Carbon Neutrality as Leverage in Transitioning a Financial Organisation Towards Sustainability

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Abstract:

Climate change is one of the most pressing environmental issues of our time, as it threatens the survival of human civilisation. With the increasing number of initiatives trying to address climate change, it is important to examine how effective they are and what other roles these initiatives can serve in transitioning society towards sustainability. This thesis investigates the role of one such initiative, carbon neutrality, within a strategic approach to sustainable development, based on the case study of the North American Credit Union (NACU). A scientific understanding of climate change and sustainability provide a strict evaluation of the carbon neutrality concept with its benefits and challenges, including the role of carbon offsets. Within this context, recommendations are provided for roles and actions that a financial organisation such as NACU can take in order to set high standards in this new and still evolving market of voluntary carbon offsets, while striving for full sustainability and leadership within the community.

Keywords: sustainability, carbon neutral, carbon offsets, emission reductions, The Natural Step.

Disclaimer Statement

The views expressed in this report are solely those of the authors and do not reflect the views of Blekinge Institute of Technology, our supervisors, nor our collaborators. Any errors, omissions or inconsistencies are solely the responsibility of the authors.

The "North American Credit Union (NACU)" is a fictitious name given to a real organisation that developed a working relationship with the authors of this thesis project. The scope of this relationship was limited to exchanging information pertaining only to the identification potential carbon offset opportunities within its existing business activities. The scope did not include sharing full information pertaining to the broader sustainability assessment. Some of the information related to the NACU has been disguised and/or removed from the document for confidentiality reasons. The recommendations found in this report do not represent any ideas, commitments, or support on behalf of this organisation.

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We profoundly thank Amanda and the North American Credit Union for the opportunity to critically analyse NACU's values, strategies, and plans. We especially valued the enthusiasm and encouragement that Amanda consistently offered. Our meaningful dialogues gave us invaluable experience in communicating theoretical, academic principles in a practical setting. We feel privileged to have worked with a progressive and people-oriented organisation in which Strategic Sustainable Development is well-received and already a part of its culture.

We would also like to thank the many experts in the rapidly-evolving and changing voluntary carbon offset field for their advice, access to information, open commentary on the complexity of the field, and the unsolicited networking of our project. Especially valuable dialogue and information came from Professor Hadi Dowlatabadi of the University of British Columbia, Matthew Bramley of the Pembina Institute for Appropriate Development, Brian Rawson of GHG Registries, and Paul Lingl of the David Suzuki Foundation.

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Finally, we wish to thank all the patient and helpful friends, family members, and partners – near and far – for all their wonderful support (physical, spiritual, financial and other) over the course of the thesis project. This, of course, includes thanks from each of us to the other two members of the group for wonderful, lengthy, critical debates and dialogues that brought us all to a far deeper understanding of not only our thesis topic, but also of effective group processes, our personal strengths, values, and idiosyncrasies.

Executive Summary

Introduction

Climate change is rapidly gaining attention in the global community as one of the most pressing challenges for society to address today. As a result, a number of initiatives are arising quickly, in a reactionary way, that attempt to mitigate the effects of climate change. Because of the unprecedented present and future risks that global climate change has on the economy, and because the financial sector is able to guide the economy though its granting, lending and investment strategies, this sector plays an especially important role in helping to address climate change. This report brings a scientific understanding of climate change to the rapidly growing field of 'carbon neutrality' initiatives - one of the ways that a financial organisation can begin to lead our society towards sustainability. It covers an in-depth analysis of the role of 'carbon neutrality' within a strategic approach to sustainable development, a case study with a North American credit union and recommendations on how to use this short-term goal to move strategically towards the long-term goal of sustainability.

Methods

To successfully address the complexity of using a 'carbon neutral' initiative as a means to begin addressing climate change, several methods were used. An analysis was undertaken of the 'carbon neutral' concept within a framework for systematic analysis and planning towards sustainability (Robèrt 2000, Holmberg and Robèrt 2000).[1] A literature review was completed and expert interviews were conducted to gain understanding of voluntary and Kyoto-bound carbon offset standards, processes and methodologies. A sustainability assessment was completed on NACU with the focus on evaluation of the current barriers and opportunities it faces in order to achieve its goal of becoming Carbon Neutral in 5 years, and in order to move towards full sustainability.

[1] This framework is sometimes referred to as The Natural Step Framework by business people and policy makers.

Results and Discussion

As a result of the analysis of 'carbon neutrality' within a strategic approach to sustainable development using the framework mentioned above, it was determined that carbon neutrality means no net increase of carbon in the biosphere. Thus, becoming carbon neutral, *from a sustainability perspective*, means either sequestering and storing all emitted carbon dioxide back into the lithosphere (with no leakage) or completely eliminating the use of fossil fuels. Furthermore, 'sustainable carbon neutrality' requires that these aforementioned actions are done in a manner that does not create problems with regards to other sustainability aspects.

Carbon capture and storage technology is still under development and the full risks of its environmental impacts are unknown. As well, the latter goal (elimination of fossil fuel use) is typically unattainable overnight due to a variety of barriers (financial, political, technological, etc.). Therefore, assisting others in reducing or eliminating fossil fuel consumption in the form of emission reduction projects (also referred to as carbon offset projects) can be a good first step to move towards achieving 'sustainable carbon neutrality.'

A key aspect in determining how to offset or 'balance out' current emissions while moving towards 'sustainable carbon neutrality' is the importance of having a whole system perspective with a clear definition of the desired success. This definition includes the necessary conditions for sustainability to occur. Having a whole systems perspective leads to the clarification of the system boundaries that need to be considered by an organisation that has a goal of advancing sustainability. Whenever sustainability is considered, the boundaries must include the entire biosphere, based on a thorough understanding of natural cycles. Carbon offset projects can truly contribute to mitigating climate change only if they are applied in conjunction with the clear long term goal of completely eliminating the organisation's contribution to the increase of carbon dioxide in the biosphere. Additionally, carbon offset projects must not inadvertently lead to actions that run counter to sustainability in other aspects (e.g. offset projects that introduce unsustainable energy sources are not acceptable from a strategic perspective).

Therefore, NACU could use strategic offset projects to help other organisations reduce their emissions, while still maintaining the focus on eliminating its own emissions, thus leading to 'sustainable carbon

neutrality.' The use and support of carbon offset projects, while beneficial to society and the environment, should not, however, be a distraction from the main, long-term objective. This objective should be the complete elimination of contributions to increasing concentrations of carbon dioxide within an overall movement towards full sustainability.

Not all carbon offsets are equal, and as such, it is imperative that offset projects move an organisation in the right direction towards sustainability. Based on our analysis of the carbon cycle from a sustainability perspective, the recommended acceptable project types include projects that[2]:

- Offer a switch from fossil fuel use to renewable energy
- Reduce energy consumption of fossil fuels
- Sustainably restore carbon to the lithosphere by Carbon Capture and Storage (CCS)

One key aspect of this project was to determine the opportunities and challenges for NACU to obtain carbon offset credits within its existing activities as one of the ways that it can contribute to leading society towards sustainability. To do this, a high-level sustainability assessment was conducted on NACU, as well as a review of the existing standards and practices relating to carbon offsets. The results of this research showed that there are opportunities for NACU to claim carbon offset credits from activities that the organisation is already engaging in, such as grants given out to community groups for climate change projects. These results also showed that the voluntary carbon offset field is extremely new, and standards, protocols, and methodologies are constantly being developed, edited, and occasionally shelved for political reasons. There are few accepted standards for claiming, quantifying, and verifying offsets. These standards were analysed and applied in the quantification of two selected grants and one investment to determine the feasibility and practicality for future similar projects to provide offset credits.

As a result of this analysis, it was determined that claiming offset credits from existing activities, such as environmental grants awarded to community groups, may not be very effective in terms of the transparency

[2] The scope of this research was limited to carbon dioxide only and excluded other greenhouse gases (GHGs). It is possible that further research may show that projects aimed at reduction of other GHGs may offer additional acceptable project types.

of the claims, cost and emission reductions. The complex nature of quantifying and claiming carbon offset credits demonstrated that it is especially challenging to obtain offset credits from projects that are not designed with that intent. We reviewed the project descriptions of 62 environmental grants awarded and one investment made by NACU. Of these, only two grants provided quantifiable emission reductions for 2005. Once quantified, these two grants turned out to be extremely expensive in terms of cost per tonne of emission reduction (when compared to market prices for purchasing offset credits).

Considering these factors, it was recommended that NACU create a new granting envelope and program for obtaining carbon offset credits. This new program would facilitate the highest quality emission reduction credits, obtained in a cost-effective manner, while also promoting NACU's community leadership objectives. Such a program would also be beneficial in terms of transparency and administration of the verification process. It would be important, however, for NACU to ensure that such a program does not detract from its other programs that support beneficial, holistic approaches to sustainable development.

Finally, using the information gathered from the case study, a prioritization tool was developed to determine a means by which NACU staff could measure different aspects of projects, in terms of sustainability, cost, alignment with NACU's overall objectives, and risks.

Conclusion

The information gathered from the NACU study is valuable in gaining an understanding of the details of the potential role of 'carbon neutrality' initiatives, including carbon offsets, in moving an organisation towards sustainability. NACU is in a strategic position to become a leader in the financial sector with already established short-term goals, and the desire to create innovative solutions for climate change mitigation. NACU's goal to be Carbon Neutral in 5 years can be a good step providing it is accompanied by other actions aimed at the transition of energy systems and is done strategically with a long-term goal of sustainability.

The research results can be applicable to any organisation that is committed to leading society towards sustainability and is considering using the 'carbon neutral' initiative as one of the steps. Adopting a whole-systems perspective, a scientific understanding of sustainability, and a methodology for planning in complex systems can make this kind of initiative strategic

and effective in making sustainability a reality.

Glossary

ABCD Analysis or ABCD Methodology – A strategic tool for **backcasting** from **Basic Principles of Sustainability** where: (A) refers to the understanding of the system and how to apply backcasting from **Sustainability Principles**; (B) refers to listing the current practices and/or situation (present or absent) with reference to the four **Sustainability Principles**; (C) refers to the creation of a vision of success based on complying with the **Sustainability Principles**, and then brainstorming solutions to move from the current situation to the desired future; and (D) refers to prioritizing concrete actions chosen strategically to move from the current situation to the desired future

Additional - A criterion often applied to emission reduction projects indicating that the project would not have occurred under the 'business as usual scenario'

Backcasting - A planning procedure by which a successful planning outcome is imagined in the future, followed by the question: "What do we need to do today to reach the successful outcome?"

Baseline Scenario – A hypothetical description of what would have most likely occurred in the absence of any considerations of climate change mitigation

Basic Principles for Sustainability – see System Conditions

Biosphere – The part of a planet's outer shell – including air, land, and water – within which life occurs (this includes the atmosphere)

Carbon Dioxide Capture and Storage (CCS) – A process consisting of the separation of CO_2 from industrial and energy-related sources, transport to a storage location and long-term isolation from the atmosphere to the **biosphere** or the **lithosphere**

Carbon Dioxide Equivalent (CO_2e) - A unit that incorporates the relative global warming potential of a mass of a given **GHG** in terms of a mass of carbon dioxide, according to that particular GHG's lifetime and radiative forcing

'Carbon Neutral' – A predefined system with clear boundaries that has

zero net increase or decrease of carbon dioxide. If the system uses fossil fuels in any way, and therefore emits a given amount of carbon dioxide, this amount is offset by others' reduction in emissions, or by sequestration.

Carbon Offset – A project or activity that results in a given amount of carbon dioxide being avoided or reduced in one place, that is used to 'balance out' another's total emissions

Emission Reduction – The avoidance of an emission that would otherwise have occurred

Greenhouse Gas (GHG) – A gas that absorbs and emits radiation at specific wavelengths within the spectrum of infrared radiation emitted by the Earth's surface, the atmosphere, and clouds. The six main GHGs whose emissions are human-caused are: carbon dioxide (CO_2); methane (CH_4); nitrous oxide (N_2O); hydrofluorocarbons (HFCs); perfluorocarbons (PFCs); and sulphur hexafluoride (SF_6).

'Greenhouse Gas Neutral' - A predefined system with clear boundaries that has zero net increase or decrease of all **Greenhouse Gases** (GHG). If the system emits any GHGs, this amount is offset by others' reduction in emissions, or sequestered.

Lithosphere – The solid outermost shell of a rocky planet. On the Earth, the lithosphere includes the crust and the uppermost layer of the mantle which is joined to the crust.

Permanence – With regards to storage of CO_2 in a sink or reservoir, the property of being able to exist in that given location for an indefinite duration without reversibility or leakage

Sequestration - The process of increasing the carbon stock in a reservoir other than the atmosphere

Sink - Any process, activity or mechanism that removes and stores a substance (e.g. a greenhouse gas) from the atmosphere

Sustainability – A condition achieved by not violating the four **System Conditions** as defined by **The Natural Step**

Sustainability Principles – See **System Conditions**

'Sustainable Carbon Neutrality' – A predefined system with clear boundaries that does not consume any fossil fuels therefore emitting zero carbon dioxide, OR any amount of carbon dioxide that is emitted is captured and securely sequestered back into the lithosphere in a sustainable manner

System Conditions or Basic Principles for Sustainability – Four generic and non-overlapping principles that are used to define sustainability from a scientific, whole-systems perspective. These principles are constraints, and describe the basic conditions that must be met in order to achieve the bare minimum of **sustainability**. The four conditions describe a society in which nature is not subject to:

1. the systematic increase in concentrations of substances extracted from the earth's crust,
2. the systematic increase in concentrations of substances produced by society,
3. the systematic degradation of natural systems (forests, oceans, etc…),
   and in that society,
4. the ability for people to meet their needs is not systematically undermined.

The Natural Step – An international non-governmental organisation (NGO), in collaboration with scientists internationally, that has promoted and supported the development of a framework for sustainable development that incorporates **backcasting** from **Basic Principles for Sustainability**.

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1 Introduction

Climate change is rapidly gaining attention in the global community as one of the most pressing challenges for society to address today. As a result, a number of initiatives are arising quickly, in a reactionary way, that attempt to mitigate the effects of climate change. This thesis attempts to inform one such initiative—the growing trend to become 'carbon neutral'. A combined understanding of the science underlying global climate changes and strategic planning in complex systems applied to a concept of 'carbon neutrality' can forward the movement of society towards sustainability.

This thesis will examine how financial organisations, a large leverage in society's actions, can use a 'carbon neutrality' initiative to bring such an organisation to a position of sustainability leadership within its sector and within its community. In accordance with these goals, this thesis will follow a structure that: (a) examines the common understanding of 'carbon neutrality;' (b) defines 'sustainable carbon neutrality;' (c) paints a picture of a sustainable financial organisation, of which 'sustainable carbon neutrality' is a small component; and finally (d) suggests concrete actions that a financial organisation can take to move towards, and perhaps beyond 'sustainable carbon neutrality.'

1.1 The urgency of addressing climate change

1.1.1 Basic science on the carbon cycle and climate change

The natural flow of carbon from the lithosphere (the Earth's crust) into the biosphere[3] is limited to volcanic eruptions and weathering. By extracting

[3] The biosphere refers to the part of a planet's outer shell – including air, land, and water – within which life occurs. While much of the existing literature refers to climate change resulting from increases in carbon dioxide in the atmosphere, this thesis refers to the concentrations of carbon and carbon dioxide in the biosphere, since the terrestrial, oceanic and atmospheric cycles are all interrelated, with carbon flowing easily among the three.

and burning fossil fuels, this natural flow is altered; carbon is removed from an isolated storage and released into the active land-ocean-atmosphere cycle within the biosphere. In addition to altering the flows of carbon by the use of fossil fuels, human activity such as deforestation, chemical pollution, and soil erosion from agriculture has released carbon previously stored in vegetation and soils, as well as caused a decrease in the natural capacity for carbon sinks (forests, oceans, and soils) to absorb carbon dioxide (CO_2) (Steffen 2004, 120 – 121). Figure 1.1 describes all carbon flows, including the human contributions that put the natural carbon flows out of balance with the accumulation of carbon dioxide in the biosphere.

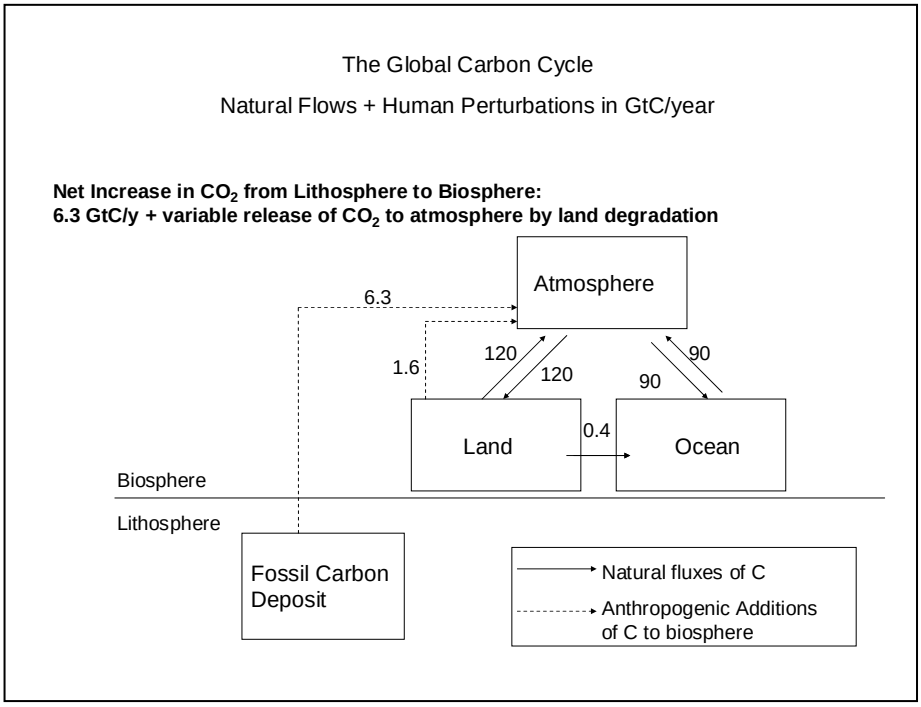

Figure 1.1. The Global Carbon Cycle. Natural Flows and Human Perturbations in GtC/year (Steffen et al 2003, 120).

