complex system of different offset markets, features, accounting systems, verification regimes and organizations. This vast array of oversight, standardization and management can seem baffling to the uninitiated, but is integral to understanding how offsets work and why they can be useful tools for greening research networks.

Offset Markets

There are two primary markets for carbon offsets: a compliance market and a voluntary market. In the much larger compliance market, buyers engage in carbon transactions because of current or anticipated emission constraints at the international, national, or sub-national level. The majority of the compliance market is made up of credits produced from projects that have been certified

[10] This could include holding tele- or videoconferences instead, choosing environmentally friendly buildings and hotels in which to hold the event and house participants, limiting printed material such as event agendas, papers, or journals, finding environmentally friendly catering companies, and many other actions.

through mechanisms established under the Kyoto Protocol.[11] These credits are called Certified Emissions Reductions (CERs), to signify that they have met international standards for production, accounting and overall quality. The smaller voluntary markets include all carbon offsets not required by regulation. Transactions in the voluntary market include the retail purchase of credits by individuals or companies to offset their own emissions, the purchase of credits directly from a project for retirement or resale, and the donation to GHG reduction projects by corporations in exchange for credits.

The voluntary market is broadly divided into two segments: the voluntary yet legally-binding cap-and-trade system that is the Chicago Climate Exchange (CCX),[12] and the larger, non-binding over-the-counter (OTC) market. Credits sold in the OTC market are referred to as Voluntary or Verified Emissions Reductions (VERs), which signifies that they've undergone a registration and verification process somewhat different than offsets produced for the compliance market. While VERs were in the past seen as inferior to CERs in terms of quality, a wide variety of verification and accounting standards have recently been developed for the OTC market that have largely addressed these concerns. Moreover, the wide variety of offset retailers in the OTC market have created a vibrant and competitive marketplace which provides many useful services and benefits for consumers, including easy-to-use emissions calculation tools, accounting and consulting services for businesses, and the ability to tailor purchases to satisfy personal tastes for certain types of offset projects.

Offset Features

Offsets have several essential features: location (the geographical location of the project), vintage (the year produced), source (the technology or project that led to reductions in emissions), and

[11] These include the Clean Development Mechanism (CDM) and Joint Implementation (JI) program. Both mechanisms were established to provide means through which countries and businesses could invest in environmentally-friendly projects in developing countries to meet their own emissions targets.

[12] A joint venture between the Chicago Climate Exchange and the Montreal Exchange has produced the Montreal Climate Exchange, a marketplace for trading emissions futures contracts. See the Montreal Climate Exchange, available from http://www.mcex.ca/aboutUs_overview_en

quality (a complex determination of numerous different criteria for standardization, accounting and verification). **Location** is more of a consumer preference than an indicator of quality; some consumers may wish to invest in projects located in specific countries (their own or others), depending on where they believe the greatest contribution to sustainability may be made. Since climate change is a global concern, however, the geographical location of GHG emissions is not directly relevant to mitigating it. The **vintage** of offsets in the OTC market is predominately the same as the year they are bought, although it is possible to purchase older or future vintages in contracts of 'forward purchasing.'[13]

There are five principal **sources** for offsets: 1) renewable energy projects; 2) energy efficiency improvements; 3) methane capture and/or flaming; 4) land use, land use change and forestry (LULUCF)[14]; and, 5) elimination of industrial gases. Not every source is seen as equal in terms of their contribution to combating climate change however, and consumer behaviour has increasingly been motivated by these concerns. In 2007, renewable energy-based credits composed the largest share of the OTC market at 31%, followed by energy efficiency at 18%; these two sources generally being considered the 'best' for producing tangible contributions to sustainability. This demonstrates a strong shift from 2006, when LULUCF-based credits composed 36% of the market, and industrial gas elimination 20%, both of which have increasingly been subject to criticism of their offset quality (issues surrounding offset quality will be discussed in greater detail below, in the section *Problems and Controversies*).[15]

[13] In contracts of forward purchasing, the offset purchased represents emissions that are guaranteed in the process of verification to occur in the near future. See Katherine Hamilton, Mijo Sjardin, Thomas Marcello, and Gordon Xu (2008) "Forging a Frontier: State of the Voluntary Markets 2008" Ecosystem Market Place and New Carbon Finance, p. 46

