

**INDUSTRY PROVINCIAL OFFSETS GROUP (IPOG)
WORKING GROUP ON BIOSEQUESTRATION**

**ADDRESSING PERMANENCE IN BIOSEQUESTRATION
PROJECTS IN A NORTH AMERICAN CONTEXT**

**CROSS CUTTING ISSUES SUBMISSION TO ENVIRONMENT
CANADA**

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SUBMITTED BY



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BACKGROUND

Following the release of Environment Canada's Draft Guide for Protocol Developers in August 2008, a number of representatives from Canadian industry, government, and non-government organizations joined together to coordinate development of eligible Offset Quantification Protocols (OSQPs) on the fast track protocol list, Annex J, Draft Guide to Protocol Developers. The Industry-Provincial Offset Group (IPOG) facilitated the creation of eight working groups, tasked with the development of over 21 eligible OSQPs.

As the IPOG coordination process proceeded, a number of crosscutting issues were identified that impact several of the protocol working groups and their related OSQPs. The Crosscutting Issues Working Group on Biosequestration was formed to assess options for policy issues related to permanence. This paper is focused on policies to guide development of Canada's biosequestration projects and specifically policies to manage the risk of carbon sink reversals. The Biosequestration Cross Cutting Issues Working Group is formally submitting this paper to Environment Canada for consideration.

PURPOSE OF THE SUBMISSION

The basis for this submission is the Biosequestration Working Group's desire to:

- Maintain environmental integrity of the Offset System;
- Maximize participation of project developers¹ in soil and forest sequestration projects;
- Generate compliance quality biosequestration offsets that are fungible in the context of other offsets in the system (i.e. a tonne is a tonne); and,
- Ensure that the administrative requirements for both government and project developers are as simple and practical as possible.

IPOG finds the suggested federal options of selecting either a temporary credit or permanent offset credit with a liability period for a biosink project to be unworkable and impractical, especially considering there are several policy options that could simultaneously address the risk of biosequestration reversals, and enable biosink projects to participate in the market. IPOG has provided previous analysis on the significant barriers to participation imposed by the federal biosequestration permanence options announced to date (please see IPOG June 2008 submission in Appendix D for a thorough discussion of the concerns – Section 2.2).

The alternative policy options that IPOG is suggesting are workable solutions that are being applied at a provincial level, recommended by international-based standard organizations, or implemented in other offset systems.

This paper builds on the previous work, and presents a more refined set of options than previous submissions, and takes inspiration from mechanisms being used or proposed in other offset systems around the world. The objectives of this policy discussion document are:

¹ Project developer could be a single entity or in the case of smaller projects it could be an aggregator

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- To begin a dialogue with Environment Canada on the policy issues/barriers to ensure that the perspective's of both side's are well understood;
- To provide a preliminary analysis of options to overcome the barriers present in the federally announced approaches to ensuring permanence;
- To present a summary of the dialogue to date on these issues amongst IPOG and Working Group processes (face to face plenary sessions, teleconferences, and email dialogue).

ISSUE DEFINED

Basic Premise - Risk-based Approach to Dealing with Reversals and Permanence

A risk-based approach for dealing with sink reversals for biosequestration projects is increasingly common in existing and developing offset systems and standards. The Regional Greenhouse Gas Initiative (RGGI), California Climate Action Registry (CCAR) and the Voluntary Carbon Standard (VCS) are all using (or developing) risk management approaches for biosequestration offset projects. Further, in international REDD discussions, France has proposed a global insurance mechanism, enabled under an international body, that would have countries place dollars/carbon into a reserve to insure against large losses of forest from natural disturbances.

A risk-based approach is not new to insuring against loss of any kind – in the offsets field or in much of our daily lives – it is therefore logical to apply a risk-based approach to biosequestration projects in the Canadian offset system. A risk-based approach is commonly used in insuring other products and processes (e.g. automobiles, houses and health from fire, flood, hurricanes, etc.). Statistical estimates of risk, based on historical data or other means (reliable prediction tools), are used to devise actuarial tables and risk premiums. Similar techniques can and are already being applied to offset projects.

A Four Step Process

The risk-based approach to biosequestration projects will require four general steps:

1. **Assessing the risk of a reversal** – First, a Protocol Developer or the Program Authority would determine the reversal incidence – the probable or possible levels of risk for different regions and projects. This can be based on historical data, future projections of loss, and/or, where historical data and the ability to make projections are lacking, expert judgment can be applied.
2. **Managing the reversal** – Once the level of risk is determined, appropriate measures to assure against the risk would be chosen and put in place. This paper outlines four options for managing the reversal including: an assurance factor, private insurance, reserve holdbacks/reserve buffers or various types of a balanced carbon account;
3. **Verifying the reversal** - When a significant reversal occurs, it must be quantified and taken into account as outlined for the specific management options in the section below. Procedures to quantify the reversal must be outlined in all biosequestration protocols and the verifier must review quantification practices to ensure the procedure has been implemented correctly.
4. **The Permanence Period** – Projects must guarantee a certain time frame for a sink to be maintained in order to satisfy the requirement for permanence. Reversals must be addressed in some fashion over this time period in order to protect the offsets against

loss. The length of the period required to satisfy the requirement for “permanence” is a policy decision to be made by government after review and consideration of all factors involved.