In the past 200 years, global CO_2 levels have risen 35%. This increase is put into perspective of the range of natural CO_2 variability in last 460,000 years, shown in Figure 1.2. The correlation between global CO_2 levels and

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Therefore, where the term biosphere is used, it is necessary to understand that this incorporates the atmosphere.

average global temperature for the past 160,000 thousand years is shown in data from the Vostok ice core data (See Figure 1.3). This data suggests that the amount of atmospheric CO_2 is positively correlated to temperature, and compellingly links climate change to the extraordinary levels of anthropogenic CO_2 emissions produced in the past fifty years.

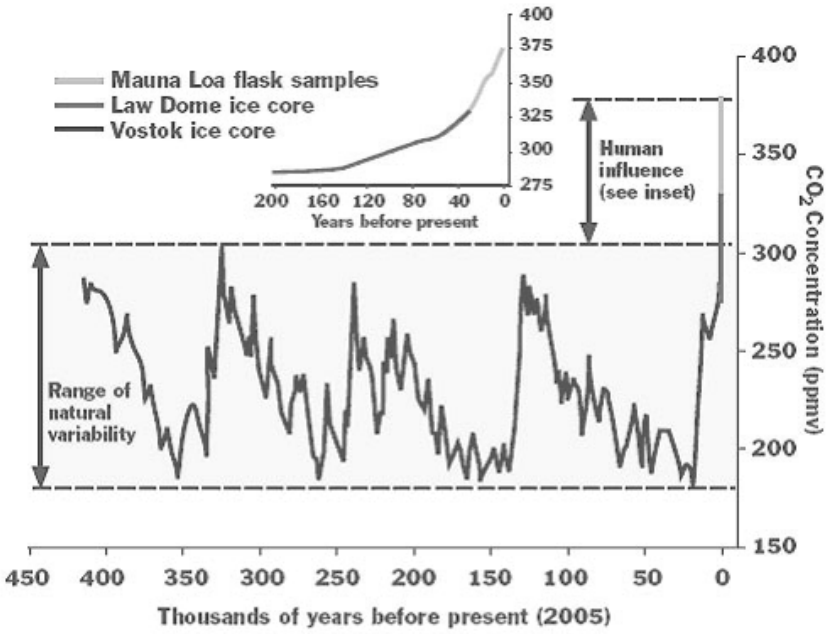

Figure 1.2. History of CO_2 concentrations over the past 450,000 years (Pew Center 2006).

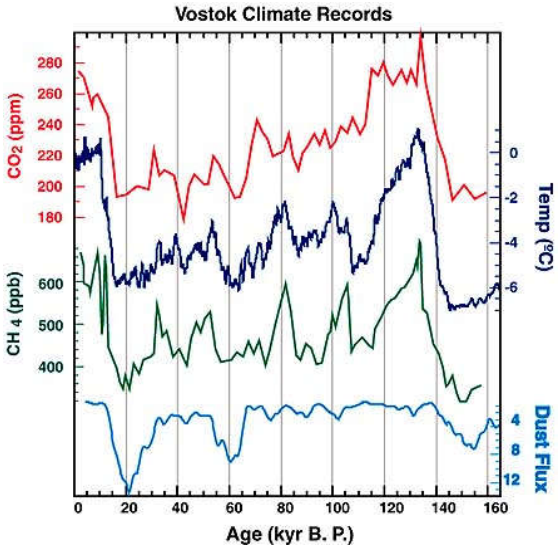

Figure 1.3. Correlation of methane and carbon dioxide levels with global temperature (NOAA ESRL n.d.)

1.1.2 Addressing climate change in a strategic, sustainable manner

Such unprecedented changes in global systems create risks that threaten the survival of current society's social, economic, scientific, and spiritual developments. In order to address this complex problem that affects, and is affected by, all sectors of global society, a strategic approach with a clear vision of success is needed. Maintaining a whole-systems perspective of climate change is absolutely necessary due to the scale and magnitude of the problem. Climate change is different from threats that humankind has faced in the past in the way that "human activity anywhere affects everywhere" (Steffen 2004, 131). Having a whole-systems perspective will avoid the common pitfall of focusing so intently on creating solutions to one problem that these solutions create unforeseen problems in seemingly unrelated areas. A whole-systems perspective can bring to light synergies and causal relationships associated with complex issues—this is an integral step in identifying the source(s) of problems and finding effective solutions.

1.2 The role of financial organisations in addressing climate change

Considering that the unprecedented risks caused by global climate change are likely to have extreme and potentially disastrous impact on the economy and society as a whole, it is not surprising that there is an increasing interest to examine the role of the financial sector in addressing these issues. Some of the ability of the financial sector to assist society to move towards sustainability is already being recognized—the resulting momentum is expressed in a number of international initiatives such as: the UNEP Finance Initiative (UNEP FI, n.d.), the Global Reporting Initiative (GRI, n.d.), the Equator Principles (n.d.), the Dow Jones Sustainability Index (n.d.), and the Carbon Disclosure Projects (2006). These initiatives are effective in promoting some aspects of sustainable development. However, they do not offer a clear description of the role of financial organisations in a sustainable society, nor do they outline standards or best practices with respect to sustainability. These initiatives also do not point to the gaps between current activities and the desired effect that financial organisation could have in a sustainable society.

A clearer picture has been created by a recent study by WWF and BankTrack (2006). It provides a review of 39 international banks and their initiatives related to 13 specific areas of concern ('Climate and Energy' being one of them) set against benchmarks from two sources: widely accepted international conventions, treaties and other law instruments, and best practice standards. The research concluded that many banks have made an important shift in recent years towards addressing sustainability aspects of their operations, but are a long way away from taking on an instrumental role in transitioning society towards sustainability.

Specifically with regards to issues of climate change and energy, the study reports that an increasing number of banks are assessing and reporting on emissions through the Climate Disclosure Project (this initiative covers mainly emissions from internal operations and is based on an annual survey; the quality of responses vary). It also reports that some of the financial organisations have begun to recognise the opportunities of investing in renewable energy and energy efficiency programs. However, when assessed on the basis of adopting strong policy frameworks

effectively implemented across all portfolios and departments, all of the banks have scored extremely low.[4]

The WWF and BankTrack study clearly demonstrates that although the industry is slowly becoming aware of the implications and concerns of current environmental issues, they have not been able to address them in an effective manner by which their actions would bring about and support a positive change. The report shows that although there are several good intentions demonstrated by the banks, there is a need to apply current policies into all project finance deals. It suggests banks should apply their policies to all kinds of project-related support, including arranging, advisory services, equity interests, export finance, corporate loans and insurance. Furthermore, it suggests that banks should develop policy-based analyses to address the environmental and social risks of other types of transactions.

In addition to the different aspects of addressing climate change by financial organisations that have been listed above, new roles for financial organisations have surfaced since the development of market-based approaches to reduce greenhouse gas emissions. Some examples of market-based approaches within which financial institutions can play a role are:

- Global trading of emissions reductions under the Kyoto Protocol;
- European Union Greenhouse Gas Emissions Allowance Trading Scheme (EU ETS);
- National emissions trading programs such as: the UK Emissions Trading Scheme (UK ETS); and
- Voluntary reduction initiatives including:
    a. registry and trading systems such as the Chicago Climate Exchange (CCX),
    b. government-industry partnerships such as: Department of Energy Climate Challenge and Climate Wise,

[4] With a few exceptions bank policies are lagging significantly behind relevant international standards and best practices. The study uses the rating scale of 0 – 4. The highest overall average of all categories score was achieved by ABN AMRO and HSBC Group at 1.31. The highest score in 'Climate and Energy' category was given to Bank of America and JPMorgan Chase – rated at 3; Citigroup scored 2; ABN AMRO, Bank of Tokyo Mitsubishi, Barclays, HSBC, HVB and Scotia Bank scored 1; all other banks scored 0.

c. government commitments such as: Cities For Climate Protection (CCP), and
d. private sector commitments of reducing emissions or becoming 'carbon neutral' (Evolution Markets 2006).

This report focuses specifically on this last category of voluntary commitments made by financial organisations to become 'carbon neutral.'

While all financial organisations are able to play an important role in the transition towards sustainability, cooperatives and credit unions have some distinct advantages that may allow them to be even more beneficial leaders than banks. The main advantage of a credit union over a bank is its motivation and reason for existence. With a strong sense of service to the members rather than the dominant drive for the highest profits to shareholders, credit unions are in a unique position of responsibility. As an equitable democratic organisation that is equally focused on both financial results and community development, a credit union is responsible for reflecting and incorporating the concerns and aspirations of their members through their core business activities. The differences between banks and credit unions are listed in Appendix 1.

1.3 Purpose, scope and limitations

The purpose of this study is to determine how a financial organisation can use its goal of becoming 'carbon neutral' as leverage to address climate change and to transition itself and society towards sustainability. While 'carbon neutrality' can *potentially* be an element of sustainability, the latter concept encompasses the full range of activities and influences of an organisation. Thus, it is important to distinguish between the objective of becoming 'carbon neutral,' and the overall goal of reaching sustainability. These concepts are further explored in the following sections.

This research is based on a case study of the North American Credit Union. NACU has already committed to become 'carbon neutral' in 5 years and is currently exploring options to reach that goal in the most effective way that would be aligned with its mission statement. NACU's definition of 'carbon neutrality' is the following:

> NACU calculates its CO_2 emissions from its internal operations (energy and paper use) and employee transportation (work-related

> auto and air travel plus employee commuting). NACU strives to reduce these emissions as much as possible. What it is unable to reduce, it plans to 'neutralize' or 'offset' by investing in local emission reduction projects, so that NACU's net impact on global CO_2 emissions is zero. This stage is considered to be 'carbon neutral.' (NACU, 2006)

The scope of this paper is limited to carbon dioxide emissions only (excluding other greenhouse gases). In 'carbon neutrality,' the first part of the term, 'carbon,' may have two meanings: carbon dioxide emissions; or carbon dioxide equivalent (CO_2e) emissions. For the purpose of this thesis only the first meaning is considered. Adopting the second definition would actually mean aiming to be 'greenhouse gas neutral.' An important reason for focusing on 'carbon neutrality' is carbon dioxide's relative significance in climate change. While other GHGs have a higher potential to increase global warming (IPCC 2001), CO_2 accounts for 80% of all GHG contributions to global warming (Lashof and Ahuja 1990).

1.4 Research questions

Primary research question:

Can a carbon neutral initiative become leverage in transitioning a financial organisation towards sustainability?

Secondary questions:

1. What are the criteria for a sustainable carbon neutral initiative?

2. What is the current situation for NACU to move towards sustainability using its goal of becoming Carbon Neutral in 5 years, with regards to:
(a) NACU's policies and practices, and

(b) existing standards and process issues for voluntary emission reductions?

3. What are the potential solutions (criteria, processes) for NACU to move towards sustainability using its goal of becoming Carbon Neutral in 5 years?

2 Methods

2.1 Carbon neutrality within the context of Strategic Sustainable Development

Climate change within the Earth's biogeochemical cycles is a complex problem requiring suitable tools. One method chosen to analyze 'carbon neutrality' within the climate change context is the application of a framework for strategic planning in complex systems. The selected framework for analysis is known as the Five Level Framework for Planning in Complex Systems. The Natural Step, an international non-governmental organisation that promotes the use of a framework for systematic analysis and planning towards sustainability, has used the model specifically in application to a strategic approach to sustainability, or Strategic Sustainable Development (Figure 2.1). This model is valuable as it delineates five hierarchically different levels and maintains the distinction between the levels in planning (Robèrt 2000; Robèrt et al. 2002).

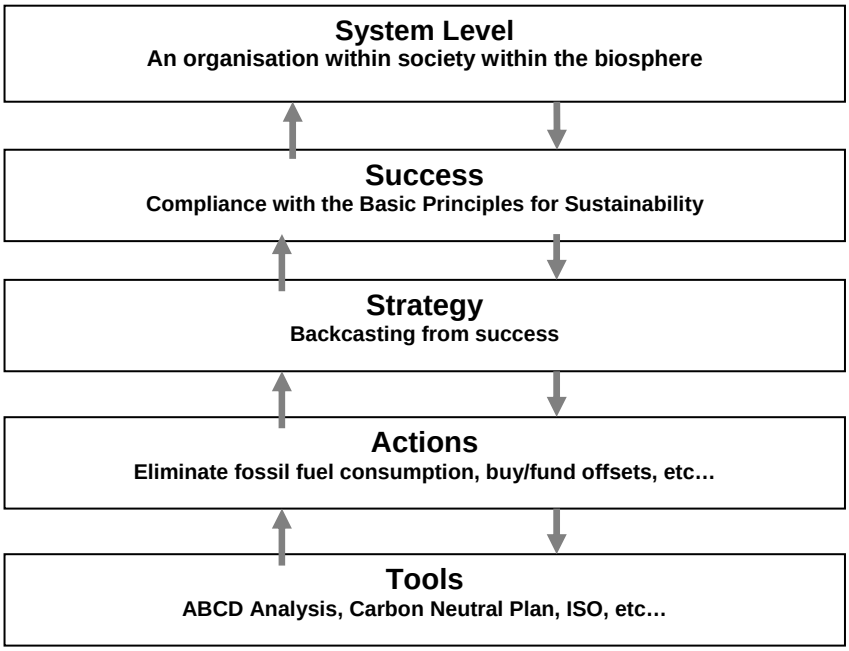

Figure 2.1. The Five Level Framework for Planning in Complex Systems, applied to Strategic Sustainable Development.

In this application, the 'System' level refers to organisations (or individuals or communities) in society in the biosphere. It fosters an understanding of the dynamic interrelationship within and between ecological and social systems and the growing need for strategic change due to a decrease in natural resources and services and an increase in demand. The 'Success' level defines the success in the system – compliance with the four Basic Principles for Sustainability. These Basic Principles for Sustainability have been developed through a consensus of scientists (Robèrt et al. 2002, Holmberg and Robèrt 2000, Ny et al. 2006). The Basic Principles for Sustainability "specify how to avoid the destruction of the biosphere by adding a negation to the basic mechanisms of destruction. Together, the first three basic principles provide a mechanistic framework for ecological sustainability that implies a set of restrictions within which a fourth condition can be formulated – that human needs must be met" (Robèrt at al. 2005, 34). See Figure 2.2.

BASIC PRINCIPLES FOR SUSTAINABILITY

In a sustainable society, nature is not subject to systematically increasing…

I …concentrations of substances extracted from the Earth's crust;

II …concentrations of substances produced by society;

III …degradation by physical means;

And in that society…

IV …people are not subject to conditions that systematically undermine their capacity to meet their needs.

Figure 2.2. Basic Principles for Sustainability (Robèrt et al. 2005, xxv)

This scientific definition of sustainability as defined by the four Basic Principles for Sustainability informs the other lower levels of the framework. The 'Strategy' level facilitates strategic planning for 'Actions'- the fourth level. These actions are informed and assisted by Tools - the fifth level.

The Five Level Framework was used to organize the thinking in this thesis to logically determine what role 'carbon neutrality' can play in Strategic Sustainable Development, and what potential actions exist to move such an initiative in the desired direction (towards sustainability). This method was mainly used to answer the primary and the first of the secondary research questions, although the understanding derived from this analysis was applied to all of the research questions.

2.2 Sustainability Assessment – Case Study: NACU

A high-level sustainability assessment was conducted on NACU to answer each of the research questions. This assessment was conducted using two specific methodologies: the 'ABCD' analysis, and, within that analysis, the

methodology of backcasting from Basic Principles of Sustainability. Both methodologies are strategic planning tools focused on aligning actions with the desired sustainable future.

Backcasting is a way of imagining the future before planning actions. It helps to focus proactively on where the organisation wants to see itself in the future, and to assess the current situation with its trends from that 'winning' perspective. By backcasting, actions are planned to strategically move the organisation *from* the current situation *towards* its desired future (Holmberg and Robèrt 2000, Robinson 1982).

The ABCD analysis tool facilitates an awareness of the current unsustainability of the world, a baseline analysis to determine what the current situation is with respect to the Sustainability Principles, an envisioning process for the organisation to co-create a vision of its desired sustainable future from which backcasting is then possible, and finally, prioritization of strategic actions (Robèrt 2000). This methodology has been used to answer the research questions as follows:

- A step – Awareness was built based on an analysis of climate change, and the scientific background of this issue. This understanding was primarily gained through a literature review, which focussed on the carbon cycle, increasing concentrations of carbon dioxide in the biosphere, increasing global temperatures, and a scientific definition of sustainability. The concept of 'carbon neutrality' was examined based on this scientific understanding within the context of Strategic Sustainable Development. Furthermore, our understanding of the carbon cycle and climate change led us to analyse common carbon offset types and make recommendations regarding which types should be used in order to address the carbon flow.

- B step – analysis of current reality with regards to:

  B1 - Carbon offset landscape:

  A comprehensive literature review was conducted on existing standards and processes for both voluntary and Kyoto-bound emission reductions. This was supplemented by interviews with experts operating in the field to further understand the challenges and opportunities associated with using carbon offsets to become

'carbon neutral.'

