LESSONS LEARNED REPORT

Saskatchewan Forest Sequestration Project

1. PURPOSE

This report identifies the lessons learned by the Review Team during the review of the SaskPower forest sequestration project. It also includes comments and suggestions about lessons learned from the Project Proponents and the Technical Committee.

The project included two types of forest sequestration projects:

1. A not sufficiently restocked (NSR) component, which involves tree planting on an area that has not sufficiently regenerated after the land was harvested prior to 1990;

2. A forest carbon reserve (FCR) component, which involves protection of forest areas from harvesting, thus avoiding emissions associated with harvesting.

While the lessons learned apply to these specific projects, some may have wider generic relevance to all or most forest sequestration projects.

For the purposes of GERT, emission reduction activity includes 'sequestration of GHGs which would otherwise have remained in or been released into the atmosphere' (GERT Pilot Rule, Section 4.2). With respect to the Saskatchewan forest sequestration project discussed in this report, the more appropriate term is net sequestration. This can be measured as the carbon stock change in the with-Project Case less the carbon stock change in the Reference Case. In this Lessons Learned Report, the term emission reduction means net sequestration and the two terms are used interchangeably. Similarly, references to registered emissions reductions (RERs) mean registered net sequestration.

2. PROCESS LESSONS

2.1 Completeness and Approval of Information Requests

Information Requests are meant to state for Proponents all of the Review Team's questions, based on the information the Team has available. The Information Requests should clearly raise all questions relevant to issues or concerns of each team member. This is needed to avoid situations in which an Information Request Response does not address all the expectations of some Review Members.

Recommendation: Review Teams need to ensure that information requests accurately reflect the specific questions and expectations of the entire Review Team.

2.2 Relevant Expertise and Review Team Capacity

The complexity of forest sequestration projects means that they can be difficult and time-consuming to understand and evaluate for people without some expertise in the area. This can create delays and limit the extent to which some team members can participate in discussions of a project. GERT Review Teams are usually comprised of Technical Committee Members. For the review of the Saskatchewan sequestration project the Team needed to make substantial use of external advisors with backgrounds in forestry and forest carbon modelling, and retained an expert to provide advice on specific issues.

Recommendation: Review Teams must include people with the appropriate expertise. Forest sequestration projects require highly technical reviews, which will occur most expeditiously if experts in areas such as forest carbon modelling and forest management planning are involved. The more technical the review, the more time it can be expected to take, especially if the Review Team includes members that do not have the technical background.

2.3 Policy Decisions

Some of the difficult issues that arise in this project could not be fully resolved, as there is not necessarily one right or obvious solution. Thus governments need to make policy decisions to guide certain aspects of forestry sequestration project development and review. In particular, issues surrounding "permanence" and accounting were difficult to fully resolve in the context of this project, in the absence of government decisions about appropriate approaches. The Proponents expressed frustration about difficulties encountered as a result of lack of a government policy framework governing forestry sequestration projects.

The approaches taken by the Technical Committee in dealing with these issues reflect its judgement as to how best to address the issues, at this point in time, in the context of GERT. For instance, for the purposes of learning, the Technical Committee decided to accept a 50-year life of the project and to not address methods of accounting for net sequestration or emissions after the end of the project. In the future, these issues may be addressed through approaches deemed to be scientifically more appropriate, or as a result of policy decisions.

Recommendation: Governments should provide guidance on policy issues identified below in Sections 3.3, 3.4 and 3.5. Until policy decisions are in place, those reviewing emission reductions will find they need to exercise their best judgment in coming to decisions that reflect a reasonable approach under the circumstances and with the information available at the time.

3. REVIEW LESSONS

3.1 Learning by Doing

The Saskatchewan forest sequestration project is composed of two very different components that involve both common and project-specific complex issues. The NSR component involves planting forests, thus increasing the short term and long-term carbon on the land. The FCR component involves protection from harvesting so as to avoid carbon emissions over many decades. While this project involves many of the general issues involved in all forestry sequestration projects, variations on the issues will arise in other projects. Learning-by-doing is therefore critical. Even the experts involved in the review of this project found it to be lengthy and complicated, but as learning increases, and policy is determined, it can be expected that the cost and time for both project development and review will decrease.

Recommendation: There is a need for the development and review of more forestry sequestration projects, to learn-by-doing. Governments could consider how to encourage such projects, and their review, directly or indirectly. The same degree of learning will not occur with forest sequestration protocol development in the abstract. It is not until actual projects are quantified and reviewed that the problems involved are revealed, and solutions examined. The Proponents strongly support this recommendation.