1.0 Assessing the Risk

Risk assessment can be based on historical evidence, expert opinion and/or predictive modeling. Where available, statistical analysis of historical data should be carried out to determine the level of risk for reversals from natural causes. The risk of reversals from human error and/or sampling error inherent in forest inventory systems must be included in the assessment process. Further, reversals from a change in management and natural disturbances must also be taken into account. Once the level of risk has been determined, the federal government can approve an appropriate mechanism to manage it. Work has already been done for some types of agriculture and forestry projects to assess the risk of reversal.

The federal government could take one of the following approaches to guiding risk assessment of biosequestration projects:

- 1) Conduct the risk assessment within government and set it out the total risk of reversal in the protocol, as well as mechanisms to manage the reversal;
- 2) Provide a tool (state a procedure) for the protocol developer (PD) or the project proponent (PP) to use to determine the risk; or
- 3) Require that PDs/PPs include within their project management and administration, conduct a risk analysis and estimate of reversals for the project area based on historical statistics and/or projected changes.

In all cases the results and reliability must be monitored over time and improvements implemented as required.

VCS and CCAR² have developed procedures/tools to guide risk assessments on biosequestration offset projects. Both procedures ultimately determine the size of the buffer reserve needed to provide assurance against loss of offsets for each project. The VCS tool is qualitative and fairly subjective. While CCAR applies a quantification method for risk assessment, many of the answers to questions are based on a subjective; high, medium, or low level of risk.

Historical statistics used in concert with scientific data, modeled projections, and expert advice have the potential to produce more rigorous and less subjective measurements of risk albeit at a potentially higher cost. **That is why it is preferred that standardized procedures be incorporated into the Protocols**, rather than being developed at the Project application stage. These figures should be reviewed by the verifier and/or could also require a certain level of expert review including experts employed by the provincial or federal governments.

Risk Assessment for Agriculture

The Tillage System Management protocol, originally developed by Agriculture and Agri-Food Canada and later incorporated in the Alberta system, already includes the outcome of a statistical assessment of the risk of reversal. The risk-assessment survey was conducted by polling agricultural extension specialists and examining records of industry practice over the last

² California Climate Action Reserve, *Draft Revised Forest Project Protocol*, December 2008

few decades. These data were used to develop conservative estimates of the number of tillage reversal events for each of the regions on the Prairies, over the last 20 years (Table 1). This reversal risk percentage is projected into the future. The Alberta prairies have over 25 years of experience with reduced tillage management. Experts who do not have an interest in the offset market (government and ‘not-for-profit’ extension staff) were consulted to derive the assurance factor.³ The outcome is outlined in Table 1 below. When they are developed, other bio-sequestration agriculture protocols will need to conduct similar assessments in order to determine statistically reliable estimates of the risk of reversal.

Table 1 Reversal Events/Risk Assessment for Alberta’s Tillage Management Protocol

Region	Factor	Reduced Till Risk Incidence	No Till Risk Incidence
Parkland	Reversal events (20 yrs)	2.5	2.5
	Risk Assessment (event/20 years)*	12.5%	12.5%
Dry Prairie	Reversal events (20 yrs)	2	1.5
	Risk Assessment (event/20 years)	10.0%	7.5%
East	Reversal events (20 yrs)	3	4
	Risk Assessment (event/20 years)	15%	20%%
East – Central	Reversal events (20 yrs)	2.5	3
	Risk Assessment (event/20 years)	12.5%	15%
West	Reversal events (20 yrs)	2.5	1.5
	Risk Assessment (event/20 years)	12.5%	7.5%

*The risk assessment can be interpreted as; at any given time, a given percentage of the producers in the region will be tilling their soils. A range of estimates is originally collected; these values represent the midpoint of the range.

Note: A process to update these assurance factors has been initiated by the IPOG Tillage System Working Group, but is not complete at the time of writing. This paper will be updated as soon as updated assurance factors are ready.

³ For the East, West and East-Central soil zones, it was found that further expert consultation will need to occur. Further scientific analysis may serve to adjust the assurance factor over time as better data becomes available.

Risk Assessment for Forestry

For forestry, carbon reversals occur mainly from death of standing trees and loss of standing volume due to natural causes (fire, etc) or due to unauthorized harvest or breach of contract. Given the size and diversity of Canada's forest conditions, a Risk Assessment/Risk Management procedure can be standardized for all regions but the results will vary for different forest regions and forest types.

Based on risk assessments carried out for other regions and protocols, the risk of loss of carbon for forestry projects varies within the 10 -25% range based on regional historic losses and projections. If large reserves are developed by aggregating geographically dispersed projects, the size of reserves for individual projects can be smaller. Forested regions in Canada are subject to different levels of risk from disturbances – for example, the Western forest with Mountain Pine Beetle infestations is at much greater risk of loss to insect infestation than forest stands in central Canada. Forests that are largely composed of coniferous species have a higher risk of fire than deciduous forests.

Differences in Agriculture and Forestry Reversals

International discussions related to the development of a post-2012 framework agreement on climate change are beginning to recognize the distinction between anthropogenic and non-anthropogenic carbon reversals. Since the global terrestrial carbon pool is three orders of magnitude greater than annual fossil fuel emissions, losses from this pool can be very large, particularly from emissions released through disturbances that are beyond human control. In this sense, agricultural soil carbon sequestration is different from forestry sequestration. While the latter can be more susceptible to natural disturbances like fire, pests and diseases, the former is more susceptible to changes in human land use and agricultural practices. These non-anthropogenic carbon losses cannot be handled through current accounting rules; several countries are putting forward alternatives such as Forward-Looking baselines (Canada) or a global insurance reserve (France; similar to an assurance factor approach).