After review of the existing standards and processes, the best available quantification methodology was selected and enhanced with supplemental information and steps from other existing methodologies. This formed our recommended generic quantification methodology that could be used to assess some of NACU's activities.

Furthermore, the literature review and expert opinions gave us the necessary understanding of issues such as additionality, legal aspects of ownership and allocation, and verification/registration of credits. This information was used to determine if NACU's existing activities (grants and investments) could provide carbon offset credits, and later it was used to make recommendations on future steps (see below).

B2 – NACU's position in relation to sustainability at large, its commitment to climate change, its goal of becoming 'carbon neutral,' and its existing activities:

A review was done of both publicly-available information, and information provided to us directly by NACU to assess its current commitment and plans with regards to climate change mitigation.

To determine if NACU had existing activities that could be used to provide offset credits, two types of activities were examined: granting and investing. For granting, project descriptions of 62 environmental grants that NACU awarded in 2005 were provided to us directly from NACU. We based our review of these grants on the understanding we had gained from the literature review and expert opinions discussed above in B1. After choosing the grants that appeared to offer direct emission reductions, we reviewed the project proposals and/or final reports. We then identified two grants that were the only projects that directly created quantifiable emission reductions for 2005. For investments, the sample investment chosen by NACU was reviewed and quantified in a similar manner as the grants.

To quantify these three projects (two grants and one investment), we used the recommended generic quantification methodology explained above, and did further research to determine

acceptable emission factors, calculation ratios, and other necessary data pertaining to each of the three projects. After quantifying the two grants and one investment (i.e. providing estimates on the amount of carbon dioxide emissions saved), we calculated a cost per tonne of emission reductions for each of the projects.

- C step – Creating a vision of success and associated measures:

  C1 – 'Sustainable carbon neutrality,' and sustainable NACU, moving society towards sustainability:

  Using the understanding of Basic Principles for Sustainability, the carbon cycle, and the goals of NACU, we outlined a picture of the organisation not violating the Sustainability Principles while still meeting the needs of the business. Within the goal of overall sustainability, we envisioned NACU not contributing to upsetting the natural balance of the carbon cycle, therefore becoming 'sustainably carbon neutral.' As well, we envisioned NACU promoting similar positive actions to others and facilitating the community at large to move towards sustainability.

  C2 – Brainstorm of clear and compelling measures that are aligned with the vision that move NACU, and then society, towards sustainability:

  We created a list of possible measures that are based on NACU's current plans related to becoming 'carbon neutral,' its mission statement (NACU 2006), and expert commentary on the role of financial organisations in a future low-carbon economy (WWF and BankTrack 2006). These measures were a combination of goals and actions that NACU can undertake in the short- and long-term future.

  Here, the backcasting planning method was utilized. Based on the envisioned future of NACU's role in its community and in sustainable development at large, specific measures were suggested that may move the organisation from where it is today, to this envisioned future. Long-term solutions were developed first, and then short-term measure were developed and analysed with respect to their alignment with the longer-term goals.

- D step – recommendations for NACU on how its 'carbon neutral' initiative can become effective leverage in its

transition towards sustainability (presented in the Discussion section of this paper):

To strategically prioritize measures, three questions were asked to help with the selection and prioritization among the brainstormed measures in C2 above (Robèrt et al. 2005, xxx):

1. Is the measure a movement in the right direction?

2. Is the measure a flexible platform for further sustainable development?

3. Will the measure provide a good economic, social, and environmental return on investment?

After asking these questions of the brainstormed measures, we chose the use of strategic local carbon offset projects. This is one measure that will help NACU attain its Carbon Neutral in 5 years goal, while still maintaining its focus on the on long-term goals. In order to obtain the most strategic local carbon offsets, we made recommendations of both a new granting program and a method for prioritizing among different carbon offset options.

3 Results

3.1 Main concepts and definitions

3.1.1 'Carbon neutrality'

In an effort to begin addressing climate change, certain organisations have taken on the goal of becoming 'carbon neutral' as a way to curb the spiralling CO_2 emissions. Examples of such organisations within the financial sector are HSBC bank, Swiss Re - the insurers, and as discussed, NACU.

The initial stage of this research focussed on defining the criteria for a 'sustainable carbon neutral' initiative, and found that there were discrepancies in understanding the term 'carbon neutral.' We will discuss the source of these discrepancies below.

Strictly speaking, 'carbon neutrality' describes a system that has a zero net increase or decrease of carbon in the system. Confusion arises, however, when there are different assumptions made when defining the system boundaries.

System boundaries set around an organisation. Commonly the concept of 'carbon neutrality' is applied at an organisational level. In this case, an organisation calculates how many CO_2 emissions they create. Typically after trying to reduce their internal emissions, the remainder is 'balanced out' or 'offset.' This offsetting is done when the emitting organisation invests in projects that contribute to the reduction of the same amount of emissions elsewhere (See Figure 3.1). A carbon offset is an emission reduction generated from another organisation's project or activity that results in less CO_2 released to the atmosphere than would otherwise occur (i.e. are 'additional' to business-as-usual practices).[5] The premise of this notion of 'offsetting' emissions is that because climate change is global, investment to reduce emissions somewhere else (through another

[5] Emission reduction credits are typically measured in tonnes of carbon dioxide equivalents (CO_2e), and are bought and sold through a number of international brokers, retailers and trading platforms. (David Suzuki Foundation 2006)

organisation or in another country) has the same overall benefits (David Suzuki Foundation 2006).

Figure 3.1. 'Carbon neutrality' using system boundaries of an organisation.

This definition has several limitations, both in terms of the science of climate change, and in terms of ethics and the sense of responsibility one should have for their own contribution to climate change.

First, it is theoretically possible to comply with the four System Conditions for sustainability while continuing using fossil fuels. This would be in compliance only if it was possible to safely (with no risk of leakage) capture and sequester carbon/carbon dioxide to the lithosphere at a rate equal to or faster than the rate of extraction, in a manner that does not violate the System Conditions.[6] That said, the option of sequestering carbon/carbon dioxide to the lithosphere is generally not currently available as a carbon offset, and has not been proven to be without significant risk.[7]

Therefore, until more options exist for safe and sustainable carbon sequestration, any reliance by an organisation on fossil fuel use for at least a portion of their energy use and/or other inputs will still cause a net introduction of carbon to the biosphere. The amount of the net introduction may have been decreased by reduction initiatives, but this net introduction will still be greater than the natural systems are able to return this carbon to

[6] This consideration is presented to demonstrate the environmental sustainability aspects of carbon capture and storage. The presented scenario does not take into consideration that in reality this solution (CCS) will be limited by the fact that fossil fuels are non-renewable resources and their continued usage will eventually lead to economic unsustainability.
[7] Carbon capture and storage will be discussed later in this report.

the lithosphere, and thus the accumulation of carbon in the biosphere will continue.

Secondly, with regards to ethics and the sense of responsibility, the notion that an organisation can absolve itself of the guilt and/or responsibility for continuing to use carbon from the lithosphere by purchasing offsets related to others' emission reductions, may, by psychological and other reasons, reduce the organisation's efforts to continue making efficiency improvements in their own establishment. As well, it may hinder the organisation's appreciation of the necessity to completely switch to renewable energy, misled by the claims that it has become 'carbon neutral.' In this case, even the most well-intentioned organisation may not be contributing at all to the stabilization of the spiralling emissions.

These arguments suggest that adopting a broader definition of the system within which the main problem occurs (climate change in this case) is necessary for providing adequate solutions to the problem. This broader definition of the system refers to having a full systems-perspective with an understanding that the organisation operates within the biosphere, and therefore needs to consider the biogeochemical cycles, especially with regards to the flow of carbon from the lithosphere to the biosphere.

System boundaries set around the Earth system. In the global context of the system, defined as 'planet Earth,' carbon neutrality means a zero net introduction of carbon from the lithosphere to the biosphere. (See Figure 3.2.)

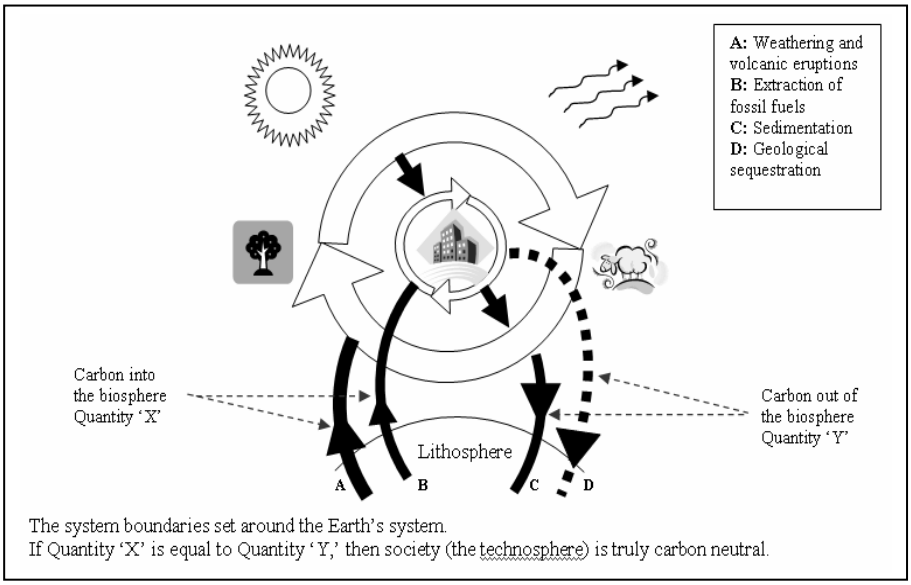

Figure 3.2. The system boundaries set around the Earth's system. The organisation is placed within society, within the biosphere.

Zero net introduction means that the rate at which carbon is released from the lithosphere to the biosphere (through weathering, volcanic eruptions, and extraction) is not exceeding the rate at which it is replaced back into lithosphere (through sedimentation and geological sequestration). In other words, being carbon neutral means not disturbing the balance of carbon flows.

Therefore, 'sustainable carbon neutrality' can be achieved by an organisation in an upstream manner by eliminating the use of fossil fuels or in a downstream manner by capturing and sequestering an amount of carbon (to the lithosphere) that is equivalent to the quantity being released into the biosphere.

3.1.2 'Sustainable carbon neutrality'

This understanding of carbon neutrality, based on a whole-systems perspective and respecting the balance of carbon flows within the Earth's system, can be called 'sustainable carbon neutrality' as it complies with the definition of sustainability as described by the four Basic Principles for

Sustainability.

From the individual organisation's point of view, these four Basic Principles for Sustainability can be interpreted into Sustainability Principles for the individual organisation. Consequently, when planning for sustainability NACU can view its overall vision of success as:

1. The elimination of our contribution to systematic increases in concentrations of substances extracted from the Earth's crust,

2. The elimination of our contribution to systematic increases in substances produced by society,

3. The elimination of our contribution to systematic physical degradation of nature, and

4. The elimination of our contribution to the systematic undermining of people's abilities to meet their needs worldwide.

As such, 'sustainable carbon neutrality' is a sub-criterion of the Sustainability Principle number 1. Of course, all actions, projects, and measures must also comply with the other three Sustainability Principles. For example, one could not destroy vast areas of forests to supply fuel-wood in exchange for oil, as this would violate Sustainability Principle number 3.

As previously described, the Five Level Framework for Strategic Sustainable Development (SSD) (Robèrt et al. 2005, xiv – xxxi) defines the 'System,' 'Success,' 'Strategy,' 'Actions,' and 'Tools.' This framework clarifies the role of 'sustainable carbon neutrality' in the context of SSD (see Figure 3.3). For 'sustainable carbon neutrality,' the 'System' is defined as the organisation operating within society, within the biosphere; the 'Success' level is compliance with the four System Conditions (Basic Principles of Sustainability) including 'sustainable carbon neutrality;' 'Strategy' includes plans for achieving the success through the use of backcasting from the Basic Principles of Sustainability; 'Actions' are concrete steps that are taken to achieve success, such as buying or funding offset projects/credits; and 'Tools' are the things we use to carry out or inform our actions, such as the ISO 14064 standard for emission reduction

projects or activities.

Achieving 'Success' (including 'sustainable carbon neutrality') is perceived as unattainable straight away on a global scale, and often also on an organisational scale due to economic, social, and technological barriers. Therefore, it is important to move towards that goal in a strategic manner. A 'carbon neutrality' initiative can be looked at as a first step in addressing climate change, whereby many organisations can begin their transition away from fossil fuel use while continuing to help others reduce their emissions through the creation of carbon offset projects. Still, it is important to fully appreciate the definition of 'sustainable carbon neutrality' and the importance of reaching that goal as soon as possible.

The concept of becoming carbon neutral with the intention of addressing climate change can be described by different stages (See Figure 3.4, below):

1. **'Carbon neutrality' an interim target on the path towards sustainability** ('carbon neutrality' counting offset credits): This is the current most common understanding of carbon neutrality, allowing for a certain amount of reliance on fossil fuel for inputs. The resulting emissions are then 'balanced out' by offset credits. The purchase or use of offsets typically takes place after efforts to reduce internal emissions have been exercised. Targets for internal reduction or elimination of emissions are established by each organisation.

2. **'Sustainable carbon neutrality**:' This refers to the organisation not contributing to increases in concentration of CO_2 in the biosphere, typically through the use of clean (renewable) energy and transportation (while likely continuing to lead and assist others to reduce their emissions as before but 'retiring' the offset credits rather than counting these credits against the organisation's emissions). As mentioned, 'sustainable carbon neutrality' may include some reliance on fossil fuel use, providing the resulting emissions are sequestered back to the lithosphere in a safe and sustainable manner. It is important to note that 'sustainable carbon neutrality' does not equal 'sustainability', as the former is only one component of one of the four Sustainability Principles, all of which need to be met to achieve sustainability.

3. '**Carbon negativity'** (belonging to the restorative organisation that has already achieved sustainability): This refers to meeting all conditions of

'sustainable carbon neutral' as above, and then conducting additional safe and sustainable carbon sequestration (or enabling others to do so) aimed at reducing the excess of carbon already existing in the biosphere. This step refers to a 'restoration' stage of sustainable development.

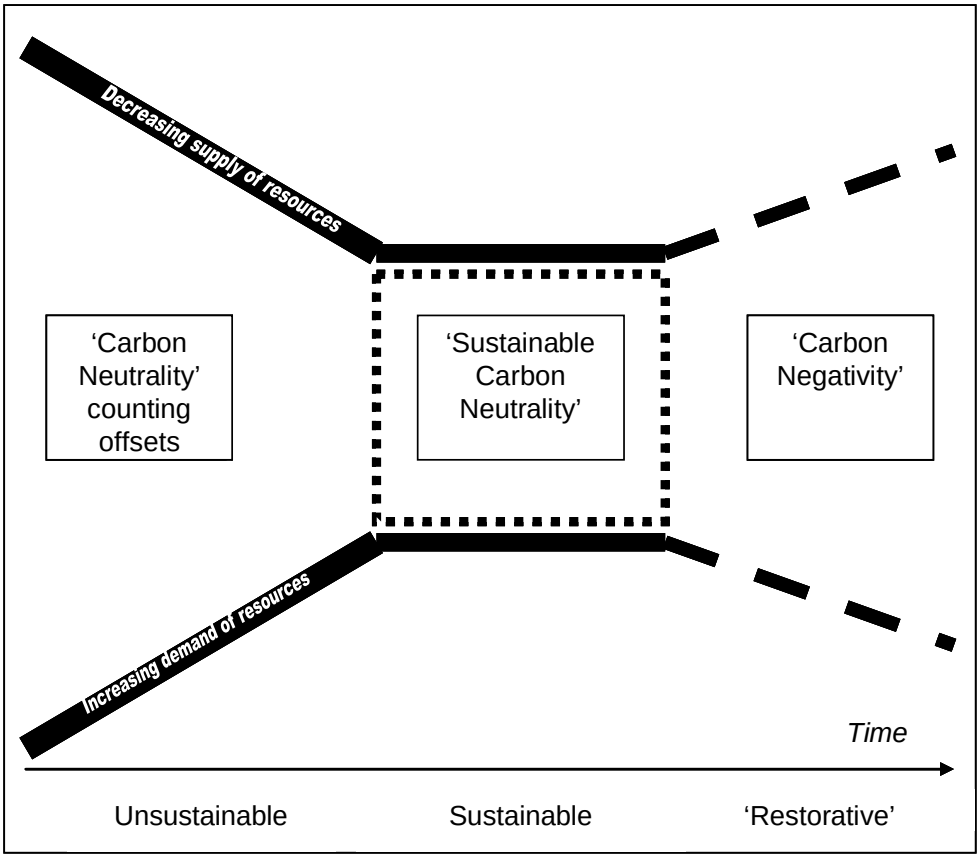

Figure 3.3. Carbon neutrality within the strategic movement towards sustainability depicted in three stages aligned with the transition of the organisation from 'unsustainable' to sustainable and 'restorative.'

In order to begin the transition towards sustainability it is imperative that the 'carbon neutral' initiative is conducted in a strategic manner leading in the right direction. Knowing what constitutes 'Success' and using the 'Strategy' of backcasting from a position of 'Success' in the future informs the choices of most appropriate 'Actions' and 'Tools.' If an organisation is determined to address the issue of climate change through its 'carbon neutral' initiative, it needs to aim at gradual but complete elimination of its

contributions to the increasing concentrations of carbon dioxide in the biosphere. While the organisation makes this transition, it can temporarily rely on strategic carbon offsets. The following sections discuss the different options available for carbon offsets and their applicability for addressing climate change.

