



EMISSION REMOVAL PROJECT DOCUMENT

TREE PLANTING TO REMOVE ATMOSPHERIC CO₂

TREE CANADA FOUNDATION

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1.0 PROJECT DESCRIPTION

1.1 Overview

The Tree Canada Foundation is a not-for-profit, charitable organization established to encourage Canadians to plant and care for trees in urban and rural environments. One of the goals is to help reduce the harmful effects of carbon dioxide emissions in support of climate change.

The Foundation provides educational, technical and financial support through partnerships with the private and public sectors in order to:

- facilitate the planting and care of trees throughout urban and rural Canada;
- educate Canadians about the environmental benefits of planting and caring for trees;
- assist interested parties in implementing a wide range of self-sustaining tree planting and educational initiatives;
- encourage corporations, communities and individuals to participate in the program.

Tree Canada has helped over 100 organizations plant almost 500,000 trees in the 10 year period ending in Dec 2002. Each planting project will follow the same methodology as outlined in this Project Document.

1.2 Description

Tree Canada helps facilitate the planting of a variety of tree species in Canada, in both rural and urban settings. Co-ordination of each planting project is provided by 14 Technical Advisors located throughout Canada. The individual tree planting projects, supported by companies and individuals, will sequester carbon in the trees biomass, thus removing atmospheric CO₂.

1.3 Location

Each project is unique in its location and the species and age of the trees being planted. The verification document accompanying the emission reduction claim for each planting project, for each year, will detail the exact location in Canada that the trees were planted.



1.4 Project Contact Information

Tree Canada can be contacted for general information regarding any of the planting projects:

Jeff Monty, President
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Ottawa, ON K1P 5ZP
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2.0 DESCRIPTION OF THE METHODOLOGY

Forested ecosystems sequester carbon through the annual increment in growth in their woody biomass, plus the proportion of litter fall that becomes incorporated into the soil carbon pool. When trees are first planted, a large proportion of the annual exchange of CO₂ goes into growing plant biomass. Also, early in the growth of the tree planted on an agricultural or urban land, the amount of carbon in the soil is small, and consequently soil respiration is not large. This results in a high rate of carbon sequestration in the first several decades of growth of a tree (Figure 2). As a forest ecosystem matures, the organic content of the soil also increases, and the total ecosystem respiration rises. When the ecosystem is mature, the total ecosystem respiration is approximately equal to gross production, and the ecosystem will no longer be a net sink of CO₂. The total amount of CO₂ removed from the atmosphere is then equal to the carbon stored in the living biomass of the trees and soil. The age at which trees reach maturity differs greatly among species and climatic regions, but the largest component of carbon sequestration occurs during the first 60 to 100 years.

If the trees are harvested and used in a way that returns the carbon to the atmosphere as CO₂, (e.g. if used as firewood, or allowed to decompose), then the sequestered carbon is lost. If, however, the harvested wood goes into some form of long-term storage (e.g. housing timber or furniture), then a large portion of the stored carbon will remain sequestered, and new tree growth in the regenerating forest will remove additional CO₂ from the atmosphere. If the cut tree decomposes quickly, or is burnt, then new tree growth is only replacing part of the previously sequestered carbon.

It is estimated that a total of 11.8 Gt C (or 11.8 x 10¹⁵ tonnes of carbon) has been sequestered in tree plantations in the tropical, temperate, and boreal forest regions (Winjum & Schroeder, 1997), and that the annual rate of sequestration is about 0.2 Gt C/yr. The total carbon stored in plantations is equivalent to a 2% reduction in the total CO₂ stored in the atmosphere. This represents an 8% offset to the anthropogenic emissions to the atmosphere over the last 100 years, and is a 4% offset of the current annual CO₂ emissions from fossil-fuel combustion.