2.0 Managing the Reversals

Different policy options can be used to manage reversals on biosequestration offset projects. Most of these are based on some form of risk assessment (Table 2) and reserve. All of these options meet the objectives of maintaining environmental integrity and supporting the permanence and market acceptance of biosequestration offsets.

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Table 2. Analysis of Policy Options to Manage Reversals of Biosequestration Offset Projects

Policy	Discount / risk assurance factor	Holdback Reserve – Project Level	Insurance	Balanced Carbon Account
Details of Mechanism	A discounted sink coefficient to account for the probability of a reversal occurring over a set period of time for a defined regions - based on risk assessment. All tonnes created are discounted to create a carbon reserve.	Based on a risk assessment ⁴ for each project type and location, an appropriate percentage of offsets must be put into a reserve.	Project Proponent is required to purchase private insurance to cover the risk of reversals This option will not be available for 8 to 10 years in NA (see Appendix A)	A positive Carbon Account must be maintained by management and modeling - included in the account: Debits – offsets sold/reversals/harvest Credits – standing volume pledged to offsets <ul style="list-style-type: none"> • reserve block of standing volume⁵ • ‘time reserve’ to replace carbon
Risk Sharing	Government shares in the risk through the enabling policy of an assurance factor	By individual Project Proponents or through participation in an pooled or aggregated reserve	Amongst all Project Developers and the insurance agency	Account balance – By individual Project Developers or amongst all Project Developers
Who sets % in reserve?	Program Authority/government through the protocol; Government holds and monitors the reserve to make sure reversals have not gone past the regional average	PA – requires PP to carry out a risk assessment and put reserve into Escrow account. Reserve Board comprising verifiers, registry and escrow account manager to report on losses and adequacy of the reserve	Insurance company covers the risk. No reserve required. If commercial insurance is purchased a small reserve will be needed to cover minor losses. Similar to the ‘deductible’ on an auto policy.	Program Authority through the protocol or Project Developer
Reserve Returned?	No	Yes, depending on losses, through periodic review and recalibration of the size of the reserve.	No	Depends on if there’s a deficit in the account
Reversal Monitoring Requirements	Government monitors amount of reversals through Project registration, verification and GHG Reporting	Project managers and verifiers report significant losses to the Reserve managers and the Program Authority	Project managers and verifiers report significant losses to the Reserve managers, insurance company and the Program Authority	Determined by long term performance management agreement
In the event of a	Reserve must be re-established	An amount equivalent to the	Insurance company	Debit is measured and reported,

⁴ 20 years is considered the minimum acceptable VCS project crediting period for the buffer or ‘physical reserve’ approach to serve as an effective non-permanence risk mitigation tool.

⁵ The amount of reserve timber is determined by the risk assessment

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reversal?	and Offset production reduced as required for that year, PP discloses the reversal event in the Project Report for verification. If the loss is outside the limits of the discount factor the factor will be revised and applied to all projects.	reversal is taken out of the reserve and the reserve is replenished by a reduction in offsets offered for sale. A major loss may trigger a recalibration of the risk and the reserve.	purchases allowances or credits to replace lost offsets? (see Appendix A)	verified and reconciled by the account
Verifier's Role – review and verification of risk assessment/ management procedure	Quantifying a reversal reported by Project manager and ensuring reversals have not gone past a regional average. Verifier reports to Registry.	Identify and verify quantification of a reversal, ensure notification of reserve manager.	Identifying a reversal and verifying quantification of a reversal, and that the insurance agency is notified	Verifying debits and credits against the carbon account.

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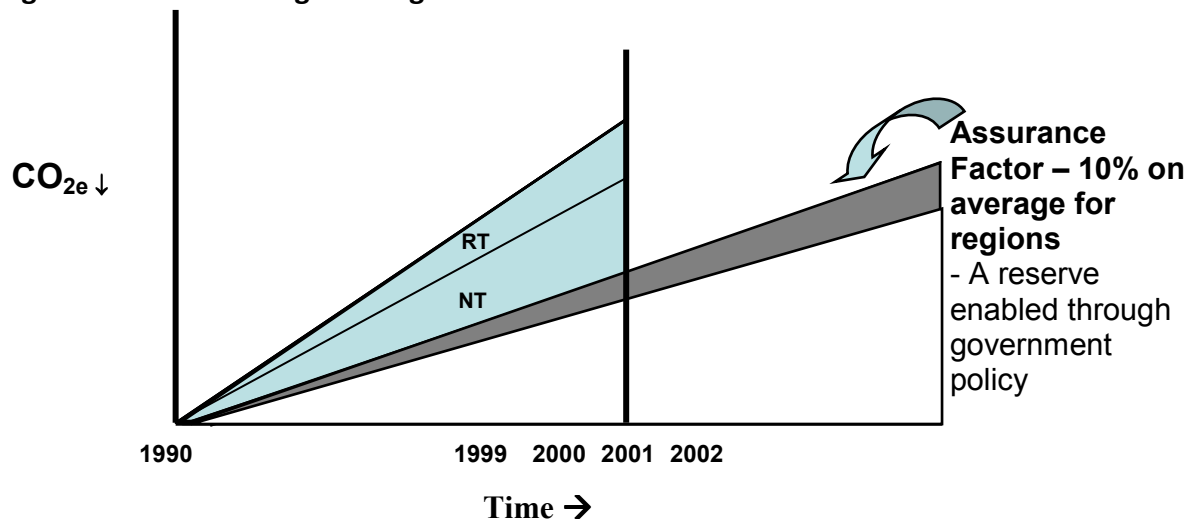
The structure of an assurance factor - agriculture example

The “Assurance Factor”, derived from the risk probability or assessment exercise is applied to every tonne of carbon offset created under the protocol. In essence, the coefficient for carbon sequestration is discounted, and shaves on average 10% of the carbon off of each tonne, according to the reversal risk percentage derived for a given protocol region in Alberta. This shaved carbon goes into a reserve and is set aside by the government (e.g., 10% discount on every verified tonne creates a set aside, resulting in 0.1 t CO₂e collected by the government for each verified tonne created under the protocol). This pool of carbon is used to cover the risk of a reversal.