3.1.3 Carbon offsets

Carbon offset projects were created as a means to compensate for GHG emissions that cannot be eliminated by a particular organisation at a given time. *Typical* offset projects currently being used by organisations include:

- Investments in renewable energy technologies
- Energy efficiency improvement projects
- Methane and other industrial waste gas capture[8]
- Carbon sinks

As previously discussed, there are risks associated with the use of carbon offset projects to 'balance out' emissions created by an organisation - in essence, the risk of continued introduction of carbon to the biosphere and the risk of not appreciating the imperative switch to renewable energy systems. Those risks being considered, using high quality carbon offsets to achieve 'carbon neutrality' as intermediate step to becoming 'sustainably carbon neutral' can offer some important benefits:

- incentive for an organisation to measure and monitor its own emissions;
- incentive to invest in 'clean' technologies;
- opportunities to engage in partnership with other organisations;
- opportunities to positively influence the general awareness of climate change; and
- the ability to assist other organisations to begin addressing their emissions.

[8] As discussed in the Introduction of this report, methane and other industrial waste gas capture projects were excluded from the scope of this research.

3.1.4 Strategic carbon offsets

In order to determine criteria for strategic carbon offsets, it was first necessary to determine which project *types* qualify as offsets that can lead towards sustainability. The following project types are a result of synthesizing research on the carbon cycle with a focus on dematerialization and substitution[9] as mechanisms that further Strategic Sustainable Development (Robèrt et al. 2001).

- **Projects that offer a switch from fossil fuel use to renewable energy**

  For example: projects that switch to solar, micro-hydro, wind energy, or 100% biofuel energy

- **Projects that reduce energy consumption of fossil fuels**

  For example: electric hybrid vehicles, high-efficiency lighting, ground source heat pumps

- **Sustainable Carbon Capture and Storage (CCS) projects that restore carbon to the lithosphere**

  For example: Technology installed at a coal plant that captures carbon from the emissions and sequesters it

These three project types directly address the flow of carbon in the carbon cycle and contribute to meeting the first Sustainability Principle, although some in a more upstream manner than others (extraction of fossil fuels versus efficient use of fossil fuels). All three activities, however, are necessary steps in order to stabilize the concentration of carbon dioxide in the biosphere. Hence, they are not prioritized.

Carbon Capture and Storage (CCS) is a relatively new concept that is currently being evaluated by international organisations, such as The Intergovernmental Panel on Climate Change (IPCC), governments (EU, USA) and private companies (Statoil, Shell), as a technology that may

[9] Dematerialization refers to using less of the same substances such as mined resources, manufactured products, energy, etc. Substitution refers to changing to new types of materials, flows, routines, etc.

assist in stabilization of atmospheric CO_2 concentrations. Carbon Capture and Storage technologies offer a great potential for enabling the utilization of existing fossil fuel-based energy infrastructure, while decoupling the use of fossil fuels from climate change impacts.

Carbon Capture and Storage has been promoted by leading scientists as a necessary step in stabilizing atmospheric carbon dioxide levels because even with upstream solutions, the current concentration is already so high that the downstream solutions are necessary to repair the damage (Pacala and Socolow 2004; Sachs and Lackner 2006). As such, CCS with geological storage (to the lithosphere) should be considered a viable option for carbon offset projects, provided they can be shown to be safe (with no risk of leakage) and sustainable.

3.1.5 Carbon sinks

Carbon sinks include forests, soils, oceans, and other developing, human-made systems that remove carbon dioxide from the atmosphere and store it temporarily. Typically, with regards to carbon offset projects, terrestrial sinks (such as forests and other land cover) are the primary focus. Whether or not carbon sinks should be included as potential carbon offset projects is a controversial issue. Some organisations such as the European Trading Commission do not include sinks as carbon offset projects. Other organisations such as ISO leave it to the project proponent to decide. Yet others, such as the Kyoto Protocol are in favour of including carbon sinks as offset projects in certain situations (Kyoto Protocol n.d.), although even within the Kyoto Protocol, ambiguities exist with regards to which circumstances are acceptable for using sinks as offsets. The arguments for both sides are listed below.

Arguments presented in favour of including terrestrial carbon sinks as carbon offset projects:

a. Existing terrestrial sinks are removing about 30% of the additional CO_2 injected into the atmosphere by human activity;
b. Increasing concentrations of CO_2 in the atmosphere are not only the result of matter taken from the lithosphere but also due to terrestrial ecosystems changes (resulting from human activity, as well as current climate changes) that are weakening the capacity of the remaining carbon sinks to function as a brake on human-driven CO_2 accumulation in the atmosphere; and

c. Emissions resulting from the conversion of natural vegetation to croplands and other human induced land use changes are a net source of carbon to the atmosphere (Steffen et al. 2004, 43-50).

Because of these three points, it is suggested by some that the creation of carbon sinks (primarily in the form of forests) is a valid carbon offset project, as these sinks will help remove CO_2 from the atmosphere and replace carbon on the land where forests and other vegetation have been removed by human activity.

On the other hand, the following are arguments for not including terrestrial carbon sinks as carbon offset projects:

a. Creating sinks is addressing the issue of matter taken from the lithosphere into the biosphere only in a limited way. Flows of carbon from vegetation back into the soil and eventually to the lithosphere are significantly smaller and slower than flows from the lithosphere to the biosphere caused by human activities.
b. Terrestrial carbon sinks may have a short lifespan.
c. A recent model suggests that the capacity for land sinks will peak within the twenty-first century (Steffen et al. 2004, 43).
d. Using carbon sinks as carbon offsets will result in increased levels of subjectivity in quantification and verification related to issues such as permanence,[10] additionality, and uncertainty.
e. Increasing the amount of terrestrial carbon sinks shifts the burden of maintaining this stored carbon to future generations and to other jurisdictions.
f. Management of CO_2 reductions are very challenging due to the impermanent nature of carbon sinks, associated risks (such as forest fires), seasonal and geographical changes, and societal (governmental, legal, etc.) changes.

We acknowledge that carbon sinks play a crucial role in the carbon cycle and are necessary for our existence. In order to create a sustainable global society, specific efforts (such as implementation of strict policies regarding land use) need to be taken to preserve and replenish forests and natural

[10] With regards to storage of CO_2 in a sink or reservoir, permanence refers to the property of the stored CO_2 to exist in that given location for an indefinite duration without reversibility or leakage

vegetation. These actions in fact are necessary to address the issue of the decreasing amount of natural carbon sinks, the associated decrease in biodiversity, and the decrease in nature's ability to process the already-high levels of CO_2 present within the biosphere.

However, using carbon sinks to offset emissions *that are resulting from the use of fossil fuels* would be inadequate in addressing the main cause of the problem. Therefore, considering the natural and anthropogenic carbon flows, as well as all the risks associated with verification and management of the carbon sinks, we have chosen to *exclude* carbon sinks as potential carbon offset projects. Further implications of this choice will be explained in the Discussion section of this thesis.

3.2 Evaluation of the current situation for NACU to move towards sustainability using its Carbon Neutral in 5 years goal

This section of the results outlines the current status of NACU with respect to its understanding of society's current unsustainable situation (Step A), and its compliance with the Basic Principles of Sustainability (Step B1). It then describes the current standards and processes for the voluntary carbon offset market (Step B2).

3.2.1 High level sustainability assessment of NACU

Awareness of the system (Step A). The previously mentioned scientific definition of sustainability, and a full understanding of the biogeochemical cycles (and especially the carbon cycle) included in this report are useful for:

- building on the awareness of the system in which NACU operates;
- setting goals including the goal of becoming 'carbon neutral'; and
- guiding future actions.

NACU is already in a strategic position to improve the sustainability of the regions in which it operates because of its awareness of the connection between social, economic, and environmental wellbeing. This awareness results from the understanding of the diminishing availability of

resources combined with the increasing demand of such resource services. It is reflected in NACU's mission statement (typical of a credit union) that suggests a goal of enhancing the health of its members, employees, local communities and surrounding environment while continuing to build its long-term business (NACU 2006). This awareness is part of the first stage in the ABCD planning process.

Assessment of NACU's current situation with regards to the Basic Principles for Sustainability (Step B1). As a financial organisation attempting to meet people's financial needs, the key energy and material flows into and out of the NACU system are due to internal operations (infrastructure and travel), and their material products - money. Although looking at internal operations is a good first step, it is important to emphasis that the biggest impact that a financial organisation has on a society is through their core business activities such as investing, lending and granting. A brief, non-exhaustive description is provided of NACU's current positive and negative contributions to sustainability (as defined by the four Sustainability Principles) in terms of both internal operations and core business activities.

NACU is currently taking the following positive steps that offer opportunity for addressing the four Sustainability Principles (unless otherwise identified, sourced from the NACU website: NACU 2006):

- NACU's mission statement includes the goal of working with people and communities to help create health and prosperity.

- There is a commitment to socially responsible investing that provides opportunity to not only avoid certain types of companies (screening) but also proactively investing in the companies regarded as social leaders.

- NACU offers a range of business loans that consider whether the business goals include significant environmental benefits.

- Eco-partnerships are offered, which are designed to help small and medium-sized enterprises to become more competitive by providing funds for eco-efficiency opportunities consultation.

- NACU has created an 'eco-fund' - a pool of money created by donations from NACU's VISA Card profits. The fund supports local

environmental projects (specific projects are selected by the votes from the cardholders).

- Grants are available for projects that contribute to social justice, economic self-reliance or environmental responsibility.

- Low carbon car loans are available for hybrid (gas-electric or natural gas powered) vehicles at a preferential interest rate.

- There is encouragement of energy-saving renovations for homes through two programs: a personal loan at prime rate and $170 cash back ($170 is the ballpark cost of the EnerGuide for Houses evaluation).

- An eco-friendly building granting program is aimed at the reduction of greenhouse gas emissions resulting from building activities.

- Every two years NACU releases its comprehensive, third-party audited accountability report.

- Leadership from the top management demonstrates efforts of addressing climate change through reducing travelling, jogging to work (instead of driving) and becoming 'carbon neutral.'

- There is an existing action plan for reducing GHG emissions and increasing energy efficiency including accounting and annual reporting on emissions through GHG Registries.

- NACU has made a publicly-announced goal of becoming Carbon Neutral in 5 years.

The list below summarizes the key areas for improvement within NACU with regards to meeting the Sustainability Principles:

- There is lack of specific climate change policy for financing in sectors that affect the climate in some capacity, whether through support of manufacturing, construction, transport, or energy and utilities.

- There is a lack of commitment to require clients to report on GHG emissions.

- There is a lack of policy requiring emission reductions from clients and partners.

- There is a lack of systematic sustainability assessments and auditing of internal operation relative to violations of the Sustainability Principles.

- There is a lack of systematic sustainability assessments and auditing of the impacts of all financial products and activities relative to violations of the Sustainability Principles.

As the above list shows, NACU is already demonstrating several activities that could be a platform in transitioning towards sustainability. Some suggestions on how they can be developed further are included in the next sections of this paper. Further review of this list suggested that there was a high probability that some of the projects funded by NACU might be contributing to emission reductions (as they have been undertaken with an intention of addressing environmental issues and specifically climate change) and as such could potentially be used as carbon offsets. Having specific knowledge (i.e. quantified results) on how NACU is assisting to create emission reductions would help in making more strategic decisions when selecting activities that the organisation supports financially.

3.2.2 Process issues related to obtaining and claiming offset credits (Step B2)

This section synthesizes the results of our research done on the key aspects of the still-evolving voluntary carbon market. It should be noted that the Gold Standard and the Kyoto Protocol CDM guidelines are only applicable to projects in Non-Annex 1 countries, meaning that they do not apply to projects undertaken in Canada. Still, their guidelines are included here as a source of information for comparison.

Additionality. Proof of project additionality is the cornerstone of the carbon offset concept. If the intent of purchasing an emission reduction credit is to make a tangible reduction elsewhere (because the purchasing organisation cannot immediately reduce its own emissions), and if credits had been awarded to projects that would have occurred under the business-as-usual (BAU) scenario, then the additional money invested in the credits has no 'additional' benefit to the environment. Therefore, prior to quantification of any emission reductions, a project must prove to be additional, meaning

that emission reductions would not have otherwise occurred under the BAU scenario (Kyoto Protocol, n.d.). The practical application of defining the BAU scenario is fraught with subjectivity and ambiguity, and is often the source of emission reduction calculations that are inaccurate (and on occasion, completely fraudulent). As a result, several guidelines have been published, related to establishing what constitutes the BAU scenario and how it is applied to the quantification of reductions made.

The GHG Protocol for Project Accounting (WBSCD and WRI 2005) incorporates additionality into the 'Baseline Analysis' section of the quantification methodology, which is the section that determines what the BAU scenario would be. The United Nations Framework Convention on Climate Change (UNFCCC, n.d.) utilizes a separate 'Additionality Tool' which asks questions to the project proponent to determine whether a project is additional or not. The Gold Standard (2006) requires the project proponent to satisfy the requirements of the 'Additionality Screen', in addition to the UNFCCC 'Additionality Tool'. The Voluntary Carbon Standard (Climate Group, IETA and WWF 2006) requires that the project passes one of four 'Additionality Tests'.

Although the above guidelines offer different approaches to additionality, the following is a summary of the key aspects (summarized from the Voluntary Carbon Standard, the GHG Protocol, UNFCCC's Additionality Tool and interviews with experts):

- A project is additional if it encounters some barriers to its implementation. The Voluntary Carbon Standard only identifies financial barriers (i.e. the project must not be the least cost option for the service provided), however it is commonly agreed that there may be other barriers, such as poor market development, technological barriers and legislative or other policy barriers (UNFCCC, n.d. Additionality Tool, Step 3).
- A project is not additional if it is undertaken to meet any government legislation. There are differing opinions as to whether or not a municipality's 'commitment' is considered binding legislation *per se*, as it is something self-imposed (Bramley 2006). The Voluntary Carbon Standard suggests that undertaking a project to meet voluntary targets negates the possibility of any emission reduction 'credits' being

generated (Climate Group, IETA and WEF 2006 17), and should only be reported by the organisation actually reducing the emissions This is supported by the GHG Protocol for Corporate Accounting and Reporting (WBSCD and WRI 2004).

- A project is not additional if it is an established practice, or can be seen as the 'norm.' Ways to overcome this may include monitoring market trends, behavioural trends, etc., over the course of the project to determine 'normal' practices (Voluntary Carbon Standard uses >51% in the defined market) and then ceasing to claim offset credits. For example, the purchase of a hybrid vehicle in 2006 is generally agreed to be beyond BAU, and is therefore additional. However, purchasing the same vehicle in 2010 may not be genuinely additional, as it may have become common practice. This decision does include a certain degree of flexibility, and thus should be done conservatively, so that true emission reductions are being made where claimed (Dowlatabawi, 2006).

Determining an adequate level of stringency in setting additionality criteria will determine the effectiveness of the emission reduction initiatives. If they are set too high, there is a risk of rejection of desirable projects. If they are set too low, there is a risk of projects not effectively contributing to addressing the climate change challenge (WBSCD and WRI 2005, 19 -20).

Multiple partners/investors in a project. It is common for there to be multiple partners in the implementation of the project. The project proponent retains ownership of any emission reduction credits until those credits have otherwise been assigned or sold to other parties. This can be done by any type of legal agreement between parties (WBSCD and WRI 2004). It is advisable that the quantities or shares of the emission reduction credits allocated to each party be determined prior to the project's implementation and/or prior to financial commitment (Wharton 2006, Bramley 2006). It should also be noted that the proportion of the emission reduction credits does not necessarily need to match the proportion of the funding made by a party – this can be negotiated between parties involved. Depending on the parties involved in the project, and their interest in obtaining the credits, legal negotiations may become cumbersome and

prohibitively expensive (Dowlatabadi 2006).

The Voluntary Carbon Standard indicates that when there is a governmental entity as a partner in a project, the portion of the project that is supported by public funding is not eligible for emission reduction credits (Climate Group, IETA and WEF 2006 13). Whether or not this aspect of this Standard will be included as currently drafted remains to be seen.

Time issues for claiming of emission reductions. Emission reduction credits must always be claimed after they are realized (WBSCD and WRI 2005, Wharton 2006, Bramley 2006). Typically this is done year by year, but may depend on the physical characteristics of the project. The length of period that a project may realize true emission reduction credits varies from project to project (WBSCD and WRI 2005). This issue is partially addressed above in the additionality section.

Verification. In the voluntary carbon offset market, verification of the offset projects is conducted for two reasons: as a requirement of a registration body (that then would trade the offset credits); and in order to ensure credibility of the emission reduction credits. Currently there are a few existing bodies offering voluntary carbon offsets registration. Examples include Canadian GHG Registries[11], WWF Climate Savers, and the California Climate Action Registry. They are still establishing themselves and use a variety of different requirements.

In terms of the verification process there are two main standards that have been widely accepted: GHG Protocol (WBCSD and WRI 2004) and ISO 14064–3 (2006). They are complimentary and have the same target audience. The main differences are that ISO 14064-3 provides a clear set of requirements on 'what must be done' that is highly amenable to verification, while the GHG Protocol is more descriptive and narrative. Neither of these two documents ensures contributions to sustainable development nor requires environmental or social impact assessment.

Both of these standards suggest that while verification is often undertaken by an independent external third party, sometimes it might be more viable to use internal verification by personnel who are independent of the GHG accounting and reporting process. While external third party validation and

[11] Canadian GHG Registries are currently in transition.

verification will increase the credibility for external stakeholders, independent internal validation and verification offers such benefits as lower cost, valuable assurance, a learning experience for the organisation and improvement in the quality of data for the external verifiers.

For micro-scale voluntary projects, the Gold Standard has developed a set of process guidelines for verifying these projects, so as to continue the creation of these offsets while lowering the transaction costs to verify their genuine nature (Gold Standard 2006). This verification process is called 'targeted random' whereby each project application pays a nominal, standard fee which is pooled to cover the costs of the verification of the 'chosen' projects.