[14] LULUCF projects are alternatively referred to as Agriculture, Forestry, and other Land Use (AFOLU) projects by the Voluntary Carbon Standard (VCS), and are composed of four sub-categories: afforestation, reforestation and revegetation; agricultural land management; improved forest management; and reducing emissions from deforestation and degradation (REDD) projects

[15] See Hamilton, et al., (2008), p. 36, and Katherine Hamilton, Ricardo Bayon, Guy Turner, Douglas Higgins (2007) "State of the Voluntary Carbon Markets 2007: Picking up Steam" July 18th, p. 25

Another mechanism used to finance renewable energy projects are Renewable Energy Certificates (RECs), which are tradable certificates representing the environmental attributes of the generation of one kilowatt hour of on-grid renewable energy. RECs are sometimes converted into VERs based on tonnes of CO2 equivalent, though this process is contentious and there are also concerns over the *additionality* and ownership of REC-producing projects.[16] Because the site of the energy produced is not usually the site of the emissions reduction (the displaced power plant), there is a potential that the emission reduction could be 'double-counted', in that both the producer of renewable energy and the displaced plant count the reduction in their own emissions inventories. The solution to these problems is simple: avoid purchasing RECs or offsets derived from RECs if your aim is to compensate for your own emissions (offsetting), but consider them if you need to purchase 'green' energy to satisfy the prior step in achieving carbon neutrality (addressing indirect emissions).[17]

Offset Quality and Controversies

The principal controversy surrounding offsets, especially VERs in the OTC market, is over their **quality**. The goal is to ensure that people who purchase offsets know their money is going to a project that truly needs the funding to be viable, that the emissions reductions represented by the offset actually take place, and that the offsets are not resold or otherwise 'double-counted' in other inventories of emissions reductions. Consumers want to make sure they are effecting change, not merely purchasing modern day "papal indulgences" to compensate for their sins.[18]

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[16] See Mark Trexler, "Renewable Energy Certificates to Carbon Offsets: What's the Right Exchange Rate?" in Ricardo Bayon, Amanda Hawn, and Katherine Hamilton (2006) Voluntary Carbon Markets: An International Business Guide to What They Are and How They Work, London: Earthscan, p. 48-50; Hamilton, et al (2008), pp. 36-7

[17] This is the recommendation of the US Environmental Protection Agency's Climate Leaders Program and the Green-e Energy Program. See Hamilton, et al., (2008), p. 36

[18] This criticism was levied by George Monbiot, a British journalist, who argued that offsets are akin to 'indulgences' Dutch citizens could purchase from the Catholic church to compensate for their sins: "Just as in the 15th and 16th centuries you could sleep with your sister and kill and lie without fear of eternal damnation, today you can live exactly as you please as long as you give your ducats to one of the companies selling indulgences. It is pernicious and destructive nonsense." The target of Monbiot's criticism is the carbon offset packages offered by UK travel firms such as Travelcare, or oil companies like BP. This criticism is misplaced for several reasons, one being that proper offsetting is supposed to take place only after one has made all the changes they could to their own activities. Also, the increased

Accordingly, there are several criteria that are involved in determination of the overall quality of an offset: *additionality*, *permanence and co-benefits*, *verification and standardization*, *ownership and registration*, and *pricing*.[19]

Additionality

Additionality is the principal determinate of offset quality. Basically, additionality asks if the project that is said to be producing emission reductions is truly 'additional'; that is, it would not have been developed in the absence of the revenue received from carbon credits. Testing for additionality occurs in the process of offset verification and standardization (see below). In practice, this consists of two primary tests: *is the project financially prudent without offset revenues? (the financial test), or is it required by regulation?* (the regulatory test). If the answer to either of these questions is yes, then the project is not considered 'additional.' An example might include an energy efficiency project that makes financial sense in itself (the savings produced from increased efficiency more than compensate for the additional costs), or a project that was required by government environmental regulation (mandated light-bulb programs, for example) or that was developed before emissions trading was fully developed (generally, this excludes projects that produced the reductions prior to 2000). There are several other dimensions to a project's additionality, including the existence of nonfinancial barriers to implementation (the barriers test) or if the project goes beyond common business practices (the common practice test), which truly comprehensive verification programs will take into consideration.

