

# Scientific Review of Afforestation Protocol

Purpose: The purpose of this review is to review a series of proposed amendments to the 2007 Afforestation Protocol. The proposed amendments are twofold:

1. Address concerns regarding adaptation of original science discussion document in the quantification methodology
2. Address concerns regarding the treatment of harvested biomass

*Goal: The Goal of this meeting is to work towards and obtain consensus on necessary revisions to the afforestation protocol*

*Throughout the day a number of key questions (called “Decision and Discussion Points”) will be posed and input will be sought*

**Location: J.G. O’Donoghue Building**  
**7000 113 Street (Neil Crawford Centre)**  
**Edmonton, Alberta**

## Documents for review and discussion:

1. Technical Review of Alberta Afforestation Protocol Discussion Document
2. Draft Afforestation Protocol Version 1.2

Friday, October, 23, 2009 Time: 10:00 am – 4:00 pm	
<b>10:00 – 10:30</b>	Welcome and Opening Remarks Introduction: How did we get here today? Objectives... Overview of History of the Alberta Afforestation Protocol
<b>10:30 – 10:45</b>	Review of Discussion Document
<b>10:45 – 12:00</b>	Address quantification and clarification issues Discussion Points <ol style="list-style-type: none"> <li>1. Correction of Table 2.4</li> <li>2. Correction of Stand Level Biomass Expansion Factors</li> <li>3. Reasonable Guidance to Support the Protocol</li> </ol> Decision Points <ol style="list-style-type: none"> <li>1. Definition of Gross Merchantable Volume</li> <li>2. Discount Factor for Risk of Reversal</li> <li>3. Required Models</li> </ol>
<b>12:00 – 1:00</b>	Lunch
<b>1:00 – 3:45</b>	Discussion of Proposed Treatment of Harvested Biomass <ol style="list-style-type: none"> <li>4. Introduction of Liability Period</li> <li>5. Treatment of Harvested Biomass Based on Final Use</li> <li>6. Required Documents</li> <li>7. Availability of Species Density Factors</li> </ol>



	8. Availability of Default Wood Decay Factors Introduction of Mandatory Periodic Verification
3:45 – 4:00	Wrap Up Next Steps

## Scientific Review of Afforestation Protocol

### Participants:

- Kerriane Kohler-Monroe - ARD
- Tim Keddy - CFS
- Milo Mihajlovich
- Gord Whitmore - DMI
- Stan Kavalinas - SRD
- Barry White - SRD
- Barb Thomas - APLAC
- Toso Bozic - ARD
- Rob Hamaliuk - AENV
- Amanda Stuparyk – C3gord
- Karen Haugen-Kozyra – C3
- Tanya Maynes – C3

#### On Phone:

- Brad Rabie – The Carbon Farmer
- Kelly Campbell - BlueSource
- Dave Beck – Ainsworth Lumber

- Voluntary transactions between 2 parties (enough government oversight?)
- Factors that undermine:
  - **Leakage** – diverted emissions beyond project boundaries; shifting activities elsewhere
  - **Non Additional** – parties being paid for actions they would've done anyway
  - **Permanence** – release of stored carbon during or after project ends

#### Criteria of the Alberta Offset System

- **Additional** – beyond normal practices/business as usual (new)
- **Real, Measurable, Quantifiable** – based on best available science, net of all 6 GHGs, certainty in science accounted for
- **Verifiable** - carbon accounting/tracking process must be clear, defensible, with QA/QC procedures; verified by qualified 3<sup>rd</sup> party
- **Permanent** – must account for reversals of sequestered carbon ; account and replace mechanisms
- **Clearly Owned** – Crown Land vs. Private Land; Land Lessee vs. Land Owner; Technology provider vs. Buyer
- **Not Double Counted** – registered, serialized and sold once



- **Leakage** – possible shifting of emitting activities elsewhere due to GHG-reducing practice in the projects (e.g. cutting down rainforests due to biofuel incentives in North America)
- **Additionality in Alberta:**
  - Action (project) taken on/after January 1, 2002
  - Not otherwise required by law
  - Beyond a project baseline as defined in the protocol
- **Must be *real, quantifiable and measurable***
  - Government approved protocols only (ISO 14064-2)
  - Considers all GHG's (SGER) impacted by the project
  - Transparently and rigorously reviewed
- **Occur in Alberta; Registered on the Alberta Registry**
- **Clearly Owned**
- **Verified by a 3<sup>rd</sup> Party (SGER)**
- **If Biosinks – permanency addressed**



Discussion Points

Correction of Table 2.4

- Changes to Equation for P8 (Above Ground Biomass) and P9 (Below Ground Biomass)

**Proposed:**

The equations for P8 and P9 actually calculate the biomass. In order to convert biomass to carbon it is necessary to apply a factor of 0.5.