The buffer reserve assures against carbon lost to the atmosphere via reversals in the future – it functions as a reserve holdback that is authorized through government policy. To date, tillage management offsets in Alberta are approaching 1.3 million tonnes, thus, the reserve has grown to 130,000 tonnes to ensure against any reversals that occur in the future as well (see Figure 1 below). In the event of a sink reversal, project proponents must disclose the reversal and they cannot receive credits for that year. If the risk factor is accurate and perhaps more than adequate to cover losses, then a liability or permanence period is not needed because a sufficient number of tonnes, to ensure against losses will always be in the government reserve. In the case of Alberta’s assurance factor, Agriculture Canada scientists estimate that the average reversal incidence is likely 3%, not 10% reversal incidence.⁶

Alberta has found that this approach allows for more certainty in management and contracting. With this discounted approach to address liability, annual contracts can be used. Further, the liability is not borne by the land owner/land lessee for an unmanageable period of time. If done right, the risk assessment should cover off any current reversal risk as well as future reversal risk as the reserve grows.

Figure 1 Alberta’s Tillage Management Risk Assurance Factor



Note: RT = Reduced Till; NT = No Till

⁶ Dr. Brian McConky, pers comm.

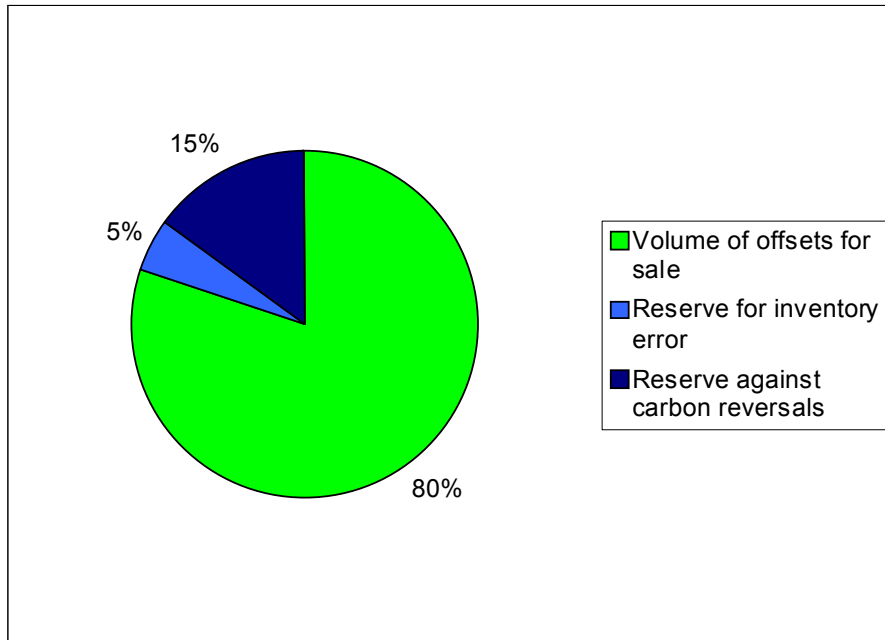
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The structure of a reserve holdback – forestry example.

A simplified model is presented below for a forestry project to illustrate how the structure of the reserve could be established. Some reserve is required to cover the inevitable statistical error in the forest inventory sampling and calculation procedure (in Figure 2 below- 5%). There will have to be an additional reserve to cover the risk of loss from fire, wind, disease, insect attack and unauthorized harvest, usually varying from 10 to 25% based on regional historic losses and projections. All of these risks can be assessed based on regional rate of loss records, which vary considerably across the country (in the graph below this is set at 15%).

Pooling the reserves from several geographically distributed projects will result in a larger aggregated reserve. Larger reserves are desirable as a risk sharing approach. Very large reserves will have more credibility as well as autonomy and be able to assess reserve size against actual experience of losses and adjust periodically. It might be possible to structure a group of smaller forest carbon projects into a co-op or an aggregated approach. This will allow them to pool the reserves established by projects distributed over a large geographical area and reduce the size of the individual reserve percentages. This may reduce the size of individual reserves by 5 to 10%, while at the same time providing excellent reserve capacity and credibility with buyers and the PA.

Figure 2: Carbon Reserve in the Forestry Sector



Please see Appendix B for more information on forestry examples and Appendix C for an analysis of pros and cons for each policy option.

Managing the Risk of Reversal in other Offset Systems

Looking to other offset systems demonstrates the willingness of Program Authorities in other jurisdictions to take a risk management approach to biosequestration projects. CCX requires a reserve pool of 20 percent for all biosequestration offset credits issued. RGGI offers either a discount factor of 10 percent for their afforestation projects or the opportunity to use insurance

approved by the regulatory authority. CCAR provides the option of managing a reversal by putting tonnes into a buffer pool or to purchase a form of approved third-party insurance.⁷ If a reversal is experienced and reported, the buffer pool is used to compensate for the reversal. The CCAR buffer pool is managed for all projects of a similar type – if there is a reversal, the offsets first come out of the project that incurred the reversal and if that buffer pool is exceeded it will come out of the larger aggregated pool.