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standardization and quality of offsets offered by third-party retailers in recent years ensures offset revenue has a legitimate and beneficial impact on the global concentration of emissions. See George Monbiot (2006) "Selling Indulgences" The Guardian, October 18 and David Roberts (2007) "An Observation into the Offset Debate", Grist, July 11, available from http://gristmill.grist.org/story/2007/7/11/0138/18222 for a response.

[19] See Clean Air-Cool Planet (2006) "A Consumer's Guide to Retail Offset Providers", December, p. 17

Permanence and Co-Benefits

The permanence of an offset pertains to the likelihood that the reduction will not be reversed in the near future. The co-benefits of an offset project are the additional environmental benefits that may occur because of the project. These could include increased biodiversity or their overall contribution to sustainable development, including promoting low-carbon forms of energy, social equity, or economic development.

Forestry (LULUCF) projects as sources for offsets are highly controversial. On the one hand, they face lower financing and bureaucratic hurdles than larger projects, are highly valued for their additional benefits to communities and to biodiversity, are more easily understood by voluntary buyers, and are more congruent with voluntary buyers' values. On the other hand, they are arguably the least permanent of the above mentioned sources. This is because they are easily reversed, if the forest is subsequently cut down, fails to thrive, or is destroyed by forest fire or disease. The well publicized efforts of rock band Coldplay to offset the production of one of their albums by investing in a forestry project in India, which subsequently failed when many of the trees died, highlights the difficulties in guaranteeing the reductions claimed by such projects.[20] Despite recently published guidelines for the verification and standardization of the quality of offsets produced by such projects,[21] it is too early to determine the extent to which they address concerns about LULUCF additionality and permanence.

An example of an offset with minimal co-benefits is one produced from the reduction of industrial gases like hydrofluorocarbons (HFCs). The industrial gas segment of the OTC market was proportionally large in 2006 (20% by transaction volume), as it was the preferred choice for buyers who do not care about where the reductions come from but wanted the largest possible

[20] See Amrit Dhillon and Toby Harnden (2006) "How Coldplay's green hopes died in the arid soil of India", Telegraph.co.uk, April, available from http://www.telegraph.co.uk/news/worldnews/asia/india/1517031/How-Coldplay%27s-green-hopes-died-in-the-arid-soil-of-India.html

[21] See the Voluntary Carbon Standard (2008) "Guidelines for Agriculture, Forestry, and Other Land Use Projects", November 18, available from http://www.v-c-s.org/docs/Guidance%20for%20AFOLU%20Projects.pdf

volume of reduction for their money.[22] Because of the extremely high global warming potential of industrial gases such as HFC-23, the price of an offset produced by its reduction would be comparatively much cheaper than an offset produced by a renewable energy project, which would have a more onerous verification process, higher start-up costs, but also more environmental co-benefits. A dangerous side-effect of the combination of a high technical contribution to emissions reductions and a low offset price is the possibility for a "perverse incentive" for more of the gas to be produced prior to verification, so that its subsequent elimination can garner large profits. Consumers have since become more informed about the problems with industrial gas offsets, and their share of the OTC market shrunk significantly in 2007.[23]

Quantification, Monitoring and Verification:

Evaluation of the above criteria is the job of offset standards and verification regimes. There are three components to a comprehensive offset standard: 1) accounting standards; 2) monitoring, verification, and certification standards; and 3) registration and enforcement standards. Accounting standards aim to ensure that offsets are real, additional, and permanent by providing guidelines crucial to the early design and implementation phase of projects. These guidelines include methodologies for baseline emissions projections, additionality tests, accepted types of projects, and early validation of project activity. Accounting standards validate projects according to a standard but do not verify that planned reductions actually take place; this is the role of monitoring, verification and certification standards. These standards aim to verify emissions reductions are actually taking place, and to certify the number that will be available on the market. Once the offset is sold, it is the job of registration and enforcement standards to clarify ownership, retire credits upon 'consumption', and to make this information public.