3.2 Estimation and Measurement Lessons

3.2.1 Complexity of Forest Management

Forest management in Canada typically involves public lands and management for multiple objectives that change with time as new information and societal goals change. Companies undertake many forest management activities on public lands, operating under the terms of contractual tenure arrangements. Thus a complex mix of policy decisions, tenure arrangements and economic considerations affects forests and the carbon in them. In the FCR component, an understanding of these factors, how they had evolved, and likely future directions, were key in understanding the carbon implications of the project. They were particularly important in determining whether the reference case assumptions regarding harvest in the FCR component were reasonable, and whether there might be leakage associated with FCR component. In relation to leakage, the Technical Committee continued to have a concern that some of the net sequestration estimated to result from the FCRs could be offset by a shifting of harvest from the FCR lands to other areas within the province. This could occur through an increase in harvesting on forestland already in forest management agreements, or it could occur through an expansion of the areas subject to forest management agreements. These concerns will need to be re-assessed on registration of RERs.

Recommendation: Full information concerning any applicable policy, tenure and economic factors is required for proper identification and quantification of leakage, the

reference case, and the project case. Even with information on these factors, issues such as leakage may prove difficult to quantify (especially at the beginning of a project, prior to potential leakage occurring). Proponents should ensure they provide full information on relevant policy, tenure and economic factors.

3.2.2 Incomplete and Uncertain Information

Specific aspects of the FCR and NSR components of this project are uncertain, reflecting a lack of data or a lack of scientific knowledge. For example, in the FCR component, the fate of carbon in over-mature boreal forest stands in Saskatchewan, and as a result of break-up of these stands, is not known. Similarly, the current carbon characteristics and likely evolution of NSR lands, in the absence of planting, are not well known.

These are both questions that can be partially or fully resolved through measurement and monitoring efforts as part of the project, as well as through scientific research that takes place outside the project. This new information may warrant revaluation of assumptions and key parameters in the determination of the Reference and with-Project cases.

Other uncertainties may be less easy to address. For example, uncertainties regarding the impact of climate change on rate and severity of fire and pest disturbances will be difficult to address. Similarly, the uncertainty regarding leakage and reference case harvest rates in the FCR component may continue because of the complexity of the policy, tenure and economic influences.

Recommendation: Proponents should be required, as part of their project design, to identify, develop, and propose approaches to improve information on key uncertainties. The Technical Committee believes that one good approach for understanding and helping to address uncertainty is for Proponents to provide several scenarios for key uncertainties, in both the Reference and with-Project cases. As information improves after project registration, it may be appropriate to change assumptions and data. Verifiers of subsequent emission reductions from the project should accommodate such changes if they clearly represent improvements.

3.2.3 Carbon Pools

The calculation of the net sequestration from forestry projects is not a straightforward exercise. The calculation not only involves accounting for carbon stored in the visible, above-ground trees but also the carbon stored in the roots of living trees, in other vegetation, in dead organic matter (stumps, forest litter, soil layers), and in forest products after the harvesting of a tree. The calculation is further complicated by the fact that carbon moves from one carbon pool to another over time, as well as being released to or taken out of the atmosphere, in response to a variety of natural processes as well as by human actions. Therefore, to support a thorough and meaningful review of forest sequestration projects, detailed information on carbon stocks and carbon stock changes over the life of the project, including information regarding the methods of calculation,

parameters and assumptions is needed. This may represent a large amount of data and assumptions.

Evaluating the impact of a project requires careful consideration of all the processes that affect carbon on all the land in both the reference and project cases. In the FCR component, the Review Team and Proponents eventually concluded that the with-Project Case should include growth of non-mature stands, break-up of mature stands, and consideration of the effects of fires and insects. In the Reference Case, the processes include growth of non-mature stands, harvesting of mature and over-mature stands, regeneration after harvest and consideration of the effects of fires and insects.

Recommendation: Proponents must provide detailed information on carbon stocks and carbon stock changes for both the reference and with-project cases. This should include full information on the carbon stocks in each major carbon pool over time, as well as associated carbon stock changes. It should include detailed discussion of assumptions with references. An assumption that there is no net carbon stock change for a given pool should be acceptable provided that thorough justification of the validity of the assumption is provided.

3.2.4 Modelling Approaches

The science of ecosystem carbon sequestration is complex. There are a number of carbon pools, each of which is affected by a variety of natural and human-induced processes. Assessing the effect of a forest sequestration project involves estimating flows between the pools resulting from the various processes. Models will be needed to project carbon stock changes that will occur in the Reference and with-Project cases. One approach is to build a model for an individual project. A second approach is to adapt an existing recognized forest carbon budget model, of which there are a number. Both approaches require essentially the same information. An advantage of the second approach is that the processes, carbon pools and carbon flows are already modeled in an integrated coherent framework so that the user need only ensure that the project specific data and parameters are entered and used in the model. This was the approach taken in the NSR component. In retrospect the Review Team considers that difficulties in arriving at a good understanding of carbon impacts in the Reference and with-Project cases in the FCR component were in part a result of using the first approach. This meant that there was sometimes confusion about which processes, pools and flows were or were not included in estimates, and how.