Voluntary Carbon Standard's (VCS) agriculture, forestry and other land use (AFOLU) projects use a Pooled Buffer Account mechanism for dealing with the risk of carbon sink reversal. Project developers must maintain an appropriate amount of carbon credits in a non-tradable buffer reserve created by the aggregation of reserves from all projects into a Pooled Buffer Account. The number of offsets deposited into the pool is based on a project's risk of future reversal. Project developers must themselves undertake the initial risk assessment using the *VCS Tool for AFOLU Non-Permanence Risk Analysis and Buffer Determination*. "Truing up" of the buffer pool occurs every few years based on a semi-quantitative assessment and review of existing VCS AFOLU verification reports. The process flags projects that have failed or underperformed and identifies their common characteristics and adjusts the buffer amounts for future projects accordingly.

3.0 Verifying the Reversal

Depending on the reversal management mechanism, if a reversal occurs there may need to be a decision regarding what constitutes a significant reversal. For the assurance factor this is not needed, since the factor is applied consistently across a region for the registration period of the project – project developers must disclose a reversal event and they do not receive an offset for that year. But for a reserve holdback, insurance or balanced carbon account, a quantification of the carbon lost due to the reversal will need to be made - according to what constitutes a significant reversal. IPOG proposes a number of options here including :

- 25% of accrued carbon since the start of the Project has been lost;
- If and when the reversal exceeds the amount predicted by the risk assessment procedure;
- The statistical variance of the risk assessment procedure (e.g., using the coefficient of variation in the risk estimates, or the percentage range in one standard deviation of the mean of the risk assessment estimates.

By setting a threshold, this places a reasonable burden on the project developer since there is a significant cost associated with hiring 3rd party verification and the possible loss of ability to sell offsets or until the reversal has been replaced by tree growth. Once the threshold for lost carbon is triggered, a reversal report will be made and verified by the 3rd party according to the reversal quantification procedures outlined in the protocol, and submitted to the program authority. Placing the primary responsibility squarely on the project that suffers the reversal will provide an incentive to limit loss through good management and implementation of loss control procedures.

⁷ In CCAR's draft 2008 forestry protocol.

4.0 The Permanence Period

Predicting risk and managing the reversals of a sink is only one aspect of addressing permanence. The permanence period – i.e., the number of years that offsets must be maintained and monitored and during which reversals will need to be accounted for - will need to be established for some of the mechanisms.

It is unreasonable to say that permanence should be guaranteed ‘in perpetuity’. No landowner, land lessee, organization or government can sign a contract to ensure the ‘permanence’ of the sequestered carbon ‘forever’. In establishing a permanence period, some considerations may be:

- (1) Capital stock replacement period for LFEs – i.e. the time to develop and adopt processes that are less carbon intensive (15-25 years);
- (2) Half life of carbon dioxide in the atmosphere (35- 50 years);
- (3) Planning and decision making horizons of landowners and land lessees; and,
- (4) Business life spans of land managers or land management organizations.

On the latter point above, consideration of the management of both public and private land is required - planning horizons for a private land holder averages in the 20 to 25 year range; larger corporations with forest land holdings or licensing agreements average 50 years. So a permanence period that goes beyond the life span of an agent/farm manager operating that business does not make sense.

One further consideration in the determination of the permanence period is the land ownership and duration of forest management licenses. Approximately 192 million ha of forested land is owned by governments in Canada, but managed by private sector companies. Although the government ownership lasts for long periods, forest management agreements may not. Furthermore, approximately 50% of agricultural land in the prairies is leased - making long permanence periods untenable due to the relatively short term of agreements between landowner and lessee. There are approximately 5 million ha of privately owned industrial forests in Canada. Ownership of the land changes from time to time. There are 20 million ha of private woodlots owned by Canadian families with relatively short planning horizons. All these factors needs to be considered when establishing the permanence period.

On the forestry side, CCAR draft protocols are using 100 years and RGGI is using “in perpetuity” as a permanence period. In the case of CCAR, a conservation easement or deed restriction is combined with a buffer reserve to ensure the maintenance of the carbon sink and to insure against reversals. But, CCAR considers harvested wood product as project activity stock (ie part of the 100 year permanence period) as long as it can be verified from tax records. RGGI requires a buffer of 10% or insurance and a conservation easement. The easement requires the land be maintained in a forested state in perpetuity, environmentally sustainable forestry practices be used, and shall include a requirement that the carbon density within the offset project boundary be maintained at long-term levels at or above that achieved as of the end of the CO2 offset crediting period (maximum 60 years).

CONCLUSIONS

At a recent Environment Canada consultation on the role of Agriculture and Forestry in the post-2012 framework⁸, the Coordinating Co-Chair of the IPCC 4th Assessment Report, Agriculture Chapter⁹, presented his summation of how effective the Kyoto Protocol and its mechanisms have been in mobilizing emission reductions from Land Use, Land Use Change and Forestry (LULUCF) under the CDM. In his estimation, the largest barrier to the uptake of LULUCF offsets is the CDM choosing to issue temporary credits as the mechanism to assure permanence.

Good environmental and economic policy must recognize the capacity of the buyers and sellers to respond to and engage in programs to achieve the desired outcome. IPOG still maintains that flexibility in mechanisms is essential during the early days of implementation of a Carbon Market. Governments sharing in the risk through mechanisms authorized by policy may make more sense until experience has resulted in governments and business having more confidence in the risk assessment and risk management procedures.