[22] See Hamilton, et al., (2007), pp. 7, 28.
[23] Industrial gases composed only 2% of the market by transaction volume in 2007. See Hamilton, et al., (2008), p. 7

The many different standards and certification regimes in the carbon offset market can be divided into several groups, the first containing full-fledged offset standards which include each of the above components. Two particularly prominent full-fledged standards are the Gold Standard for VERs and the Voluntary Carbon Standard (VCS) 2007, which together accounted for nearly 40% of OTC offsets sold in 2007.[24] The Gold Standard for VERs aims to define the highest quality offsets by certifying only renewable energy and energy efficiency projects with proven additionality and environmental co-benefits. However, its stringent guidelines and intensive application process can act as a disincentive to project developers and increase prices, and its relatively small size raises questions over its ability to expand significantly in the future (Gold Standard offsets accounted for only 9% of the 2007 OTC market).[25] The VCS 2007, on the other hand, is a base-level-quality standard that includes methodologies for all project types, has a less onerous verification process, and accounted for a much larger 29% of the 2007 OTC market. However, some of its administrative procedures (it outsources verification and approval of projects to third-party auditors that have conflicts of interest) are untested, and there are some concerns over the thoroughness of its additionality tests.[26]

In addition to the full-fledged standards, there are also standards specifically for initial project design (the Climate, Community and Biodiversity Standards), offset standard 'screens' (The Voluntary Offset Standard)[27], retailer specific standards, standards for evaluating offset sellers and/or carbon neutrality claims (Green-e), and offset protocols (ISO 14064 and the GHG Protocol).

[24] Hamilton, et al., (2008), p. 53
[25] Kollmuss, Anja, Helge Zink, and Clifford Polycarp (2008) "Making Sense of the Voluntary Carbon Market: A Comparison of Carbon Offset Standards", World Wildlife Fund Germany, March, pp. 54-58
[26] Kollmuss, et al., (2008), pp. 58-63, write that though the VCS plans to bolster its additionality tests, it is too early to gauge their quality or stringency.
[27] Offset standard screens like the VOS accept projects implemented under other standards but that abide by their specific provisions (eg., all CDM credits except those from large hydro or industrial gas projects).

Offset protocols such as ISO 14064 and the World Business Council for Sustainable Development/ World Resources Institute's (WBCSD/WRI) GHG Protocol provide definitional, measurement and quantification guidelines for accounting of offset projects, but have no associated regulatory or administrative bodies. The GHG Protocol consists of three standards, the Corporate Accounting and Reporting Standard, the Project Accounting Protocol and Guidelines, and the Supply Chain and Lifecycle Standards (currently in development). The Project and Corporate Accounting standards provide the methodological framework for the majority of the world's GHG standards and accounting programs (including the VCS 2007), and are the most widely used international accounting tool for government and business leaders to understand, quantify, and manage greenhouse gas emissions. ISO 14064 was cooperatively developed in 2006, and is based on the GHG Protocol. It consists of standards for organizational reporting, project reporting, validation and verification of offsets, and accreditation for third-party verification organizations. In December 2007, the heads of the ISO, WBCSD and WRI announced a memorandum of understanding to jointly promote both the GHG Protocol and the ISO standards.[28]

Ownership, Registration and Retirement

Offsets must be officially registered and retired to avoid 'double counting', which occurs when two or more parties claim the emission reductions for a single project or if credits are sold twice. Carbon offsets and renewable energy credits (RECs) are easily double counted, especially when the environmental benefit represented by the credit is indirect or external to the point of production. Double counting can occur across national boundaries (if a US citizen buys VERs from a Canadian project and both the US citizen and the Canadian project count the reductions in separate national registries) or on a local level (if a city or region sells VERs in the voluntary market and counts both the initial reduction and the sale of VERs in its emission inventory).