(A) External verification:

Currently there are different standards determining the required accreditation of external verifiers for the voluntary carbon offset projects. The Gold Standard requires that they are a Designated Operational Entity (DOE), a UNFCCC accreditation, while the Voluntary Carbon Standard states that "applicable Verification Entities are all credible institutions and organisations with documented experience in verifying greenhouse gas emission reductions" (Climate Group, IETA and WWF 2006, 5).

(B) Internal verification:

Both ISO 14064 (2006) and the GHG Protocol (WBCSD and WRI 2004) provide guidance with regards to the qualities and competencies that a verifier should have. They include such aspects as: independence; ethical conduct; due professional care; previous experience and competence in undertaking GHG verifications; and an understanding of the company's operations and industry. The requirements for the composite knowledge and skills of the verification team include: familiarity with the legal rules under which the validation or verification is being undertaken; familiarity with the requirements of the specific GHG program; familiarity with the processes generating GHG emissions and the technical issues related to their quantification; auditing of GHG data; risk assessment methodologies and

others. Further requirements on knowledge and skills for the verifiers will be provided by ISO 14065[12].

Quantification and verification will typically require a certain degree of monitoring and documentation of the project results, usually by the project proponent. These requirements should be addressed at the onset of funding/investment, and may need to be written into the funding agreement.

Quantification of Investments and Loss Leaders. It is generally agreed that the original intent of a party's involvement is irrelevant in determining whether or not emission reductions can be claimed (Bramley 2006, Rawson 2006). Emission reductions could be one of many benefits accrued to a party as a result of their involvement in a project, above and beyond any financial benefits received. Consequently, it is suggested that financial organisations such as NACU can claim emission reductions resulting from investments and loss leaders.[13] As previously mentioned, the intent to claim any emission reductions should be noted and negotiated prior to final decisions on funding arrangements.

Project Eligibility. The GHG Protocol and ISO 14064 do not specify the types of projects that are eligible for receiving offset credits. Only the Gold Standard and the Voluntary Carbon Standard have requirements for types of projects. The Gold Standard, the Voluntary Carbon Standard, and Kyoto Protocol documents require that that these projects contribute to sustainable development.

The Gold Standard requires that each project and its components must be one of two project types: 'Renewable Energy' or 'End Use Energy Efficiency Improvement,' and identifies specific eligible project types in each of these categories (Gold Standard 2005). To be eligible for the Voluntary Carbon Standard, projects must fall into one of eight categories defined, although it is considering adding more eligible categories (Climate Group, IETA and WEF 2006, 10).

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[12] ISO 14065 - GHG Validation and Verification Bodies – standards for the accreditation of bodies offering GHG validation or verification services is to be published in 2007.

[13] A loss leader is a product or service deliberately sold below cost, often with the intention of attracting new customers and/or attracting customers to purchase other more profitable products or services.

To address sustainability, the Kyoto Protocol sets requirements for Clean Development Mechanism (CDM) offset projects; these requirements include environmental protection, social advancement, human rights, and economic development (Kyoto Protocol n.d.). The Gold Standard addresses sustainability by testing projects against a set of indicators. The project must have a certain score in order to be eligible for Gold Standard certification (Gold Standard 2005). The Voluntary Carbon Standard addresses sustainability by requiring that the project proponent demonstrate that the project has no negative impact to sustainable development in the local community (Climate Group, IETA and WEF 2006, 19).

Other process issues.

(A) Proving a direct link

Depending on the project type and characteristics, it may become difficult to show a direct link between the project activity and a reduction in emissions. For example, if a project provided educational materials to consumers to purchase an energy efficient appliance, it must be demonstrated that this particular educational information was directly responsible for the purchase of that appliance. If a customer intended to purchase that given appliance prior to receiving the educational material, then these credits should not be claimed since that customer's purchase would have occurred anyways. For circumstances such as the example above, an incentive coupon could be used to track purchases occurring as a result of an educational campaign (Dowlatabadi 2006). Where a direct link cannot be clearly established, organisations should not attempt to quantify and/or claim these credits.

(B) Quantifying behavioural change

Quantifying behavioural change resulting in emission reductions, while possible, may be costly in terms of time, money, and energy (Rawson 2006). Types of behavioural change that are short in time scale (e.g. the decision to purchase one appliance over another) would be easier to both prove the direct link and monitor, than a change in behaviour that occurs and is (or is not) maintained over a period of time (e.g. the change in commuting behaviour), which requires more effort to monitor.

(C) Quantifying core funding or capacity building

If a particular organisation could obtain quantifiable and verifiable emission reduction credits either in its own organisation, or through the results of

some or any of its specific projects, then that organisation could sell, trade, or assign those credits as it sees appropriate. Therefore, funding by organisations such as NACU to other organisations for core funding and/or capacity building could reasonably be given in exchange for the credits created by that organisation. This transfer of credits could be written into the funding contract, provided those credits had already been verified and/or it was reasonable to expect those credits could and would be made available to NACU. It should be noted, however, that the Voluntary Carbon Standard suggests that any emission reductions that occurred as a result of an organisation's voluntary emission reduction target, are deemed as not additional (Climate Group, IETA and WEF 2006, 17), and therefore could not be assignable to another organisation.

3.2.3 Overview of available quantification methodology

Review of existing quantification methodologies was conducted with the purpose of selection of the most suitable one for the voluntary carbon offsets that might be used by NACU. Below is a brief description of all existing quantification standards, outlining their intended use and strengths.

- The GHG Protocol provides a detailed explanation of required steps for calculating offsets, as well as guidance for each step required. It delineates two types of calculation methodologies depending on project type, and provides detailed examples for each of these calculations. The methodology outlined in this document is applicable for small or large scale offset projects, voluntarily undertaken or bound by the Kyoto Protocol (WBCSD and WRI 2005).

- The OECD Framework for Baseline Guidelines provides insight into baseline determination, a challenging and important step for offset quantification. The document is not, however, a step-by-step methodology for offset quantification. It discusses the main methodological issues for baseline determination, primarily for the audience of Annex 1 countries intending to undertake Clean Development Mechanisms (CDM)/Joint Implementation (JI) projects. It can be useful for the development of credible, stringent baselines that need to meet the United Nations Framework Convention on Climate Change (UNFCCC) criteria (OECD and IEA 2001).

- The Gold Standard provides methodology guidelines and principles for offset quantification and determination of additionality to ensure the highest possible quality of offsets, and it specifically addresses the project's benefit to sustainable development. It references the UNFCCC for the actual quantification steps. The Gold Standard recently developed a Voluntary Emission Reduction (VER) scheme (Gold Standard 2006) that outlines requirements for voluntary projects of different sizes, including guidance on Micro-Scale projects (<5000 tCO_2e per year). As discussed above, the Gold Standard VER certification is not available for projects originating in Annex 1 countries (Gold Standard 2005).

- The Government of Canada Offset System for Greenhouse Gases[14] provided guidelines for the development of offset credits to be used by Canada to meet its Kyoto commitments. For quantification of offsets, it required that either an established standard be used, or that the project proponent develops a new methodology based on the document *Offset System Specification for Quantification*, not yet published. The recommended existing standards to be used were the GHG Project Protocol and approved UNFCCC methodologies (The Government of Canada 2005).

- UNFCCC provides a list of approved calculation methodologies for specific projects, and the project proponent must select the appropriate approved methodology with respect to the project type. If no approved methodology exists for the project type, a new one may be developed and used pending approval by UNFCCC (UNFCCC n.d.).

- The Voluntary Carbon Standard[15] reinforces existing standards and provides criteria that ensure the additionality of offsets. The Standard discusses certification for Voluntary Carbon Units

[14] It should be noted that the Government of Canada Offset System for Greenhouse Gases, while just a few weeks from being launched, was shelved by the government in April 2006 (Rawson, 2006). It is unclear if this work done under this system will be incorporated into future climate change initiatives of the Canadian Government.

[15] Draft 1 for consultation was released in March 2006. It is expected that the next version of this Standard will be released in September 2006 (Kenber 2006).

(VCUs). Each step in the Standard's methodology is supplemented with appropriate segments of other existing, accepted standards. For the quantification section, the Standard cites both the GHG Protocol and UNFCCC approved methodologies, requiring that one or the other be used to quantify emission reductions (Climate Group, IETA and WWF 2006).

The GHG Project Protocol is the only of the reviewed documents that provides a specific methodology for the actual calculation of GHG emission reductions or removal enhancements, for any type of project. As mentioned, the other documents provide clarification of key concepts of the offset crediting process as well as standards to be adhered to, that ensure additionality. To provide a methodology that is the most comprehensive, clear, and effective, these specific components of other quantification documents have been added to the calculation steps outlined by the GHG Project Protocol. The complete selected methodology with supplemental components is included in Appendix 2. For each step, the respective document is cited and a brief explanation included.

Using this selected methodology and the understanding of the process issues described above (B2), we analyzed opportunities for NACU to use its existing granting and investment activities to determine the possibility and effectiveness of calculating and claiming emission reductions.

3.2.4 Opportunities for carbon offsets within existing granting and investment activities

NACU's grant quantifications. Once an appropriate methodology for quantification of emission reductions was established (as described in the previous section), we used it to estimate potential offset credits existing in NACU's current granting and investment activities. We reviewed the project descriptions of 62 environmental grants that NACU issued in 2005. Based on a review of the grant proposals and/or the final reports, two grants were selected for quantification of emission reductions, herein referred to as the 'Car Share' grant and the 'Biodiesel' grant. These two grants were the only grants that were determined to have actually realized quantifiable emission reductions in 2005. There were a number of grants that may result in emission reductions in subsequent years, due to the project timeline, but these grants were not quantified at this time as the emissions reductions have not yet been realized.

The subsequent quantifications of the 'Car Share' and 'Biodiesel' grants show the total emission reductions for 2005 for each of the projects. The quantification methodologies and calculations are included in Appendix 3 – Grant Quantifications. It was determined that the 'Car Share' project could have recognized a total of 4.5 tonnes of emission reductions in 2005, and it is estimated that it would continue to produce an additional 160 tonnes of emission reduction through the period of 2006-2010 (approximately 22 tonnes per year). The 'Biodiesel' project was determined to have created 59 tonnes of emission reductions in 2005, and an additional 4239 tonnes over the course of the next 5 years.

It is not guaranteed that NACU would have been given rights to any or all of the emission reduction credits for either project. Issues surrounding the division of credits and rights to credits were addressed earlier in *Process Issues*, section 3.2.2. Notwithstanding these issues, the estimated cost per tonne of the emission reductions (according to quantity and proportion of the total project costs of the grants awarded) was calculated. Both projects created emission reductions at a cost per tonne significantly (2 to 10 times) higher than the average market price for high quality carbon offset credits.[16]

The results of the conducted quantifications demonstrated that:

- The process of examining project descriptions for all the environmental grants for possible emission reductions was time consuming, and in the end only two of 62 were selected.

- Projects were difficult to work with if they were not designed for obtaining quantifiable emission reductions, and subsequently information was typically difficult to obtain or completely unavailable.

- Many of the grants were small and provided synergistic effects to the community, including emission reductions, but were difficult to quantify either due to the project design or the access to information. Also, due to the scale of these projects, in combination with the lack of specific intent to obtain quantifiable emission reductions, the cost of grant per tonne of

[16] Exact cost per tonne is not listed here, due to confidentiality concerns.

emission reduction was very high compared to existing market prices for emission reduction credits.

NACU's sample investment quantification. One of the main activities that a financial organisation engages in is investments. This is also one of the areas where financial organisations have a big impact, as often the funding they provide decides whether or not certain activities and projects occur. For the purpose of this research, one investment was analysed to provide information on potential carbon offset opportunities for NACU to use.

The investment project under review was a run-of-the-river hydroelectric energy project.[17] This particular example was not deemed to be additional due to the fact that the local energy provider is already claiming the emissions reductions that occurred as a result of the project against their own targets for renewable energy generation, and is using this project to provide renewable energy certificates for customers. In such a situation, NACU could not claim the same credits as it would lead to double counting of the same offsets. Quantification of this project was still carried out to determine approximate possible emission reductions for a similar type and size of project. The quantification methodology and calculations for this project are included in Appendix 4. It was determined that this project could generate approximately 825 tonnes of emission reductions per year, a total of 16500 tonnes over the 20-year investment lifetime of the project.

The results of this exercise demonstrated the following:

- Having multiple partners in the project can present a challenge for the offset claims, as in all or some participating parties may want the offset credits, which can only be claimed once. This is especially true in situations where one or more of the parties involved, such as governments or Kyoto-bound organisations, have legal obligations for emission reductions, or where one or more of the parties have their own voluntary targets for emission reductions.

- In a region where the main source of power already comes from hydroelectric energy (that has low carbon dioxide emissions compared to fossil fuel based sources of energy), it is difficult to

[17] A run-of-the-river hydroelectric plants use the power in the river water as it passes through the plant without causing an appreciable change in the river flow.

obtain significant emission reductions from energy generation projects.

- The quantification of this investment also showed that the cost per tonne in such a project would be more than an order of magnitude higher than the cost of high quality carbon offset credits available on the market. [18]

3.3 A Vision of Success and Associated Measures

This section identifies potential solutions (criteria and processes) for NACU to move towards sustainability using its goal of becoming Carbon Neutral in 5 years. By imagining a vision of success in the future, and backcasting to the current situation of NACU's existing activities and the carbon offset landscape, we can create a list of possible solutions for moving strategically towards success.

3.3.1 Setting the vision of success (Step C1)

In a sustainable society all financial organisations will meet the Basic Principles for Sustainability. These principles will be integrated into all of their internal and external activities. This would translate into obligation to not just provide financial benefits but also to contribute to the continued growth and development of local communities.

Despite currently not using the Principled-based definition of sustainability, NACU has already made many commitments that would contribute to sustainable development. It has demonstrated its ability to show leadership in this area. Our goal is to see NACU further this leadership role and fully realise success with respect to meeting the Principled-based definition of sustainability.

Within the vision of meeting all Sustainability Principles, achieving the state of 'sustainable carbon neutrality' is included. For a financial

[18] The exact cost per tonne of this project is not listed here due to confidentiality concerns of the investment details.

organisation to achieve full sustainability, this would imply that there is not a single activity or product that contributes directly or indirectly to the violation of any of the Sustainability Principles. Therefore, the reaches of NACU's influence would be expanded beyond the organisation to everyone that it interacts with: members, partners, and suppliers. Once this state has been achieved, the vision can expand even further into the future with actions aiming at the restoration of the environment. In terms of carbon dioxide emissions this would mean taking the excess of carbon out of the biosphere (here the primary concern is the atmospheric concentrations) in the form of sustainable carbon sequestration to the lithosphere. Out of this vision of success there are several possible long- and short-term measures that can be described.

3.3.2 Possible solutions (Step C2)

Based on the envisioned future of NACU's role in its community and in sustainable development at large, specific measures are suggested that may move the organisation from where it is today, to this envisioned future These measures are a combination of goals and actions that NACU can undertake in the long- and short- term future.

Possible long-term measures:

- Eliminate internal and external carbon dioxide footprint
- Eliminate completely the internal and external footprint of other GHGs
- Develop more indicators for NACU's ethical policy
- Incorporate assessments related to climate change into risk management
- Support and encourage development of renewable energy infrastructure through funding, investment, lending and insurance
- Become a larger player in the carbon economy and help set the best practice standard, such as establishing infrastructure for carbon credit banking (registry)

Possible short-term measures:

The following short term measures have been developed in line with long term sustainability solutions (above):

In relation to overall sustainability:

- Create a commitment to completely eliminate contributions to violations of the Basic Sustainability Principles (i.e. infuse sustainability criteria into all granting, lending, and investment activities and internal operations)
- Increase efforts to educate others about climate change
- Facilitate dialogue between the private sector, civil society and government in order to create new solutions for addressing climate change
- Set up transparent examples for how other organisations can follow NACU's footsteps

In relation to the Carbon Neutral in 5 years goal:

- Establish specific goals for further reduction and eventual elimination of carbon dioxide and other greenhouse gas emissions from internal operations
- Establish specific goals for reduction and eventual elimination of carbon dioxide and other greenhouse gas emissions from all activities (financial products, relationships with business partners, etc.)
- Put in place specific climate change policies for financing in sectors that affect the climate in some capacity, whether through support of manufacturing, construction, transport, energy or utilities.
- Support renewable energy and energy efficiency projects through all possible means (investments, lending, funding)
- Continue to engage employees in helping to achieve low-carbon lifestyles, at work and at home
- Lobby government agencies to push for stricter regulations on emission reductions
- Use local strategic offset projects to balance out existing carbon dioxide emissions

3.4 Method for selection and prioritization of strategic measures (Step D)

Choosing from the list of possible measures and prioritizing these actions is an important step in managing NACU's options. This step helps to ensure economic, social, and environmental returns that feed momentum on its current initiatives. We focussed on identifying the opportunities and

challenges for NACU to meet its Carbon Neutral in 5 years goal while moving strategically in the direction of sustainability.

Based on the three prioritizing questions described previously in the Methods section (i.e. right direction, flexible platform, good return on investment), the short-term measure of using local strategic carbon offsets was chosen as an appropriate action for NACU to take immediately. This measure answers positively to the three prioritization questions. It allows NACU to see beyond 'carbon neutrality' to the bigger picture of 'sustainable carbon neutrality,' and thus ensures all decisions are consistent with the continued movement towards sustainability. By viewing the use of offset credits as a short-term step, while energy systems are adjusted, it allows NACU to not enter any 'blind alleys,' and instead provides a flexible platform on which to build. It immediately provides a significant environmental and social return on investment (ROI). In time, being 'sustainably carbon neutral' will help NACU avoid the costly consequences of rising energy prices, competition for resources and future regulatory costs (e.g. gas taxes, carbon taxes, etc.) – which will ensure that this more long-term goal provides strong financial ROI as well.