For this reason, IPOG is recommending the use of a government approved assurance factor embedded in the protocol. Choosing a conservative factor, which guarantees more carbon reserves than the level of risk assessment, would serve to ensure that future reversals are covered off to some extent. Regular monitoring and recalibration to adjust the size of the reserve based on actual loss experience would be desirable, as outlined in Table 2. The reserve would never be returned. This assurance mechanism will offer the credibility and environmental integrity of the sink offsets, as well as provide the management flexibility required for commercializing this new venture.

⁸ Sponsored by Environment Canada, coordinated by International Institute for Sustainable Development

⁹ Daniel Martino, Carbosur, Uruguay

Appendix A – Private Insurance Investigations

The Bio-sequestration cross cutting issues working group has investigated the potential for private insurance playing a role in Canada to manage sink reversals. This section outlines the outcome of our research to date.

In discussions with insurance companies who provide conventional insurance on standing timber for the forestry sector, the consensus was that insuring for carbon losses would be different than insuring standing timber or property damage. Further, insuring carbon loss with a, 'cash-back' policy may not be adequate. More likely, the buyers would require an, 'offset-back' policy due to their obligations for legal compliance. An even larger barrier is the lack of historical and in this case, reliable information on both projected risk of loss of carbon as well as records of actual rates of loss in this new category of insurance business. There are additional factors that complicate the task of the insurance company; risk may increase due to climate change, the availability of replacement offsets in a non-liquid offset market may be limited, the price of replacement offsets in a new and untested market is impossible to predict. These uncertainties will drive up the cost. The insurance companies will set rates at very conservative levels. It is imperative that to move forward, insurance companies must understand the risk of loss, and/or the business model used to insure the loss – underwriters have to feel comfortable in what they are insuring in order to write policies.

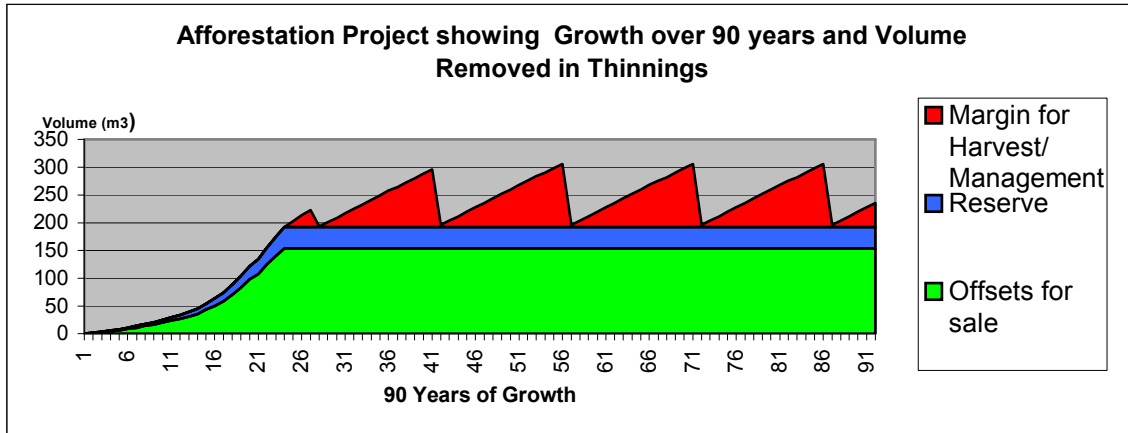
Given that the risk and loss information required can be gathered over time and that companies can build actuarial tables of risk, the level of uncertainty calls for a strategy that would insure a large number of forests over a very large area so companies can offset risks in high loss areas with areas that should have lower levels of loss (ie this in the context of areas that have higher and possibly growing incidences of disturbances such as pests, diseases and forest fires). This would require a company with international reach like a Lloyd's of London to produce a model to undertake business in this new type of insurance business. They would need to build a high level of participation that has both geographical and project diversity to manage the risk.

At a recent meeting in Poznan, Poland in Dec 2008 there was a side event on insuring forest carbon. Discussion at this session also determined that the given the large uncertainties, risk premiums at this early stage in the bio-carbon offset business will make private insurance too costly. The working group agreed that some form of reciprocal insurance mechanism, using administration by the government of captive reserves, either at the Program level or required at the Project level, was likely more practical over the next 5 to 10 years and would help build the database required to support the entry of private insurance into this business.

It was also recognized that if commercial insurance is to play a role, governments in North America may have to cost-share in some of the risk to help jump-start private insurance coverage – similar to the model used in crop insurance coverage where the federal government covers 33% of the risk; provincial governments 33% of the risk and the private insurance company the other 33% (or some variation on the respective coverage proportions).