There is little readily-available data regarding the amount of carbon sequestered by single trees, but Freedman & Keith (1995) used forest-productivity data of provincial forest agencies to develop growth and carbon sequestration curves for major tree species of the provinces of Canada, under different site conditions (poor, moderate, and good). The carbon sequestration was derived from above- and belowground biomass estimates, assuming that carbon is approximately 50% of the dry biomass of a tree. There is a very large range of carbon uptake and storage among tree species, regions, and site conditions in Canada. To simplify these calculations, however, we have computed the carbon sequestered by an "average" Canadian tree. Such a tree does not really exist, but it represents the typical carbon sequestration rate reported by



Freedman & Keith (1995) for many species of trees, in all geographic regions of Canada, under moderate soil conditions, assuming it takes 80 years for the tree to reach maturity. In the urban environment, it is assumed that the annual litter fall from the tree is removed, so no carbon is added to the soil. In rural and afforestation areas, however, litter is not removed, so we assume a typical added component of carbon stored in the soil. Overall, our calculations suggest that the "average" Canadian tree will sequester about 200 kg C over an 80-year period in an urban environment, and 225 kg C in a rural environment. On an annual basis, this is equivalent to storage of 2.5 kg C/yr in an urban environment, and 2.8 kg C/yr in a rural one.



3.0 MANDATORY CRITERIA

3.1 REAL

Definition - An emission reduction is real if it is a reduction in actual emissions, resulting from a specific and identifiable action or undertaking, net of any Leakage of emissions to a third party or jurisdiction.

3.1.1 Activity

The emission reductions described in this project document are based on carbon sequestration arising from tree planting.

3.1.2 Leakage

Potential sources of leakage from these planting projects are primarily losses in biomass or tree growth due to fire and insects, which would reduce the amount of carbon sequestered or emissions avoided. This has been accounted for by applying an assumed 30% average loss factor in afforestation planting projects over an 80 year life span.

A lesser source of leakage is the emissions released in transporting, planting and maintaining the trees over the average 80 year life span. The amount of this leakage is felt to be negligible, especially given the long time periods being considered.

3.2 MEASURABLE

Definition - An emission reduction is measurable if the actual level of GHG emissions with the project in place, and the level of GHG emissions in the project baseline, can be quantified.

3.2.1 Emission Removal Calculations

The tree planting projects referred to in this project document sequester carbon in the tree biomass as described under the section above entitled 'Description of Methodology.' Without the tree planting activity, the carbon, and associated gaseous carbon dioxide would remain in the atmosphere.

The formula used for CO₂ sequestration calculations is shown below:

$$C = n \times f \times s$$

Where:

- C** – number of tonnes of CO₂ removed each year for 80 years
- n** – number of trees planted
- f** – sequestration factor for uptake of CO₂ for each type of tree
- s** – survival factor of trees over 80 year life span



Depending on the location of the tree planting, the sequestration and survival factors will differ, as shown in the table below.

Location	Sequestration factor	Survival factor
Urban	0.009167	1.0
Rural	0.010185	1.0
Afforestation	0.010185	0.7

Each planting project will submit a verification report detailing the number of trees and the applicable location.



3.2.2 Sample Calculation

1,000 trees are planted in an urban setting in 2002. In 2003, the CO₂ removed is

$$\begin{aligned} &= 1,000 \times 0.009167 \times 1.0 \\ &= 9.2 \text{ tonnes CO}_2 \end{aligned}$$

3.3 VERIFIABLE

Definition - An emission reduction is verifiable if the calculation methodology is acceptable, transparent and replicable and the raw data required to verify/audit the calculations is available.

Each planting project will track the exact number of trees planted and the location. These records will be kept at the Tree Canada Foundation, the company or individual that supported the tree planting and at VCR Inc. and can be viewed at any time.

Efforts will be made to track any significant tree losses associated with the planting projects as this will affect the carbon sequestered.



4.0 OTHER INFORMATION

4.1 OWNERSHIP

Ownership of the emission removal will remain with the company or individual that supporting the tree planting. A certificate will be issued by Tree Canada at the completion of the tree planting. It will acknowledge the ownership and the estimated annual amount of CO₂ being removed.

4.2 REFERENCES

FREEDMAN, B., and T. Keith, 1995: *Planting Trees for Carbon Credits* (Tree Canada Foundation; Ottawa), pp. 42.

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