To summarize our results, Figure 3.4 graphically depicts the steps of the ABCD Analysis for NACU. It shows that by backcasting from a position of success in the future, measures or actions can be brainstormed, and then strategically chosen and prioritized to continue NACU's movement towards the long-term goal. In particular, it displays the positioning of the Carbon Neutral in 5 years goal, relative to 'sustainable carbon neutrality', placed in this context.

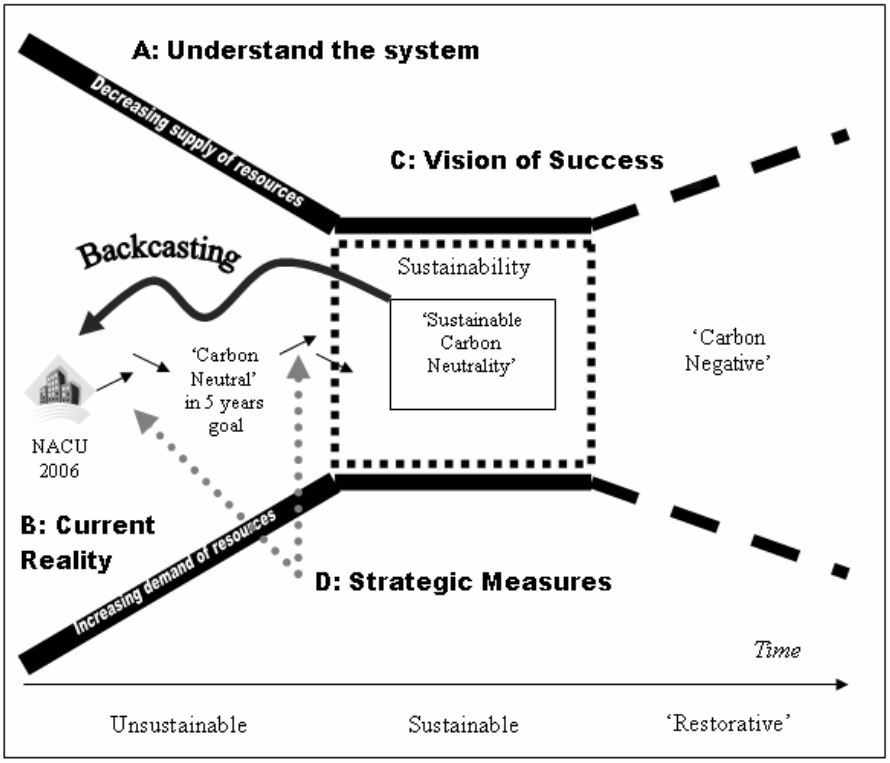

Figure 3.4. Graphical Depiction of the ABCD Analysis of NACU

The Discussion section to follow outlines the recommended criteria for a strategic carbon offset program. It also provides a method for assessment and prioritization of possible offset options, based on the three prioritization questions above, customized to reflect the issues of carbon offset projects.

4 Discussion

4.1 Recommendations for NACU

4.1.1 Becoming 'Carbon Neutral' in 5 years

Based on the results of the research conducted, it is recommended that NACU create a new funding program for reaching its goal of becoming Carbon Neutral in 5 years. This section discusses and rationalizes the need for such a program. It further outlines the requirements for such a program, and how to prioritize and evaluate potential incoming project applications. The subsequent recommendations and the prioritization process were developed based on the vision of success, NACU's pre-existing guidelines in their internal strategy documents, and the gained understanding of the voluntary carbon offset landscape, outlined in the results section.

Recommendations for NACU to achieve high quality, cost-effective and strategic offsets. It is recommended that NACU create a new, separate granting program designed for obtaining emission reduction credits. The main reasons for this recommendation are:

- The verification process for emission reductions requires steps that are currently not included in any of the existing programs (e.g. demonstration of project's additionality, identification of baseline, estimation of emissions, etc.). By being explicit about the requirements for verifiable emission reductions, projects can be designed more effectively from the beginning, allowing for more accurate and accessible information. Without these explicit requirements, it becomes difficult to extract information that the projects were not designed to provide.
- Measurements of carbon dioxide emissions are commonly associated with a high level of uncertainty and assumptions. A separate program will make it easier to create a transparent structure with standardized quantification methodology, clearly outlined objectives of the project, and predetermined roles of partners involved - leading to less uncertainty and more credibility.
- Not having a separate program may create high cost inefficiency in terms of dollars per tonne of emissions saved. Projects specifically designed for carbon emission reductions typically

generate a higher number of offsets at a lower cost.

- The most common method for achieving 'carbon neutrality' is to purchase carbon offset credits from organisations such as Climate Care and the Pembina Institute for Appropriate Development.[19] While this is a viable option, it would not necessarily provide additional benefits to local community development. A separate granting program that supports local climate change projects provides opportunity for synergistic benefits within the community.
- A separate granting program aimed specifically at carbon offset projects lends focus to the issue of climate change, and can act as a communication and education tool for both internal (e.g. employees) and external (e.g. public and business partners) audiences.

The graphical depiction of the new, separate granting program can be seen in Figure 4.1. This is meant to emphasize the continued support by NACU of projects that provide synergistic benefits to society, including benefits that may combat climate change.

[19] There is a rapidly increasing number of organisations that are offering carbon offset credits for purchase by organisations and individuals that wish to offset emissions from their activities, such as travel and energy consumption.

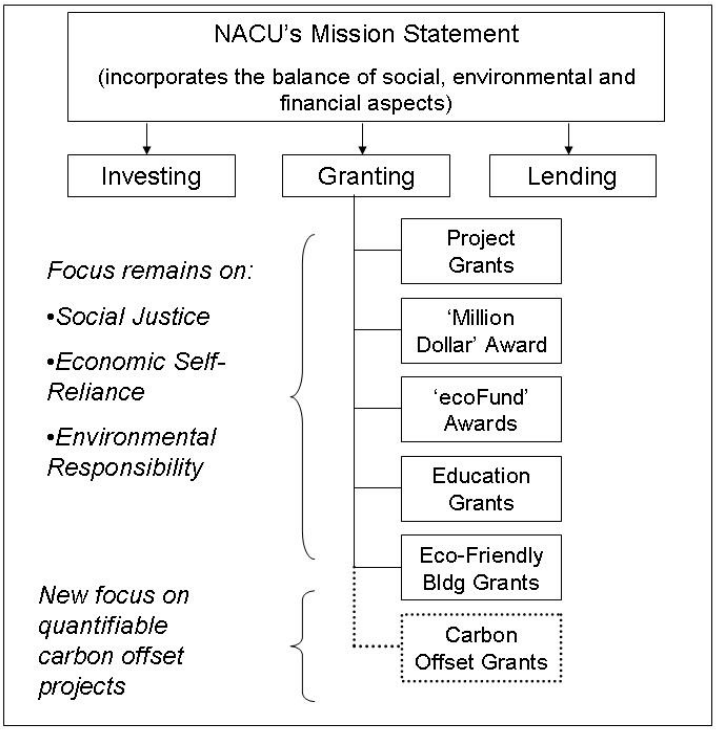

Figure 4.1 Schematic showing proposed new carbon offset granting program in relation to other granting programs

The recommendation of a separate program for obtaining emission reduction credits should not, however, take away from the goal of incorporating other climate change initiatives into regular business activities, thus ingraining sustainability aspects into the core competencies and influences of a financial organisation. It is further recommended that a completely new funding envelope be set aside for this new program, rather than using funds from existing granting programs.

This program is intended to achieve high quality, verifiable carbon emission reductions, while supporting the goals of NACU and its mission statement. It is intended that these high quality emission reductions will not only help NACU meet its stated goal of becoming Carbon Neutral in 5 years, but that these projects will also support the general transition to renewable energy systems, assist others to become more energy efficient, empower and improve communities, and ultimately address the imperative of behavioural change – all necessary to address climate change.

Specific requirements for an offset program. Nine key points were identified as minimum criteria necessary for the project proponent to meet in order to qualify (i.e. be considered) for funding under this new program. These points are:

- Type of emission reduction projects
- Type of organisation able to apply
- Location of the project
- Contribution to sustainable development
- Amount of verifiable emission reductions
- Proof of ownership
- Portion of total project budget
- Project plan and organisation information
- Compatibility with the funding organisations' goals and ethical requirements

These criteria are generic and can be applied to any organisation attempting to create an effective, strategic carbon offset program that funds a variety of projects in exchange for the offset credits. The explanations for each criterion and the rationale behind them that specifically apply to NACU can be found in Appendix 5.

Selection and prioritization of projects. Once the projects have shown to meet all the criteria above, the following questions (i.e. A – L) should be used to assess and prioritize among the eligible projects.[20] A separate prioritization tool was created to answer these questions using a scale of -2 to +2 as a rating of the project(s) for each question. From there, visual aids are available to display the project's performance relative to other options. The prioritization tool customized for NACU is shown in Appendix 6.

[20] It should be noted that most of these questions (i.e. A-L) may require several sub-questions to arrive at an answer.

It should be noted that when scoring the projects, any scoring values in the negative (-1 or -2) in the Sustainability and Risk aspects indicate a potentially serious problem and these factors should be carefully considered before supporting the project. Furthermore, the scores for the different aspects should never be aggregated (i.e. added) since they are each independent criterion.

Sustainability Aspects

A. Does the project help to address the systematic increase in concentrations of materials extracted from the earth's crust?
B. Does the project help to address the systematic increase in substances produced by society?
C. Does the project help to address the systematic degradation of nature by physical means?
D. Does the project help to reduce the systematic barriers to people meeting their needs?

Note: One example of a proposal related to fundamental human needs is that of Manfred Max-Neef (1991). He outlines nine fundamental human needs:

Affection	Identity	Protection
Creativity	Idleness	Subsistence
Freedom	Participation	Understanding

Cost Aspect

E. What is the estimated cost per tonne of emission reductions for this project?

Alignment with NACU's overall objectives

F. What is the location of project?
G. What ability exists for the project to educate the general public on climate change?
H. What is the ability of NACU to receive enhanced positive exposure by supporting this project?

Risk Aspects

I. Is the organisation credible?
J. Are there serious threats of the project not being completed?
K. Is there any risk of the project not being truly additional?
L. Is there a risk of the project being a dead end (i.e. 'blind alley') as regards to further improvements by the proponent?

A program dedicated to funding high quality offsets, explicitly measured against their compliance with the Sustainability Principles, will set high voluntary offset standards for additionality, quantification, and verification, so that NACU can confidently reach its goals and positively affect climate change mitigation. By setting high offset standards, NACU can establish itself as a sustainability leader for other financial organisations and for the communities in which it operates. It is hoped that in time, other organisations will call on NACU's expertise for establishing similar, high-quality offset programs.

4.1.2 Leadership in transitioning towards a sustainable society

NACU has the potential to lead society towards sustainability by helping to address climate change, incorporating sustainability into business strategies and core activities, and by leading others towards less carbon-intensive practices with its carbon offset project funding.

NACU has taken on the goal of becoming Carbon Neutral in 5 years within the context of its broader initiative of addressing climate change. Keeping this bigger perspective is very important as this research demonstrated. Should NACU aim at becoming 'sustainably carbon neutral,' it would need to create specific targets for complete elimination of fossil fuels. After such a state is reached, the investments in external projects that eliminate or reduce emissions can be continued and the credits gained (that prior to reaching the state of 'sustainable carbon neutral' would be used as carbon offset credits calculated against its emissions) can be simply retired. With the further development of sustainable Carbon Capture and Storage technology, the organisation can also move to 'restoration' of the environment by support of such projects. Before a restorative stage is reached, however, it is important that actions similar to those aiming at addressing carbon dioxide emissions are also taken with other greenhouse

gases and other sustainability principles are also met.

Incorporating a clear definition of sustainability into business strategies and core activities might seem like a demanding task, but as many other businesses have demonstrated, this can be done with a long term vision of sustainability. Having such a clear vision would allow NACU not only to change its own practices but also would provide a framework that others could follow.

4.2 Implications of results

Several important points are worth considering when examining the recommended carbon offset program. The following points show that any actions towards sustainability need to be considered from a whole-systems perspective to see as many possible outcomes of the recommendation as possible.

Since NACU can claim offset credits from existing activities such as granting and investing, it could theoretically claim enough offset credits from these activities to reach the 'carbon neutral' goal (without altering any of its current business practices). This makes it possible, in theory, for NACU to be criticized for carrying on its regular business activities and using the Carbon Neutral in 5 years goal as a mere public relations endeavour. However, as this research indicated, in order to claim carbon offset credits from existing activities, NACU needs to create and/or redesign its programs and activities. This will require time, effort, and investment for NACU to begin to realise offset credits from its existing activities. Furthermore, the notion of claiming carbon offsets from financial products (e.g. the low carbon car loan) seems attractive as it suggests incorporating some aspects of sustainability into core business activities.

However, once these services are open for carbon offset potential, the system boundaries of 'carbon neutrality' are expanded from a separate granting program which offsets NACU's internal operations, into the core activities of the credit union. The system attempting to become 'carbon neutral' would then include the end-use of core financial products. Thus, it becomes necessary to consider all core financial products of the organisation when determining how much carbon dioxide needs to be

offset, including the ones that may actually contribute to increasing climate change (i.e. regular car loans or investments in fossil fuel-intense technologies). *What to include and what not to include inside the boundary that will be 'carbon neutral' must not be selectively drawn around only the emissions reduced or avoided, but also around emissions created.* The importance of establishing clear and sufficient system boundaries is highlighted in this situation for the benefit of any organisation wishing to responsibly and credibly take on a carbon offset program to become 'carbon neutral.'

The last key aspect brought out in the results is the emphasis of the basic concept that financial organisations influence the activities that their services support. They can use this influence to support sustainable endeavours, and to discourage the unsustainable ones such as fossil fuel-based industries. The community support mandate that NACU takes on provides an obligation for the organisation to look beyond short-term profits and incorporate a longer term strategy that values communities and the environment. This mandate implies that NACU already carries a certain responsibility for fostering sustainable development - this mandate can be fulfilled by employing principles for Strategic Sustainable Development. A question then arises regarding other financial organisations that do not have such a mandate and whether or not they actually are beneficial to communities. Hopefully as NACU excels in its role as a leader towards sustainable financial organisations, it can make a strong business case for other organisations to follow its path.

4.3 Validity of the findings

The recommended program for creating environmentally beneficial and cost-effective offsets focuses specifically on climate change solutions. The true test of its validity will be when this program is implemented into NACU's practices. Meanwhile, it brings valuable attention to the necessity to mitigate climate change in an area where a strategic focus was lacking. This detailed focus has positive and potential negative aspects with respect to Strategic Sustainable Development.

This program could potentially distract NACU from some important aspects of sustainable development because the focus is purely on projects that produce emission reductions. By focusing on projects that aim

specifically to address the concentration of carbon dioxide in the biosphere, this program essentially compartmentalizes solutions for climate change without promoting projects that create synergies between several aspects of sustainable development (e.g. a community-building project that brings people together to restore natural habitats and biodiversity). Projects with such synergies are often the projects that lead to the most benefit to the community as a whole (including the environment), and have great opportunity for encouraging positive behavioural change.

While admittedly, this recommended program opens the opportunity for an organisation to too narrowly focus on projects offering low cost emission reductions, it is hoped that each of the prioritization aspects will be genuinely considered when choosing among options. It is possible that an organisation with a 'carbon neutral' goal utilizing a similar offset program could take the route of large-scale, low-cost emission reduction projects to reach its targets as inexpensively and quickly as possible. However it is believed that NACU, an organisation with the mandate of promoting community development, will not take such a route, and will continue to search for truly revolutionary projects, offering clear benefit to the climate and to the community as well.

The positive aspects of this program can be seen in its simple, clear goals: stabilizing concentrations of carbon dioxide in the biosphere to mitigate climate change. Climate change, among other urgent sustainability issues, must be addressed directly and effectively because of society's deeply established infrastructure that creates climate change. Due to the unprecedented state of the earth's climate, there is no longer time to allow climate change solutions to gradually emerge through other sustainability endeavours. A program that directly addresses carbon emissions, *if part of an overall sustainability program*, can more effectively create the necessary changes in energy systems with the swiftness and attention that is required, given the current state of our climate.

In terms of the validity of the research, some issues confronted by the team which resulted in potential weaknesses of the results include the lack of available standards and expert information. Three important drafts of standards and methodologies were released during the completion of this project. Being drafts, they are not finalized data, and some still await public consultation results. The infancy of this field became especially problematic because, in addition to the lack of generally-accepted standards, available quantification methodologies are often private

information owned by consulting companies and are available only to paying customers. As well, due to the level of detail in the report that was specific to NACU's internal information, there was a limit to the amount of external review and feedback we were able to receive. Additionally, because the voluntary carbon offset field applies to many businesses, much of the gathered information from experts was biased based on personal or corporate interests. Lastly, the small pool of experts at times led to cross-referencing.

The strengths of the results are that they provide a thorough review of the voluntary carbon offset landscape without any corporate interest - no benefit was gained from reporting the way each standard addresses different aspects such as carbon sinks or additionality. This allowed for the creation of a report that is comprehensive and unbiased. Moreover, the results provide a scientific understanding of 'carbon neutrality' and 'sustainable carbon neutrality' within the context of Strategic Sustainable Development, a perspective that appeared to be lacking in even the most diligent and environmentally-minded organisations. Finally, the resulting partnership of science and business yielded an effective application of sustainability in the growing field of climate change mitigation endeavours.