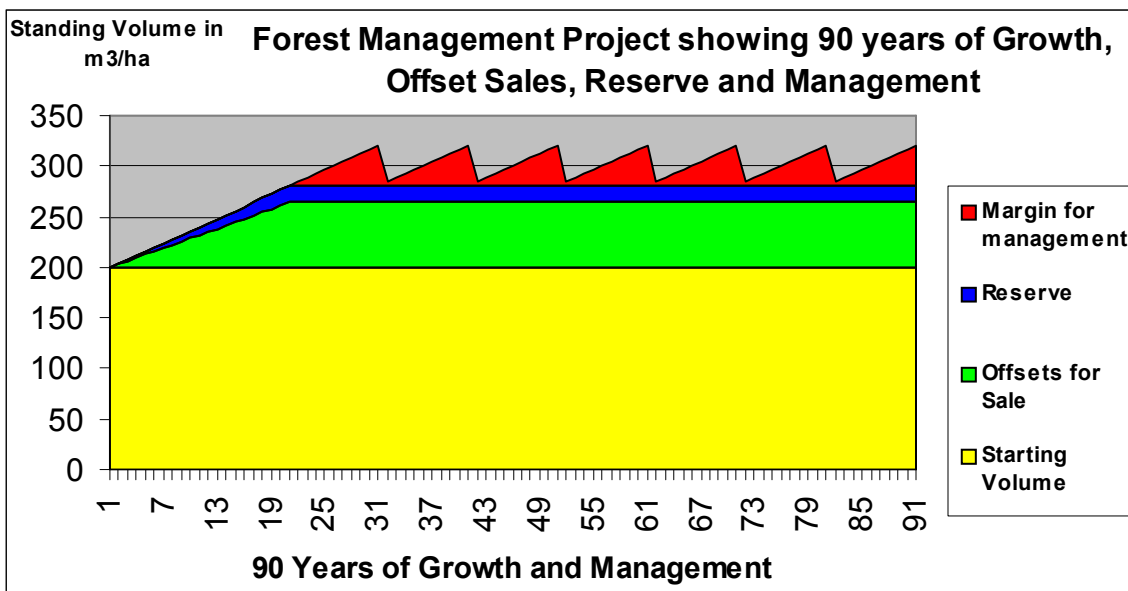
Appendix B – Using a Reserve in various Forestry Project Examples

Afforestation Projects



The reserve for afforestation offsets will grow over time as the volume of standing wood increases. This chart shows the growth curve of a plantation used to illustrate the production of offsets. The various colors indicate the allocation of the various segments of the standing volume: including marketable offsets, reserve volume, and margin for management (a volume of wood that must be cut to keep the plantation from becoming overcrowded and stagnant).

Forest Management Projects

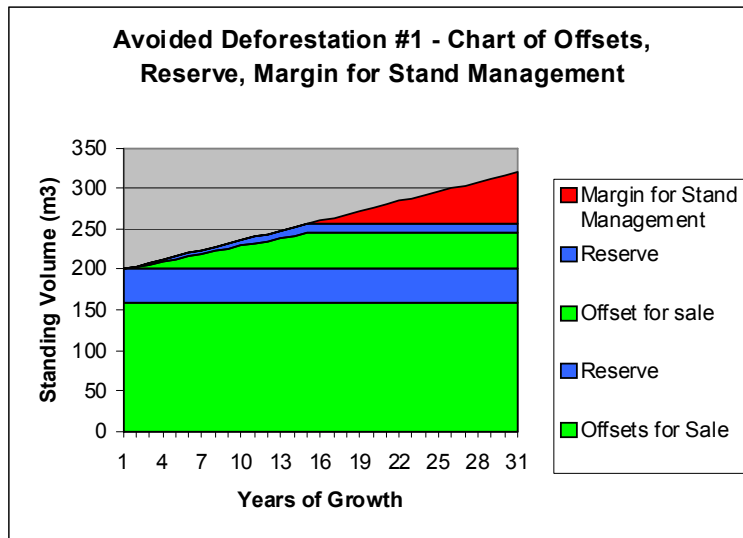


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Forest management projects start with an existing forest and calculate offsets based on growth from that point forward. There is a maximum volume of wood that can be “naturally” supported on an area of forest as represented by the standing volume on the graph above.

Avoided Deforestation Project

On avoided deforestation projects credit is given for the standing volume at the time of project approval. There will be a requirement for a reserve to protect the ‘permanence’ of this volume along with an additional reserve for offsets generated after further growth takes place.



Appendix C. The Pros and Cons of Policy Options to Manage Reversals for Biosequestration Projects

Appendix C -	Pros	Cons
Discount or risk assurance factor	<ul style="list-style-type: none"> • Allow farmers greater aggregator choice over time, because it allows for more flexibility in management and contracting (ie allows for annual, even biannual, contracts to be used).¹⁰ • Lower cost and easier administration • PD share the risk of a reversal so no major investment/action is required of an individual PD to compensate for their loss • Transaction costs of monitoring are lower because the liability does not carry forward beyond the registration period • The reserve continually builds and is not returned – if the risk factor is accurate or better yet conservative....the amount of carbon built in the reserve over time should cover off the need or a permanence period, ie the carbon is permanently held by the government. • Typically set at the protocol level – no variation in factors 	<ul style="list-style-type: none"> • All project developers receive fewer offsets as opposed to a few project developers bearing the large costs of a reversal (could be considered a pro or con depending on risk tolerance) • Lower incentive to avoid a reversal (than under a reserve or insurance) – although offset credits throughout the registration period will likely provide sufficient incentive to avoid a reversal; but a reversal means a loss in soil quality and or forest productivity and history has shown that companies are motivated to avoid this loss • Pressure will be on government to return a portion of the carbon as the reserve gets bigger and no reversals occur • Low incentive to report a reversal
Reserve	<ul style="list-style-type: none"> • Higher incentive to avoid a reversal (than under an assurance factor). Because, if no reversal occurs, the Holdback is returned to the PD for sale. • A reasonable level of liability for buyers/sellers. • Depending on design, Project Developers could share the risk of a reversal so no major investment/action is required of an individual PD to compensate for their loss • Can be set at the protocol level or by the project developer – may depend on scale of projects (known agricultural activities in a region, smaller units vs. broader scales of forest carbon management activities) 	<ul style="list-style-type: none"> • Risk of reversal can be on individual Project Developers or Aggregators, therefore greater risk of higher losses (as opposed to sharing the risk and taking a cut every year unless a reserve is pooled amongst Project Developers) • A Holdback could be a higher percentage than an assurance factor because the risk of a reversal is held by one Project Developer (unless a reserve is pooled amongst Project Developers) • Does not allow as much flexibility in contracting as an assurance factor • Project specific risk assessments may introduce inconsistencies;

¹⁰ Farmers don't always feel comfortable entering into future contracts.