Recommendation: As the preferred approach, rather than building a project-specific carbon budget model, Proponents should consider adapting an existing model for estimating and projecting carbon stock changes.

3.3 Lessons Related to Permanence, Risk and Accounting

Biological carbon reservoirs both accumulate and release carbon. When a reservoir releases carbon, there is a negative carbon stock change, and where the reservoir

accumulates carbon there is a positive carbon stock change. In a forest sequestration project the rate and direction of carbon stock changes in both the Reference and with-Project cases are likely to change over time.

Net emissions can occur because of the different and highly variable patterns over time of forest sequestration in the Reference and with-Project cases. Even where there is a positive carbon stock change in the with-Project case, net sequestration (carbon stock change in the with-Project case less carbon stock change in the Reference case) may be negative. In other words, net emissions may occur even if the carbon stock change in the project case is positive. The opposite is equally true.

For many projects, net emissions are anticipated at some point during the project lifetime. For instance, for the NSR component, it is anticipated that during the first decade tree planting will result in release of carbon as soils and existing vegetation are disturbed. The newly planted tree seedlings then can take several decades to reach a size at which they are sequestering significant amounts of carbon. As the trees grow, the net carbon sequestration increases rapidly. Eventually, some decades after the project life ends, the NSR plantations will be harvested and the NSR land will become a large source. It is anticipated that this pattern will be repeated over several rotations.

In other cases, net emissions may be unexpected. For instance, net emissions could occur in any given year during a project as a result of unauthorized harvesting, natural disturbances such as fire and insects/disease that are inherently unpredictable. Changes in disturbance patterns for a given project area over the project life may result from climate change, but these cannot be predicted with any degree of certainty at this point in time.

The risk of release, or the actual release, of some or all of the carbon stored as a result of a project, either during the project life or after it ends, is often referred to in the technical literature as the issue of permanence. It raises a number of issues that need to be addressed in forest sequestration projects:

a) How is the risk of net emissions during a project managed (addressed in Section 3.3.1)?

b) How should variations in net sequestration and net emissions be accounted for over time (addressed in Section 3.3.2)?

c) When can emission reductions be registered (addressed in Section 3.3.3)?

d) What is the appropriate minimum lifetime of a project, and who should be responsible for net emissions that occur after the project lifetime and have not been accounted for (addressed in Section 3.3.4)?

3.3.1 Risk Management

There are approaches to try to minimize the risk of net emissions during a project. In the Saskatchewan forestry sequestration project the Proponents address the risk in several ways. First, they will take steps to reduce the risk of net emissions by protecting the NSR and FCR areas from fire and insects.

Second, in their estimates of net sequestration they have used discounts (that is, they account for less than 100% of the estimated net sequestration). Historical average disturbance patterns can be used to provide indications of an appropriate discount. However, disturbances are highly variable around the average, and climate change may change historic patterns.

Third, risk can be spread among project activities and areas. This project involves two very different activities on different areas of land scattered throughout Saskatchewan. This diversifies risk and lowers the risk that a disturbance in a given area will have a major impact on the net sequestration resulting from the project.

Despite use of such approaches, uncertainty will always remain as to whether the risk management approach used for a project is sufficient.

Recommendation: Project proponents should be required to identify all sources of risks of net emissions during a project, and develop approaches to try to reduce the risk of net emissions before and, if possible, after the project lifetime.

3.3.2 Accounting

Forest sequestration projects pose two questions about accounting for net emissions:

a) How should possible net emissions that occur in the future during the project be accounted for, and

b) Should possible net emissions that occur after the project ends be taken into consideration when determining the net sequestration to be registered during the project lifetime, and how?

A number of accounting methods have been proposed in the technical literature to address the issue of possible future emissions. These include tonne-year approaches, the stock change approach and long term averaging. Different accounting approaches are likely to result in very different RERs at any given point in time. Note that, at the national level, the Kyoto Protocol rules require that only actual carbon stock changes in 2008-12 will be included in the accounting.

In the Saskatchewan forest sequestration project the Proponents proposed that long-term average (LTA) accounting should be accepted for the NSR component. Under this approach, the net annual net carbon stock changes are determined over several rotations

(300 years in this case) and the net average annual carbon stock change is calculated and would serve as the basis for registering emission reductions. One advantage of this is that it does explicitly account for high variability and the likelihood of future emissions. It also serves to provide RERs early in the plantation life.

There are two disadvantages to the LTA. First, it is not consistent with the Protocol rules. Second, (unless RERs are only issued at the end of several rotations) it is based on predictions of future net sequestration and emissions rather than on actual net sequestration and emissions. These disadvantages are not unique to LTA.