5 Conclusion

5.1 Key findings

The process of striving towards 'carbon neutrality' can be effective in leveraging an organisation towards sustainability. This goal is also a good step towards the overall goal of a maintaining a sustainable, successful organisation amongst changing markets due to social and environmental pressures. A clear understanding of the carbon cycle, the biosphere, and the role an organisation plays in these complex systems must accompany the goal of 'carbon neutrality' in order for it to actually help mitigate climate change. When an organisation eliminates its contribution to the increasing levels of carbon dioxide within the biosphere, it is 'sustainably carbon neutral,' and is taking a step in the right direction towards full sustainability.

Using certain carbon offsets as an interim way to achieve 'sustainable carbon neutrality' is strategic if these offsets do not distract the organisation from the necessity to eliminate its contribution to climate change as soon as possible. For this reason, only offsets that clearly contribute to climate change mitigation are suitable; therefore terrestrial sinks are excluded, and carbon sequestration is recommended as long as it can be done in a sustainable manner.

This information is applied for the case study, in the final recommendations for NACU. Establishing a new program to support offset projects for achieving its Carbon Neutral in 5 years goal will facilitate ease of offset project evaluation, in terms of sustainability aspects and legal details associated with the complex process of offset projects. If successfully implemented, this program will set precedence for implementing sustainability principles into concrete actions for NACU's core financial activities, where it has the most influence on society. NACU is in an excellent position to become the sustainability leader in the financial sector, and can continue to lead its entire community towards sustainability by using strategic offset projects to stimulate innovative climate change solutions.

5.2 Further research recommendations

One of the main findings of this study was the importance of placing the 'carbon neutral' initiative within a bigger context. Aligned with this notion is our further recommendation for NACU to continue monitoring its whole GHG footprint with a long-term goal of eliminating all GHG emissions. It would be also very important to expand the boundaries of the auditing to include more activities, such as the end use of the financial products. Examining the impacts that all financial activities have, and turning them into leverages to move towards sustainability, would be an incredible example of leadership within the financial industry.

With respect to short-term recommendations, we suggest that this research is extended to other greenhouse gases. Offset projects targeting other gases, such as methane, were claimed to be significantly more cost effective due to the differences in scale (carbon dioxide projects are usually larger, and typically require larger investments) and the global warming potential of different gases (Willis, Wilder and Curnow 2006). This would provide further opportunities for carbon offsets and investments.

The in-depth analysis presented in this paper focused mainly on the granting activities of NACU. Similar analysis on other activities such as lending, investments and other financial transactions may offer great insights into other alternative ways that a financial organisation can address climate change.

With carbon becoming a new trading commodity, other areas of interest might be the role of financial organisations in the rapidly evolving voluntary carbon offsets market. Opportunities may exist in emission trading and carbon credits registration.

Finally, is recommended that the proposed program and prioritization tool be implemented, tested, and further enhanced.

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Appendix 1: Differences between banks and credit unions

	Banks	**Credit Unions**
Ownership	Stockholders	Membership
Dividends	On stockholder's investments	Lower fees and interest on loan products and/or higher interest on deposits
Motivation	Profits to the shareholder	Service to the member
Volunteers	Bank directors with compensation	Members staff board of directors and key committees (with no compensation)
Democracy	Greater ownership equals more votes for higher levels of investment	Each member has one vote
Capital	Capital to support the growth of a bank may come from the sale of additional stock.	In a credit union, the only way to increase capital to support asset growth is to earn it by having more income than expenses.

Source: Washington State Dept. of Financial Institutions 2006

Appendix 2: Selected generic methodology for carbon offset quantification

Summary of GHG Protocol Methodology for CO_2 Offset Quantification, with supplemental components from OECD and UNFCCC methodologies.

1. **Describe the project (including technology, if applicable)**

   Source: UNFCCC

   a. Describe all relevant stakeholders and technologies involved

2. **Establish the project boundary**

   Source: GHG Protocol, OECD

   a. Determine which GHGs are included and excluded in analysis—justify
   b. Determine primary and secondary effects, including leakage

3. **Pick the baseline analysis method**

   Source: GHG Protocol

   a. **Project specific**
      i. For unique type of project, limited time/money resources
   b. **Performance standard**
      i. For several similar projects used together, for commonly used offset projects, or for projects in which confidentiality concerns are significant

4. **Identify the baseline candidates**

   Source: GHG Protocol

   a. Define product or service provided by project activity
   b. Identify all potential baseline candidates
   c. Define/justify geographical area and temporal range used to

pick baseline candidates

d. Identify the final list of baseline candidates
e. Choose from this list options that are representation of common practice (for project specific only)

Note: The baseline can be a rate (GHG emissions/year) or an absolute number—if the baseline is a rate, then it allows for the growth of the project with reductions of GHGs relative to the project's size.

In the GHG Protocol methodology, the identification of baseline candidates is the step which addresses additionality.

5. **If using Project Specific**

Source: GHG Protocol

a. Assess boundaries, identify/justify baseline scenario, estimate baseline emissions

6. **If using Performance Standard**

Source: GHG Protocol

a. Specify measurement (time-based or production-based)
b. Estimate emissions for baseline candidates
c. Calculate emission rates for different stringency levels
d. Choose a stringency level for appropriate credibility of additionality (10% stringency level means the selected baseline emission rate is already better than 90% of current practice)
e. Estimate the baseline emissions based on the selected stringency level

7. **<u>Calculate projected GHG savings</u>**

Source: GHG Protocol

a. Identify the time period over which the GHGs will be quantified/ credited/ monitored

Note: See OECD guidelines for determination of appropriate

time period

b. Quantify all primary and significant secondary effects, including leakage (when GHG emissions are ‘displaced’)

Note: See UNFCCC for guidance, for analysis of secondary effects of project activity

c. If necessary, estimate production level of project activity—should be same as estimated production level for baseline quantification

Appendix 3: Grant Quantifications

'Car Share' Project Quantification Methodology

1. **Describe Project:**

This project involves the addition of a new Toyota Prius vehicle to an existing, growing cooperative auto network. A cooperative auto network provides vehicles for short-term hire. These cars are located in various sites around a city, so that members of the cooperative can rent a car when its use is needed, without necessarily having to purchase a car to meet transportation needs. The Toyota Prius is a hybrid electric/gasoline vehicle that does not require being plugged in to recharge. Data available on cooperative auto networks demonstrates that people's behaviour changes when they join the cooperative – they typically walk more, use public transportation more, and drive less.

2. **Establish Project Boundaries:**
    a. Determine which GHGs are included in the calculations:
        i. Only CO_2 is included in the calculations, as it is the primary GHG emitted.
    b. Determine primary and secondary effects:
        i. Primary effects:
            - The main CO_2 emissions avoidance occurs as a result of changed behaviour when people join the cooperative. (Assumption based on trends: increased membership leads to a decrease in the driving of personal vehicles.)
            - CO_2 savings resulting from the high efficiency of the Toyota Prius versus common car-efficiencies. (Increased efficiency of hybrid motor leads to a decrease in emissions.)
        ii. Secondary effects: We have considered but not included the following secondary effects:
            - The possible increase in the sales of Prius or hybrid vehicles due to the exposure of this particular vehicle (it is very visible);
            - The possible increase in membership in the

'Car Share' in other areas due to the exposure created as a result of this project;

- The life cycle assessment of neither the vehicle, nor the gasoline
- The 'rebound effect' of some people possibly increasing their amount of driving as a result of having access to the vehicle, or as a result of feeling 'less guilty' because of the vehicle's higher efficiency. Efforts were made, however, to mitigate this possible effect by using very conservative numbers in all calculations to avoid over-estimation of CO_2 savings.

3. **Choose baseline analysis method:**
   Project specific

4. **Identify baseline candidates:**
   a. No action: No car added to cooperative auto network.
   b. Addition of a car with a gasoline engine.
   c. Addition of a car with a hybrid electric/gasoline engine.

   Discussion of baseline candidates:

   As this cooperative auto network is still establishing itself, the most likely baseline is that no vehicle would have been purchased, as there was still no demand in that particular area, and resources were not large enough for such a purchase. It is also a consideration that a more 'climate-friendly' vehicle could have been purchased, such as a vehicle that runs on 100% biofuels, to yield even higher CO_2 reductions, but the technology and infrastructure are not yet in place in the given region for that option to be viable. It is also assumed that if this project did not take place, the project's resulting members would be driving significantly more (numbers included in actual quantification).

5. **Choose baseline and estimate emissions:**
   a. The baseline chosen was no action – no car would have been purchased. This has been confirmed by the 'Car Share' organisation.
   b. Estimate baseline emissions: The members-to-be would

have been driving vehicles at least as much as 6000 km per year. The estimated (conservative) efficiency of the vehicle they would have been driving is equal to that of a new Toyota Camry. It would not seem valid to include the vehicle efficiency of a pick-up truck or a minivan, for example, as the people owning those vehicles likely need them for specific purposes (i.e. transporting children to sporting events).

6. N/A
7. **Calculate GHG savings:**
    a. Time period: This grant has been quantified for only 2005, as requested. It could reasonably be monitored and quantified for a period of 5 years. After that time, it should be assessed against what type of vehicle is 'typical' in 2010. For example, if in 2010, the Toyota Prius or other hybrids hold a significant market share of new vehicles purchased, then this type of project should no longer be considered 'additional'.
    b. Quantification details: Please see the following spreadsheets for all calculations and data sources.

Carshare Grant Quantification Calculation

Month	# New Members	# Members who left coop, or changed to a different local car	Cumulative number of members using the Pruis	Pre-Carshare Kms Driven Per Month: BAU	Pre-Carshare Emissions Per Month: BAU (kg CO2)	Carshare member kms Driven Per Month	Carshare member Emissions Per Month (kg CO2)
Sept	3	0	3	1500.00	302.52	350.00	34.43
Oct	5	0	8	4000.00	806.72	933.33	91.80
Nov	11	0	19	9500.00	1915.97	2216.67	218.03
Dec	2	0	21	10500.00	2117.65	2450.00	240.98
TOTAL:					5142.86		585.25

Average kms driven by typical driver prior to joining a coop	6000	km
Average kms driven by typical coop member	1400	km
Source: Cooperative Auto Network (CAN), Vancouver BC		

Total kg of CO2 Avoided
4557.61

Efficiency of a new base Toyota Camry	11.9	km/L
Efficiency of a new base Toyota Prius	24.4	km/L
Emissions of CO2 per L of gasoline	2.4	kg CO2 /L

Source: Fuel Consumption Guide 2006 - Natural Resources Canada

Assumptions/Notes on Conservativeness:

We assume that new coop members would have driven at least as much as the lowest end of the range given by CAN.
We used the efficiency of a Toyota Camry because it is of similar size to the Prius. New vehcile efficiencies will be very conservative.
Baseline scenario: These new members would have been driving vehicles at least 6000km per year with a vehicle as efficient as a new Camry.
Project scenario: These new members are driving approximately 1400km per year using the Toyota Prius.

Verification:

These numbers could be further validated by surveying members on their previous and current vehicle use, and adjusting the average kms.

Carshare Total CO2 Reductions to 2010

YEAR	Number of members sharing a car	Pre-Carshare Driving Per Year (kms)	Pre-Carshare Emissions (kg CO2)	Carshare Driving Per Year (kms)	Carshare Emissions (kg CO2)
2005			5142.86		585.25
2006	30	180000	36302.52	42000	4131.15
2007	30	180000	36302.52	42000	4131.15
2008	30	180000	36302.52	42000	4131.15
2009	30	180000	36302.52	42000	4131.15
2010	30	180000	36302.52	42000	4131.15
Total			186655.46		21240.99
				total	165414.47 kg CO2 saved

Note: *This cost per tonne does not incorporate fees required to verify these emission reductions*

BIODIESEL Project Quantification Methodology

1. Describe Project:

This project is comprised of two components: a biodiesel demonstration project and a series of educational workshops to introduce the benefits of using biodiesel blends in vehicle fleets.

Biodiesel is a type of fuel created from plant material, rather than petroleum products. The life cycle energy inputs and emissions of biodiesel have been shown to have significant reductions in GHG emissions.

After participating in the demonstration project or the educational workshop(s), many fleet managers agreed to sign agreements for future purchases of biodiesel. This will not only reduce emissions directly in their fleet, but it will also have the indirect impacts of increasing market and product confidence in the immediate region and elsewhere. The desired end result is that biodiesel will be used by more fleets and personal vehicles.

2. Establish Project Boundaries:

a. Determine which GHGs are included in the calculations:
   i. Only CO_2 is included in the calculations, as it is the primary GHG emitted. Life cycle emission changes of B20 were used, rather than simple tailpipe emissions as it more accurately reflects the complete benefits of switching to biodiesel fuels.

b. Determine primary and secondary effects:
   i. Primary effects:
      - The reduced emissions of CO_2 through the use of a B20 blend of biodiesel used during the demonstration project.
      - The reduced emissions of CO_2 in subsequent years (as agreed upon future purchases of the product), due to increased confidence in Biodiesel by fleet managers resulting directly from the demonstration project and/or the educational workshops.
   ii. Secondary effects: The following secondary effects

were considered but not included:

- the possible increase in the use of biodiesel by fleets that did not participate in the workshops or demonstration project, but may have been influenced (partially) by the media coverage of the projects or increased availability of and confidence in the product
- the possible increase in the use of biodiesel by personal vehicles, resulting from either media coverage or increased availability of and confidence in the product
- the transportation requirements of both the traditional diesel and the biodiesel, as this information is difficult to determine, and may change over time

3. <u>Choose baseline analysis method:</u>

Project specific

4. <u>Identify baseline candidates:</u>

a. No action: No demonstration project would have occurred, nor any educational materials or workshops would have existed.
b. The demonstration project would have occurred, and the educational materials prepared and workshops carried out.

Discussion of baseline candidates:

Without the funding provided for this project, it is likely that neither component would have been carried out, as there was limited knowledge of and confidence in biodiesel in this region. Also, because of the high transportation costs associated with the delivery of biodiesel from the existing producer, biodiesel was more expensive than traditional diesel, and therefore not appealing to many fleet managers.

5. **Choose baseline and estimate emissions:**
    a. Baseline: No action: No demonstration project or workshops. Fleet managers would have continued using traditional diesel.
    b. Estimate emission of baseline: All fleets would have continued consuming traditional diesel (at projected levels determined by each fleet), with standard CO_2 emissions (2.7 kg of CO_2 per litre of diesel).
6. N/A

7. **Calculate GHG savings:**
    a. Time period: As requested, this calculation has only included CO_2 emission reductions for 2004 and 2005. However, future emission reductions could be estimated (although can not be claimed until realized) according to contracts signed by fleet managers for future purchases. The actual amount used could be verified at the end of each year. It is possible to include all emission reductions resulting from the demonstration project and any new purchase agreements resulting directly from participation in the demonstration project and/or the workshops. The longer the time period between the project (i.e. demonstration and workshops) and their decision to purchase, the less reliable this link becomes.
    b. Quantification details: Please see the following spreadsheet for all calculations and data sources.

Biodiesel Quantification of Emission Reductions

Number of participating municipalities	Quantity of B100 used by each municipality (L)	Blend used	Total volume of fuel used (L)	CO2 emissions for diesel fuel (kg CO2 per L)	Emissions reduction factor (%)
SEE 2005	*SEE 2005*	20	*SEE 2005*	2.7	15.7

Additional quantity of B100 to be purchased	**2005**	**2006-2010**
All fleets	28000	2000000

Estimated NUMBERS from Project Proponent

Total B100 sold	28000	2000000
Total B20 used	140000	10000000
Emissions avoided per year	**59346**	**4239000**

ASSUMPTIONS:

Emissions reduction factor incorporates life cycle carbon reductions.
We assume that all participating fleets are using B20, but this spreadsheet could be modified to calculate different blends used by different fleets.
We only intend to include decisions to purchase biodiesel that occurred as a direct result of the project activities.
Baseline scenario: All litres of fuel used by these fleets would have been traditional diesel.
Project scenario: A given quantity of purchased B100 will be blended at 20% (B20) and used in lieu of traditional diesel with a similar fuel efficiency results.

Appendix 4: Investment Quantification

RUN-OF-THE-RIVER hydroelectric plant investment

1. Describe the project (including technology, if applicable)

RUN-OF-THE-RIVER hydro plant is a project proposed by a local community. The project will result in 6.0MW (capacity) less energy imported from the local electricity provider.

Technical details of the project:

A *run-of-the-river* system is a small scale hydroelectric facility.

> Hydroelectric power is the result of a process in which flowing water is used to spin a turbine connected to a generator, the force of the river current (rather than falling water) applies pressure to the turbine blades to produce electricity. Since run-of-the-river systems do not usually have reservoirs and cannot store substantial quantities of water, power production from this type of system depends on seasonal changes and stream flow. These conventional hydroelectric generating units range in size from less than 1 megawatt to 700 megawatts. Because of their ability to start quickly and make rapid changes in power output, hydroelectric generating units are suitable for serving peak loads and providing spinning reserve power, as well as serving baseload requirements (EIA n.d).

2. Establish the project boundary

a. Determine which GHGs are included and excluded in analysis—justify

When BC Hydro reports on the average GHG emissions from their energy, they include carbon dioxide, methane, sulphur hexafluoride (SF_6) and nitrous oxide gasses and as such these are the gasses included in the analysis.

b. Determine primary and secondary effects, including leakage

Primary: Reduction in emissions from generating and transmitting grid-connected electricity.

Secondary: Emissions related to the construction of the plant – a one time effect.

Other potential secondary effects are related to the risk of sulphur hexafluoride (SF_6) gas, used to insulate and protect transmission equipment, escaping from worn or leaking seals or other equipment components, or through routine handling (BC Hydro 2005). Because of the scale of the project the amount of SF_6 potentially released is insignificant.