Addressing Permanence In Biosequestration Projects In A North American Context

Insurance	<ul style="list-style-type: none"> • Familiar tool which may bring confidence to PA, buyers, and sellers • Likely won't be available in the short term (ie next 8 years or so) (see Appendix A) 	<ul style="list-style-type: none"> • Likely in the first few years of offset projects, insurance premiums will be too high for this to be a viable option • Unlike reserves, once a premium is paid it will not be returned to PD • Unknown rate of loss • Will likely not cover a reversal with real offsets
Balanced Carbon Account	<ul style="list-style-type: none"> • Similar to the Reserve but a different accounting mechanism that may provide more clarity for project developers, the public and the federal government 	<ul style="list-style-type: none"> • Similar to the Reserve

Appendix D – Excerpt from IPOG June 2008 Bio-sequestration Submission to Environment Canada

Note: to see the full submission, please refer to http://www.offsetsgroup.ca/pdf/feb26/Biosequestration_in_Canadas_Offset_System.pdf

Biological sequestration, through activities undertaken by the agriculture and forestry sectors, offers multiple environmental benefits for Canadians (improved water quality, biodiversity, improved nutrient cycling etc) and has and will continue to significantly contribute to Canada's national GHG balance.

Proposed policy approaches in Canada and elsewhere have tried to resolve several challenges relating to **equity** (early adopters, late adopters), **effectiveness** (permanence, maintenance of the sink) and **efficiency** (administrative and financial) aspects associated with enabling activities that monetize Biological sinks in offset systems.

It's recognized that high volumes of credits from land-based projects are important for compliance purposes – and for development of a long-term, liquid and stable carbon market. It's imperative that a policy solution be found that will enable participation of land-based biosequestration projects, and the accompanying environmental co-benefits they provide.

The Agriculture Sector in Canada:

Canada has over 67.5 million ha (167 million acres) of agricultural land, and over 80% of the annually, cultivated portion resides in the Prairies. The agriculture sector currently contributes 7.6% of Canada's GHG emissions, but has the potential to reduce 2 to 3 times that much, through carefully crafted policies to encourage voluntary participation by Canada's 250,000 farmers. In addition, approximately 29.5 million hectares (73 million acres) of Canada's agricultural land is in perennial forage cover including pasture, hay, silage, legume and grass seed, feed pellets, cubes and compressed hay – the management of these lands represent significant sequestration opportunities as well.

Getting the policy right has been the subject of many recent reviews. Recently, an agriculture news circular called AgriSuccess, cited a George Morris Centre report that analysed the proposed federal policy approach¹¹, and concluded the liability period for sink offsets will be unworkable from an agricultural producer point of view, they write:

"Without the participation of producers... Canada's approach to climate change will miss an opportunity. The "Made In Canada" approach is voluntary, and the success of emission trading of non-permanent credits depends highly on producers' involvement". They're urging another look at the proposed system, taking into account lessons learned through current emission trading systems and pilot projects, particularly the Pilot Emissions Removal, Reductions and Learning Initiative which recently concluded in Alberta, Saskatchewan, Quebec and Ontario"

¹¹ George Morris Centre is an Agricultural Policy think-tank in Canada, who recently prepared a report for the Australian government on Canada's agricultural GHG policy. See <http://www.georgemorris.org/GMC/Home.aspx#>.

The Forestry Sector in Canada:

Forest Carbon Management (FCM) involves a number of silvicultural practices (e.g., tree planting and thinning) and forest management strategies, that can result in enhanced forest growth and increases in standing volume. FCM can result in the enhanced performance of the forest ecosystem as a carbon sink. The additional growth and standing volume results in additional carbon being sequestered by the forest ecosystem.

Sequestering and storing carbon in trees is a proven, effective, and affordable method of carbon capture and storage. Intensive application of FCM can result in 4 times the rate of CO₂ sequestration compared to unmanaged forests. Within an administratively simple Canadian Offset System, the opportunity to sell FCM offsets may bring about significant change in forest management in Canada and resultant environmental benefits.

- Canada has vast forest resources with enormous sequestration potential over the long-term. Our “natural advantage” includes:
 - 216 million hectares of managed forest.
 - 100 million tonnes of annual CO₂ sequestration by 2050 (National Roundtable on the Environment and the Economy report)
- FCM can result in a significant supply of compliance quality offsets that can be easily scaled-up to make a significant contribution to Canada’s climate change plan
- FCM is unique in its ability to sequester carbon previously emitted into the atmosphere

Forest management is a *long-term strategy*. Due to natural forest cycles, it is not possible to abruptly increase the net forest biomass in Canada over a short timeframe. Sustainable Forest Management (SFM) involves decisions to harvest in the right place, at the right time and to ensure prompt regeneration after harvest. All this will be carried out in a sustainable manner. The superior forest management practices utilized by FCM in Canada will include sustainable harvesting with a positive impact on climate change over the long term.