The GERT Technical Committee considered whether it could accept long-term averaging. The Technical Committee concluded that it was not prepared to acknowledge long term averaging at this time and that the Proponent should base submissions for registration on actual net sequestration. The Proponent should also submit measurements when there is a net emission.

The approach of issuing RERs for actual net sequestration that has occurred, relative to the Reference Case, is consistent with the "stock change" method of carbon accounting. Under that approach, proponents would receive debits or negative emission reductions (i.e. resulting from net emissions due to the project) for net emissions.

Recommendation: Governments will need to consider policy on the acceptability of specific carbon accounting methodologies for forestry sequestration projects.

3.3.3 Timing of Registration

Under the different possible accounting approaches for net sequestration there are various possibilities for when submissions for registration of emission reductions could occur. For example, with long-term averaging the registration could occur:

a) At the beginning of the project, based on projections for net sequestration over the averaging period (e.g. registration occurs at year 0);

b) As actual net sequestration occurs, up to the level of the long-term average (e.g. registration can occur every year but the cumulative credit can never exceed the long-term average level).

Due to the Technical Committee's decision not to accept long-term averaging, a decision on timing of registration was not needed.

A second timing issue arose in the Saskatchewan forestry sequestration project. Under the GERT Pilot Rule, it is intended that registration of a project will be followed by annual submission of an emission reduction report within 90 days of the end of each calendar year, including the calendar year in which the project was registered. In this project, the Proponents need to install the required monitoring and measurement systems, which will take some time. They will wait until they have real emission reductions

backed by measurements and monitoring before they seek to register, meaning that the registration of emission reductions may cover a period longer than a year, a possibility that the TC accepted.

Recommendation: Government policy decisions regarding carbon accounting methodologies should also consider the timing of when emission reductions are to be registered or credits issued, if any accounting approach other than for actual carbon stock changes is allowed. As well, the possibility of a delay in seeking to register emission reductions should be considered within registration procedures.

3.3.4 Lifetime of Project and Responsibility for Future Net Emissions

For the purposes of learning, the Technical Committee accepted the 50-year life of the project, and decided not to address methods of accounting for net sequestration or emissions after the end of the project. However, the Committee recognized that:

a) Short lived enhancements in sequestration have negligible impacts on the atmosphere although they can be useful in terms of allowing time for development of other options for reducing emissions;

b) The stock change method is consistent with an ongoing responsibility for net emissions; and

c) Under the Kyoto accounting rules, any forestland that enters Canada's accounting system remains in the accounting permanently. This means that Canada must account for any emissions occurring on project land after the project lifetime.

Recommendation: In making policy decisions of forest sequestration projects, governments should consider issues related to the appropriate minimum lifetime for projects, requirements that carbon stores be maintained for minimum periods, and where responsibility lies for net emissions occurring after a project ends.

3.4 Lessons Related to Forest Products Accounting

Harvesting removes carbon from the ecosystem and stores part of it in forest products. Some of this carbon can survive for decades or even centuries in products such as lumber, or in landfills, and thus is not emitted for a long time after harvesting. In Canada, much of the carbon in forest products is exported to other countries. At least four methods have been proposed internationally for how carbon stored in forest products and the associated emissions should be dealt with in greenhouse gas accounting.

At present, the rules for Kyoto Protocol accounting in 2008-12 use the simplest approach – these rules assume that all carbon that is used in forest products is emitted to the atmosphere at the time of harvest. This is recognized as not being a particularly realistic

representation of carbon flows. The other three methods differ in terms of when (now, future) and where (in Canada, in importing country) emissions associated with forest products carbon are accounted for. They are the stock change, production and atmospheric flow approaches.

The different accounting approaches can have significant implications for the net effect of a project. For the FCR component the Proponents have chosen to use the production approach. The information they provide makes clear that use of the simple Kyoto Protocol approach, while not a realistic representation of emissions from wood products, would significantly increase the net sequestration resulting from the project.

Recommendation: The appropriate method to use for accounting for wood products carbon will require a policy decision. Proponents could estimate net sequestration using all of the different accounting approaches for carbon in forest products. They should be required to provide the results using the simple approach currently contained in the rules for the Kyoto Protocol, as this is the approach that Canada must use for its national-level accounting according to current Protocol rules.

3.5 Lessons Related to Surplus

The Technical Committee interprets the GERT Rule to mean that a project is surplus if it results in emission reductions or net sequestration that is not otherwise legally required. In the case of the FCR component, the FCRs are protected under the provincial Representative Areas Network (RAN) program but there was no legal requirement for the Province to protect wilderness areas.

Recommendation: Governments will need to consider policy on how surplus applies to proponents that have regulatory authority.