[28] See (2007) "ISO, WRI, and WBCSD announce cooperation on greenhouse gas accounting and verification" International Organization for Standardization, available from http://www.iso.org/iso/pressrelease.htm?refid=Ref1093

Kollmuss and Bowell give an example in which the Climate Trust, an offset retailer, purchased offsets from an energy efficiency program in its home city of Portland, which has a voluntarily-set emissions reductions target. Both the subsequent sale of the VERs and the emissions reductions for the energy efficiency program were being counted in the cities emissions inventory.[29]

It is the job of offset registries to track the ownership of emissions reductions and retire the credits upon their final sale, in order to avoid such instances of double-counting. Registries can be distinguished between those that track stated GHG emissions and reductions (such as the Canadian Standards Association's various registries)[30] and those that are actually carbon credit tracking systems (both the Gold Standard and the VCS have partnered with APX to operate their offset registries).[31] Registries of the latter variety serialize VERs, hold them in online databases, transfer them between buyers and sellers, and retire credits once sold to an end user. They must balance transparency of accounts, holdings, and standards and verification processes used with the needs for privacy of the account holders (which often consist of project developers, wholesalers, and retailers of VERs).

Pricing

Two important determinates of offset price are the costs of the offset project and the cost of getting the credit to the final buyer. Project cost is a function of technical costs (influenced by project type, size, location, upfront costs versus length of return, profits from co-benefits and additionality), transaction/administration costs (costs of verification of results), and the project developer's profit. Market price is influenced by the number of steps in the value chain, costs of

[29] Kollmuss, Anja and Benjamin Bowell (2007) "Voluntary Offsets for Air Travel Carbon Emissions: Evaluations and Recommendations of Voluntary Offset Companies" Tufts Climate Initiative, April, p. 11
[30] See the Canadian Standards Association "GHG Registries" website, available from http://www.ghgregistries.ca/index_e.cfm
[31] See (2007) "The Gold Standard Foundation selects APX, Inc. to Develop and Manage The Gold Standard Registry" APX, November 5, available from http://www.apx.com/news/pr_APX_GOLDSTANDARD_REGISTRY.asp; (2008) "APX Powers the Voluntary Carbon Standard Registry", APX, July 2, available from http://www.apx.com/news/pr-APX-Powers-Voluntary-Carbon-Standard-VCS-Registry.asp

certification, advertising, and monitoring, and final supplier profit.[32] Also, due to its voluntary nature, the OTC market is beginning to display characteristics similar to markets for Fair Trade or organic products. Consumers are increasingly motivated by more than just price and reduction of emissions; they are often interested in the 'story' behind the credit: how it was produced, whether there were ancillary environmental benefits to its generation, etc. These factors are becoming an increasingly relevant component of offset value.[33]

Pricing of carbon offsets varies widely, both within and among supplier categories (retailers, brokers, wholesalers, and developers). In 2007, prices ranged from $1.80/tCO2e to an unusually high $300/tC02e, while the average price of a credit sold retail on the OTC market rose from $8.04/tCO2e in 2006 to $11.3/tCO2e in 2007. It is possible to attain less expensive offsets, by purchasing directly from project developers, offset brokers, or wholesalers. Average prices for these suppliers in 2007 were $5, $5.4, and $6.6/tCO2e, respectively.[34] Prices for offsets verified under different standards also vary. Gold Standard offsets are typically sold at a premium, considering the more intensive application process project developers must go through to be verified. This premium is approximately 5 – 25% higher than average VERs,[35] although these figures are subject to debate.[36]

Unfortunately, this all suggests that objective valuation of offsets is difficult to come by. Prices vary across regions, sources, standards and retailers, and it is therefore challenging to make recommendations about the appropriate price to pay for any given offset. The only method of recourse is to be aware of the market averages for offsets,[37] and avoid paying prices that significantly deviate from the mean *for offsets from a certain source or standard*. Independent

[32] See Kollmuss, et al., (2008), pp. 42 -
[33] Hamilton, et al., (2008), p. 33
[34] Hamilton, et al., (2008), pp. 30-31
[35] Kollmuss, et al., (2008), p. 44
[36] Hamilton, et al., (2008) was unable to verify these figures, citing instead an average price of Gold Standard offsets more than twice as high as those verified under the VCS in 2007 (p. 55)
[37] The annual evaluations of voluntary markets for offsets by Hamilton, et al., (2007; 2008) are an excellent source of this information.

research indicates an average offset price of approximately $20/tCO2e in Canada at time of writing, with a lowest price of $15 and a high of $43.25.[38] The high end price is for Gold Standard offsets, offered by a non-profit retailer, while another for-profit retailer offers Gold Standard offsets for $39.90.[39] VCS 2007 offsets are significantly less dear and of recognizable quality, but not quite up to the level of Gold Standard offsets; the choice depends on the consumer's preferences for sources, guarantee of additionality, co-benefits, location, vintages, and other such features mentioned above.