Above Ground Biomass -the proposed changes are for the equations (Merchantable biomass and Conversion Factor c-co2)

P8 - Former Above Ground Biomass Equation

$$\text{Sequestration}_{\text{Above-ground Carbon Reservoir}} = [(\text{Incremental Vol.}_{\text{Above Ground Tree}} * \text{Area}_{\text{Afforested}}) + (\text{Vol.}_{\text{Biomass Harvested}})] * \text{Expansion Factor}_{\text{Biomass}} * \text{Conversion Factor}_{\text{C-CO2}}$$

New Above Ground Biomass Equation

$$\text{Sequestration}_{\text{Above-ground Carbon Reservoir}} = [(\text{Incremental Merchantable Volume} * \text{Area}_{\text{Afforested}}) + (\text{Vol.}_{\text{Biomass Harvested}})] * \text{Expansion Factor}_{\text{Biomass}} * \text{Conversion Factor}_{\text{Biomass-C}} * \text{Conversion Factor}_{\text{C-CO2}}$$

Example:

- Incremental Merchantable Volume of Tree = 8 m3/ha/yr (obtained from direct measurements on site)
- Area Afforested = 100 ha
- Ratio Root-Shoot (Reference Table A2) = 0.28
- Expansion Factor Biomass (Reference Table A1) = 1.08
- Mass of Carbon per Mass Dry Biomass (Reference Table A4 (tC/t)) = 0.5tC/t of biomass
- Conversion Factor C-CO2 = IPCC standard 44/12 (tCO2e/tC) = 3.667 tCO2e/tC

$$\text{Sequestration}_{\text{above\_ground}}(t - C) =$$

$$\left( \frac{8m^3}{ha / year} * 10 years * 100ha \right) * 1.08 \frac{t_{\text{biomass}}}{m^3} * 0.5 \frac{t_{\text{carbon}}}{t_{\text{biomass}}} * 3.6667 \frac{t_{\text{co2e}}}{t_{\text{carbon}}}$$

- = 15 840tonnes biomass

New Below Ground Biomass Equation

$$\text{Sequestration}_{\text{Below-ground Carbon Reservoir}} = \text{Incremental Merchantable Volume} * \text{Ratio}_{\text{Root-Shoot}} * \text{Area}_{\text{Afforested}} * \text{Conversion Factor}_{\text{Biomass-C}} * \text{Conversion Factor}_{\text{C-CO2}}$$

Note the deletion of **Expansion Factor** Biomass



After clarification with the original protocol developer (CFS), Table 2.4 was revised to reflect the correct adoption of the original quantification.

- Yes – The revised table is accurate.
- No – The revised table is incorrect.

## DISCUSSION:

Discussion on accuracy of revised of the changed equations – inclusion of the merchantable volume:

Q. Root shoot ratio (change to use Merchantable, where get) – tend to look at total above and below ground – why only Merchantable?

- Biologically in terms of storage – would be total
- factor accounts for biomass = expansion factor
- need to define the Merchantable Incremental. Volumes used in equations =incremental merchantable volume and ratios should cover all
- Table A2 could change footnote

**\*\*Need to confirm with Brian Simpson where numbers come from =standardized for Alberta – whatever used – then make clear (is the conversion factor already accounted for in the RS ratios – are these run from the models)**

**Agreement that requires explanation**

- This is not transparent as it – need to clarify and explain in protocol

Q. You need to know a lot of details (where RS ration came from to know what to do)

- Could use a standard for Alberta that can be applied all the time – Merchantable standards – what are the units
- include specific gravity (yes...then need to change the name of the table A2 – it is not RS ratio)
- Suggest - unravel all components of the table and ratios – or discrete steps in the equation (merchantable volume varies)
- Standard merchantable for tree length –
- \*table name change – develop a standard and embed in protocol with Example in the Appendix (one set unique standard...)**
- Most are able to change their merchantable volume standard – pick out the right parameters to feed the model
- users can reset to standardized merchantable assumptions for below ground depending on their specifications– for above ground (more difficult how we account for users taking more for storage)
- \* we do need a standard but must ensure that it is not too prescriptive**
- the verifiability without a standard is unclear and too variable

Q.-what were the merchantability assumptions with the ratios – there is a reference paper that may explain this

- could there be a flexibility mechanism to use own yield curves etc (the verifiers would need to be more sophisticated to determine eligibility)
- allow flexibility to sophisticated users
- \*will need to research this and send for discussion (definitions (merchantable volumes) and assumptions; renaming the table)**



Q. Should be net or gross merchantable volume? Footnote lists “gross”

**Next Steps:**

1. **Double Check References**
2. **Provide Definitions – merchantable volume**
3. **Double Check units (i.e. tonnes of Carbon or tonnes of biomass) – to ensure consistency**



#### Correction of Stand Level Biomass Expansion Factors

Stand Level Biomass Expansion Factors (table A.2 in the protocol) were revised and are presented in Appendix D.