2. Pick the baseline analysis method

Project specific

3. Identify the baseline candidates

a. Define product/service provided by project activity

Product supplied by the project activity is the production of 25GWh of electricity per year supplied to the community surrounding the project.

b. Identify potential baseline candidates

1. Power provided by BC Hydro, transmitted from mainland.
2. Stand alone run-of-the river hydro plant
3. Grid connected run-of-the-river hydro plan
4. Diesel generator
5. Wind power
6. Building of a new power generation facility by BC Hydro to meet new energy demands of the local community.

c. Define/justify geographical area and temporal range used to pick baseline candidates

Local community (precise location not disclosed due to confidentiality reasons)

d. Identify the final list of baseline candidates

1. Power provided by BC Hydro, transmitted from mainland
2. Grid connected run-of the river hydro plant

In the absence of the project the most likely scenario involves power provided by BC Hydro, transmitted from the mainland, as they are the main provider of electricity in this region.

e. Choose from this list options that are representative of common practice (for project specific only)

Most energy **in this area** is generated by BC Hydro and transmitted from the mainland. GHG emissions intensity for this type of energy is 33 tonnes of carbon dioxide equivalent per year per GWh (BC Hydro 2005). This project will replace this source of energy by constructing a non-emitting power plant (Pembina Institute 2000).

Additionality:

The *project activity* demonstrates additionality in the following manner:

1. This project uses existing technology. The main barriers are financial.
2. Common practice is to use power supplied by BC Hydro.
3. The project is not done to meet existing legislation.

It needs to be noted, however, that as per Voluntary Carbon Standard (Version 1 for Consultation), in the case where there is a combination of private and public funding, the emission reductions can only be claimed from the "portion of the project that has been financed on purely commercial terms."

More importantly the project as whole, ***would not qualify as additional*** due to the fact that it is registered as part of BC Hydro fulfilment of its voluntary GHG offset commitment (made in 2000). As well, BC Hydro Commercial sells green power certificates resulting from 'green' power generation such as this project. As per the Voluntary Carbon Standard, "Carbon credits should not be the byproduct from the creation of an ancillary environmental asset and/or financial instrument (e.g. renewable energy credits)." As a result, our conclusion is that claiming offsets from this project by NACU would represent double counting.

5. Choose baseline and estimate emissions:

Electricity generated by the project is estimated at: 25 GWh/year. If this electricity was supplied by BC Hydro, the emissions would equal 825 tonnes of CO_2 per year (see calculations below), (BC Hydro 2005).

6. If using Performance Standard – set baseline and estimate emissions – not applicable.

7. Calculate projected GHG savings

The project has 20 year fixed-price Energy Purchase Agreement with BC Hydro. The calculations demonstrate GHG saving for that period. Considering long project lifetime periodical baseline revision is suggested for assessment of additionality in order to maintain the credibility of the annual credits claimed.

Secondary effects such as the one time emissions related to the construction of the plant are expected to be insignificant compared to the primary effects, and therefore are not included in the quantification.

Quantification details:

Emissions per GWh - (GHG intensity,BC Hydro average)	33	tonnes of CO2
Energy generated by the project	25	GWh/year
Net emissions reductions per year	825	tonnes of CO2
Net emissions reductions during the 20 year project lifetime	16500	tonnes of CO2

Source: BC Hydro 2005

Appendix 5: Recommended Offset Program Details

The following points outline the criteria necessary for the proponent of a project to qualify under this new program. Beneath each point is a brief rationale for the suggestion.

A) Type of emission reduction projects: The project must be one of the three eligible project types listed below:

- Projects that offer a switch from fossil fuel use to renewable energy
- Projects that reduce energy consumption of fossil fuels
- Sustainable Carbon Capture and Storage (CCS) projects that restore carbon to the lithosphere

Rationale: The three eligible project types are strategic—they are undertaken with a vision of success in mind, and each project type addresses the anthropogenic flow of carbon from the lithosphere to the biosphere. The exclusion of carbon sinks will help with the credibility of claims, as the quantification and management of carbon offsets generated from carbon sinks is complicated and problematic, as discussed earlier.

B) **Type of organisation able to apply:** This program is open to all organisations registered in the country where NACU is based, including businesses.

Rationale: While NACU's other granting programs are limited to only non-profit groups or registered charities, opening this program up to applications from other types of organisations will widen the range of funding applications. This allows for a larger pool of offset opportunities, especially considering that a large portion of innovative energy solutions come from the private sector.

C) Location of the project: Any location within North America, with preference given to localities where NACU operates.

Rationale: NACU's desire is to support local projects in the communities where it has branches. However, due to primary use

of hydroelectricity in this region, which is already relatively 'clean,' large-scale projects aimed at switching to renewable energy options and garner high amounts of emission reductions will likely only be found in other provinces. Therefore, it is advantageous to consider applications from other areas of North America (while still maintaining a preference for local projects).

D) Contribution to Sustainable Development: The project must contribute to sustainable development in the community. The project will be measured against its compliance with the four Basic Principles for Sustainability:

Compared to the business-as-usual scenario, the project must not contribute to increasing[21]…

I …concentrations in the biosphere of substances extracted from the Earth's crust;

II …concentrations in the biosphere of substances produced by society; and

III …degradation of nature by physical means.

And the project must not…

IV …create conditions that would systematically undermine people's capacity to meet their needs.[22]

Rationale: A principled guideline for how a project should *not* contribute to *unsustainability* allows plenty of room for designing effective and creative projects that contribute to sustainable development. It is important to measure projects against a clear and

[21] In other words, the project must never worsen the contribution to unsustainability. It is assumed that many projects will, at first, not meet all the Basic Principles for Sustainability. As such, we suggest an improvement towards sustainability *compared to* the business-as-usual scenario. Ideally, over time, we envision projects that will fully meet all four Principles.

[22] This would include a requirement that the project proponent has undertaken and documented genuine stakeholder consultation and has integrated input whenever possible. Where not possible, the project proponent must be able to justify why input was not integrated.

scientific definition of (un)sustainability, rather than against a vague notion of sustainability, than is too commonly neither defined nor measurable.

E) Amount of verifiable emission reductions: The project proposal should include an estimate of the total available verifiable emission reductions,[23] and the proponent should sign an agreement to provide such verified reduction credits. If a project proponent is unable to provide such estimates due to the lack of expertise or other resources, a second stream of applications could be created, where a NACU staff member could analyze the project and work to provide an estimate of the reductions possible using the recommended quantification methodology found in Appendix 2. It is further recommended that in the application form, several questions should be included that are designed to show the additionality of the project.

Rationale: If the project proponents can provide estimates of the emission reductions, it will allow for an easier up-front analysis of the cost per tonne of the project, to assist in prioritizing among applications. Also, by requiring the project proponent to answer the additionality questions, it will help in the assurance that true emission reductions are being realized. In terms of ease of verification of the emission reductions, if the project proponent is aware of these requirements prior to application for funding, the project design will likely be done such that verification information is available and the process and requirements are fully understood.

F) Proof of ownership: The project proponent must be able to provide proof of the ownership of the project and the emission reductions, and legally allocate the agreed upon emission reductions to NACU.

Rationale: This covers part of the due diligence of NACU to show that these emission reductions are not being double claimed. This also avoids possible costly legal processes to determine allocated shares among multiple parties involved in the project.

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[23] It is suggested that third-party verification be carried out by an experienced and accredited verifier. The project should be verified against criteria developed by NACU that incorporate the measurement of contribution towards sustainable development (defined using the Basic Principles of Sustainability).

G) Portion of total project budget: The project proponent can request up to 100% of the total project costs.

> *Rationale:* Projects that have multiple partners run the risk of competing claims for the emission reductions. Projects that involve public financing may run the risk of the publicly-funded portion of the project being void of any emission reduction credits, according to the new Voluntary Carbon Standard. NACU typically only supports projects in which co-funding has been done, however, in the case of emission reduction credits, the points above suggest that it may be preferential to seek projects with fewer partners.

H) Project plan and organisation information: The project proponent must provide a detailed outline of the project finances and timeline, history of other projects, board of directors, etc.

> *Rationale:* This information will assist NACU staff in determining the risk associated with this project and/or the organisation.

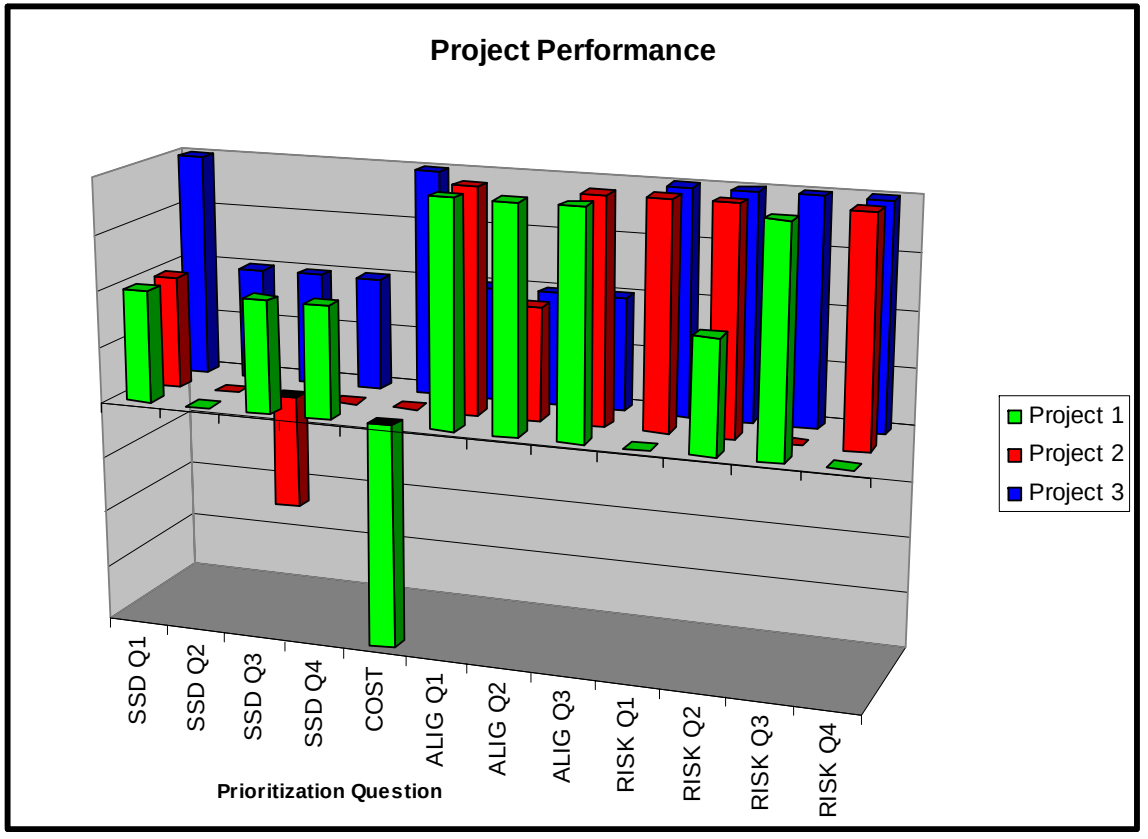
I) Compatibility with NACU's goals and ethical requirements: The organisation must be able to pass NACU's ethical policy, and the project must support NACU's overall objectives.

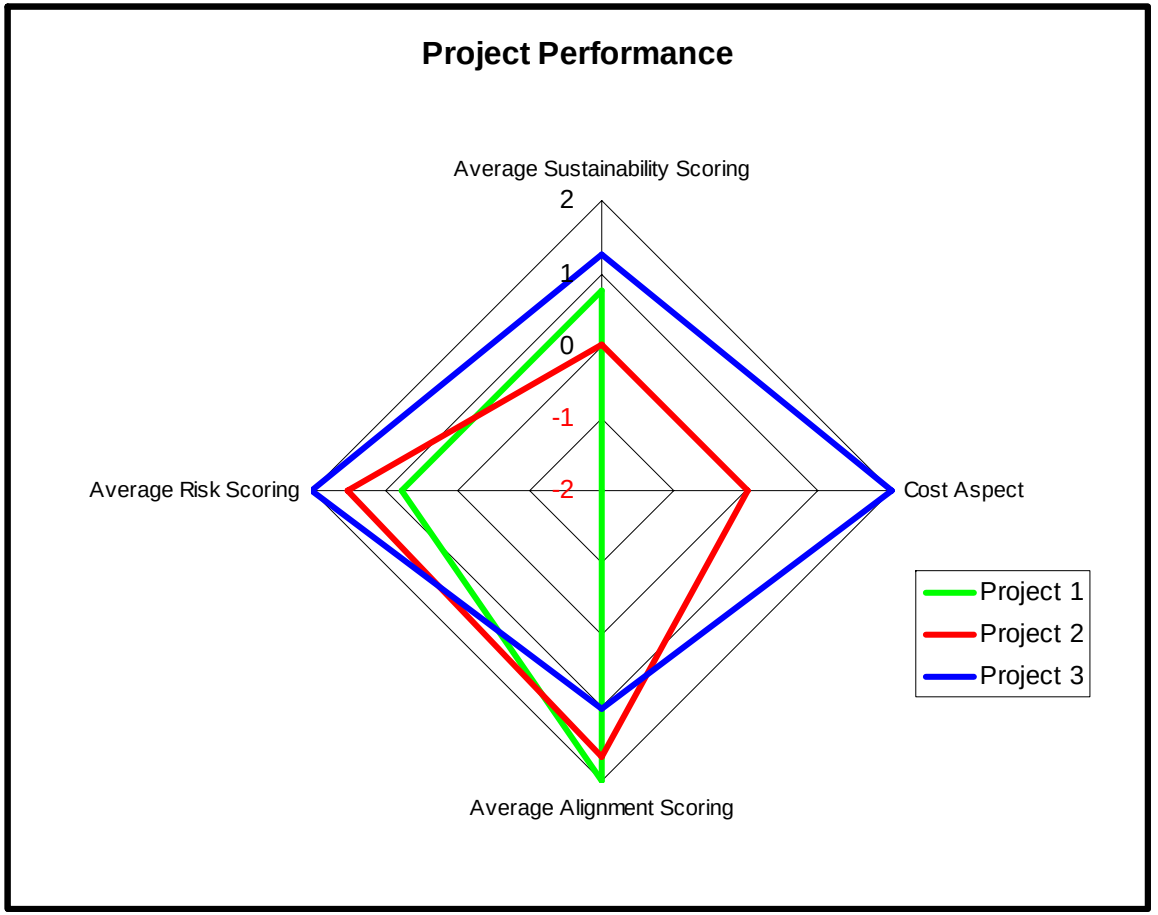
> *Rationale:* This is standard with any of NACU's business.

Appendix 6: Carbon offset projects selection tool

		Scoring Scale					Staff Scoring		
		+2	+1	0	-1	-2	Project 1	Project 2	Project 3
	Sustainability Aspects								
SSD Q1	Does the project help to address the systematic increase in concentrations of materials extracted from the earth's crust?	Yes, significantly reduces	Slight improvement	No impact from business as usual	Slight worsening	No, significantly contributes to an increasing concentration of extracted	1	1	2
SSD Q2	Does the project help to address the systematic increase in substances produced by society?	Yes, significantly reduces	Slight improvement	No impact from business as usual	Slight worsening	No, significantly contributes to an increasing concentration of	0	0	1
SSD Q3	Does the project help to address the systematic degradation of nature by phyical means?	Yes, significantly reduces	Slight improvement	No impact from business as usual	Slight worsening	No, significantly contributes to an increased degradation of	1	-1	1
SSD Q4	Does the project help to reduce the systematic barriers to people meeting their needs?	Yes, significantly reduces	Slight improvement	No impact from business as usual	Slight worsening	No, significantly contributes to increased barriers to people meeting	1	0	1
				Average Sustainability Scoring			***0.75***	***0.00***	***1.25***
	Cost Aspect								
COST	What is the estimated cost per tonne of this project?	$20 < $40	$40 < $60	$60 < $80	$80 <$100	> $100	-2	0	2

	Alignment with NACU's overall objectives								
ALIG Q1	What is the location of project?	Within communities where NACU operates	Within regions where NACU operates	Within province/state	Within country	Within North America	2	2	1
ALIG Q2	What ability exists for the project to educate the general public on climate change?	Excellent opportunity	Good opportunity	Slight opportunity	No opportunity	Detremental to communication of climate change	2	1	1
ALIG Q3	What is the ability of NACU to receive enhanced positive exposure by supporting this project?	Excellent opportunity	Good opportunity	Slight opportunity	No opportunity	Possible negative exposure	2	2	1
				Average Alignment Scoring			***2.00***	***1.67***	***1.00***
	Risk Aspects								
RISK Q1	Is the organization credible?	No risk	Minimal risk	Neutral / Unsure	Moderate risk	High risk	0	2	2
RISK Q2	Are there serious threats of the project not being completed?	No risk	Minimal risk	Neutral / Unsure	Moderate risk	High risk	1	2	2
RISK Q3	Is there any risk of the project not being truly additional?	No risk	Minimal risk	Neutral / Unsure	Moderate risk	High risk	2	0	2
RISK Q4	Is there a risk of the project being a dead end (i.e. 'blind alley') as regards further improvements by the proponent?	No risk	Minimal risk	Neutral / Unsure	Moderate risk	High risk	0	2	2
				Average Risk Scoring			***0.75***	***1.50***	***2.00***


Project Performance
Project 1
Project 2
Project 3
SSD Q1
SSD Q2
SSD Q3
SSD Q4
COST
ALIG Q1
ALIG Q2
ALIG Q3
RISK Q1
RISK Q2
RISK Q3
RISK Q4
Prioritization Question


Project Performance
Average Sustainability Scoring
2
1
0
-1
-2
Average Risk Scoring
Cost Aspect
Average Alignment Scoring
Project 1
Project 2
Project 3