What Should Networks Do?

How networks should approach carbon offsetting requires that the following questions be answered: What is practical for networks given their unique organizational structure and principle activities? Which market for offsets is most convenient and accessible for research networks? Which sources of offsets should be given priority and which standards should be used for quantification of emissions and verification of offset quality? And finally, how to pick an offset retailer who provides quality offsets and services at affordable prices, transparently and reliably?

The decentralized structure and institutionally-embedded working environment characteristic of most research networks suggests a limited capacity to centrally administer a comprehensive, multistep approach to achieving carbon neutrality. Offsetting the emissions associated with holding conferences and workshops is a more accessible and less resource intensive option. Accordingly, for each event network administration can take responsibility for quantifying and offsetting the total emissions of the event (excluding individual transportation) and individual participants can quantify and offset their own transportation emissions produced in

[38] An average of 12 Canadian retailers listed on CarbonCatalog.org, available from http://www.carboncatalog.org/providers/canada/, and a high end price from PlanetAir.ca
[39] From Less.ca, available from http://www.less.ca/

getting to and from the event. Both of these actions can be done through retailers in the OTC market for offsets.

Participation in the OTC market for VERs through retailers is the likely course of action for a research network seeking to offset residual emissions, either as individuals or as an organization. This is because of the wide variety of offset vendors and services in the OTC market, a feature which allows for consumers to pick offsets from projects they find personally appealing and the opportunity for research networks to purchase larger amounts of credits to offset network-wide activities. While some facets of the OTC market are less institutionalized and standardized than in the CCX/MCeX or the CDM/JI compliance markets (such as certification of offset quality and offset registration and retirement), numerous options exist for consumers to abate these risks by purchasing from recognized vendors and according to recognized calculation, verification, and accounting standards.

Research networks should purchase offsets produced by projects that are guaranteed as truly additional. Offsets arising from renewable energy projects or methane capture should be preferred over industrial gas reduction and LULUCF projects, because of concerns over the latter two projects' perverse incentives and emission-reductions permanence. While energy efficiency projects constitute a majority of the CDM/JI market, they make up much smaller share of the OTC market, partly because smaller, voluntary demand-side efficiency programs are often economically rational without external investment and thus have additionality issues. Efficiency projects can be worthwhile though, if verified by third-party auditors following internationally recognized standards such as the VCS 2007. RECs should be avoided as a substitute for VERs, though they may be useful in the prior stage of greening a research network; namely, the purchasing of green electricity.

The true arbiter in determining the quality of an offset is the standardization regime which verifies it. Numerous standards and accounting regimes exist to calculate, verify and qualify carbon offsets and should be taken into consideration when purchasing offsets. Both the GHG Protocol and ISO 14064 provide guidelines for organizations to calculate their GHG emissions. The Canadian Standards Association's GHG CleanStart registry – a registry for organizations to post their carbon footprints and their steps to achieving carbon neutrality – is based on the ISO standards. If the network chooses to quantify the emissions of larger events itself, one of these tools could be used and the results posted on the CSA's CleanStart registry (for communicative purposes). This registry is not, however, a registry that retires carbon credits from the market. If the network chooses to purchase offsets from a supplier other than a recommended retailer, it will need to ensure that these credits are accounted for through a recognized offset registry.

Individuals and small groups should aim to purchase either Gold Standard or VCS 2007-approved offsets. Gold Standard offsets may be slightly more expensive, but are widely agreed to be the highest quality offsets on the market. VCS 2007 offsets appear to be becoming the industry standard for base-level quality offsets, and are generally less expensive than Gold Standard offsets. Also, the wider variety of sources eligible under the VCS may appeal to individual preferences for specific projects excluded by the Gold Standard. Both standards have their own registries for accounting and retiring credits.

A Word on Offset Retailers

Ultimately, the effectiveness of offsetting for research networks depends upon choosing an offset retailer that offers services that satisfy all of the above criteria, and does so affordably, transparently and according to internationally recognized standards. Yet, there are a vast number of retailers in the OTC market and making sense of the varying prices, services, and calculation tools may seem daunting to the uninitiated.

Fortunately, two useful comparisons of offset vendors have been published.[40] These comparisons seek to rank offset vendors according to several criteria, including the transparency of projects and of the retailer, their knowledge of the technical aspects of carbon markets, the quality of their services, the accuracy of provided calculators, the priority assigned to offset quality, the levels of ancillary benefits from their offset projects, and the usage of third-party protocols and verification. Three companies garnered top ranks in both studies: atmosfair (Germany), Myclimate/Sustainable Travel International (Switzerland/United States), and Native Energy (United States). Climate Care (United Kingdom) ranked at the top of most tests in Clean AirCool Planet's study, although the Tufts Climate Initiative only recommended them with reservations. Unfortunately, the Clean Air-Cool Planet study included no Canadian firms and the Tufts study only two (one recommended with reservations (Offsetters), the other not recommended (Cleanairpass)).

However, a web service called Carbon Catalog[41] provides a convenient online ranking of various offset vendors based on numerous criteria, as well as details of their projects and services, including maps of the project locations, average prices of their offsets, emission reductions produced, standard verification, and more. While the criteria used for ranking both projects and vendors appear comprehensive, the evaluations are not as extensive as in the reports mentioned above, and offset standard verification is not given special prominence.

Although it would not be appropriate here to formally endorse a specific vendor, and research networks must ultimately take responsibility for their own selection of retailer, several Canadian companies nevertheless stand out as potentially good choices for research networks looking to purchase offsets on an individual or department basis. These are PlanetAir and Less.ca, which at the time of publication offered Gold Standard-verified offsets at $43.25 and

[40] Clean Air-Cool Planet (2006) “A Consumer’s Guide to Retail Offset Providers”, December; Kollmuss and Bowell (2007)
[41] Available from http://www.carboncatalog.org

$39.90/tCO2e respectively, and Offsetters.ca, who offers VCS 2007-verified offsets at $20/tCO2e.[42]

PlanetAir is a not-for-profit service offered by the Unisféra International Centre, a non-profit Montreal research and consulting centre whose mission is to contribute to the advancement of sustainable development in Canada and around the world. Eighty percent of PlanetAir clients' money directly finances the offset projects as well as their verification by accredited, independent agencies. The remaining 20% is used for customer service, marketing, and auditing. PlanetAir is third-party audited annually and publishes an annual report. PlanetAir is partnered with Myclimate, and is their exclusive Canadian distributor of carbon offsets. PlanetAir has a reliable online calculator for air and road travel, as well as home energy use and heating. It has the option to buy Gold Standard Certified offsets, and will provide consulting services to businesses and organizations.

Offsetters was founded in 2005 by Drs. Hadi Dowlatabadi and James Tansey of the University of British Columbia. It sources its offsets from both Canadian and international fuel substitution, energy efficiency and methane projects. Where possible, it pursues Gold Standard-verified offsets and several of its projects are verified under the VCS. It offers the ability to purchase offsets in bulk, though at a price equivalent to the Canadian average. It also provides an online air and car calculator, integrated services with WestJet and AirFrance, and business and event consultative services, though financial and business reports are not available online.

Less.ca provides businesses and individuals interested in lessening their environmental footprint with two options for purchasing offsets. Through Lessen My Flight™, Canada's first EcoLogo^{M} certified, independently audited flight offset program, customers can calculate and purchase offsets to help mitigate the GHG emissions associated with air travel. Alternatively,

[42] Prices were last checked by the author December 11, 2008

customers who have conducted their own carbon calculation may purchase the highest quality carbon offsets available in Canada from Less by the tonne. All Less.ca offsets are sourced from Gold Standard-certified projects, independently verified by third-parties, and serialized on a registry established pursuant to the United Nations Framework Convention on Climate Change.

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