- Yes – The revised table is accurate.
- No – The revised table is incorrect

#### DISCUSSION:

**\*\*need to conduct more review per last Decision Point**

Q. Do you have hybrid poplar data (is volume equation developed by Ontario (whole tree)) in table?

-These are not specific for volume – are representative using IPCC formulas and data

-Hybrid Aspen applicability? There is usability for the Hybrid Poplar (it is the most frequent specie in the province right now) with specifics for stand.

Q. Cannot provide guidance within some areas/species (lack of data in some aspects for implementation) – will list in the guidance document that accompanies the protocol (eg. Shelter belt with 26 species of trees)

Eg. Biomass Expansion Factor (1.26 for Other Hardwoods – that could be used for Hybrid Aspen is much larger than the Hybrid Poplar)??

-if converting volume to weight (density built in to that) is makes a big difference in the calculation

**\*\*need to know where the density values have come from for transparency purposes**

-All technical documents are listed on the Carbon Offset Solutions website including TSD with explanation of ratios (explanation of Wood Density values) – Provide a link and information to where pulled from

**\*\*show how derived the expansion factors and ratios (need the linkages for project implementation and understanding)**

**\*\*need to look at and review the IPCC equations**

#### Next Steps:

- 1. Double Check the nature of the factors & clearly define**
- 2. Look at and review IPCC equations**



## Definition of Gross Merchantable Volume

Include definition of "Gross Merchantable Volume" to provide clarity for non-foresters. A proposed definition is as follows:

- **Gross Merchantable Volume:** *Volume of the main stem, excluding stump and top but including defective and decayed wood, of trees or stands.*

Source: <http://www.for.gov.bc.ca/hts/inventory/reports/glossary/index.html>

- Yes – The proposed definition is accurate.
- No – The proposed definition is not accurate.

## DISCUSSION:

Q. Is this definition accurate?

Yes good definition but could add a picture for extra information

Q. What is defective and decayed wood? And what "top" is size of "stump"?

Will include more detail and picture for illustrative purposes.

## Next Steps:

1. **Add picture of merchantable volume**



Discount Factor for Risk of Reversal

→ 10% Assurance Factor

- What is the risk of an unplanned event that would result in the release of Carbon?

Comment: individual project developers already add a risk percentage when doing own modeling so with the Assurance Factor in the protocol it is double discounting. (Reduction in gross deductions)

-Yes is conservative – each project developer will need to determine a change in internal practices or discounts

-Perhaps put wording up front for information – each could decide

-this Assurance is only for projects whereas each projects level of risk and deductions are their own; this is an offset specific eligibility criteria

DISCUSSION -This is based on unintentional circumstances...not harvesting

Comment: 10% is not a reasonable level....it is high

Is at stand level?

Yes

Over a 20 year period what are the risk of reversals

This was determined through a risk assessment from the fed tech document and was actually lower than 10 but for conservativeness chosen to be 10

This is a permanent discount not to be returned to project developers – a government backed assurance factor

Comment: 5% would be more appropriate

\*\*will keep the research and data from the first development at 10% and will review as more data or options developer (i.e. 5% is deemed to be appropriate or insurance)

#### Next Steps:

1. **Add a reference to the FACCS work to support 10%.**



**Climate Change Central**

**Discussion Point 3: Reasonable Guidance to Support the Protocol** The following is a list of references that can be used to provide guidance on the quantification of forest carbon offsets and harvested wood products. Are there any other sources of guidance?

- "Methods for Calculating Forest Ecosystem and Harvested Carbon with Standard Estimates for Forest Types in the United States" – USDA
- Technical Guidelines for Voluntary Reporting of Greenhouse Gas Program – Part I Appendix: Forestry (March 2006)
- IPCC Good Practice Guidance for LULUCF (2003)
- Others?

Comment: this will be discussed within the Guidance Documents / Best Practice and guidance / best inventory practises

-these guidance documents will be sent to this group during development for discussion and review for comments

**\*\*feel does not need to be included in protocol**

-document upcoming and will be posted on SRD website - on basics (i.e. how to measure a tree and procedures) Alberta-based

-also there is a USDA forest document

Should any of these be mandatory, referenced or embedded in the protocol?

**Next Steps:**

1. **This guidance will not be in the protocol but in the guidance document. Guidance document should also have "Tree Improvement Standard" by SRD (<http://www.abtreene.com/images/STIA.pdf> )**



**Decision Point 3: Adding Requirement for Approved Models CAR** and BC lists growth models approved for use. Should the Afforestation Protocol list approved models? This would mean that models that aren't approved could not be used to support a project.

- No
- Yes

If so, please assess the following and list any alternatives:

- TASS
- TIPSY
- VDYP

Comment: These models have no applicability for AB specific projects.

What is the point of using a model? Not projection (these models are projection based)

Use after measurements have been made (at stand level) – need equations

[\\*\\*the Guidance documents will have this information \(not model\) but tree level equations to determine numbers](#)



**Decision Point 4: Introducing a Permanence Period** Many forest offset protocols emerging are addressing permanence by including a 100 year permanence period (CAR, CarbonFix, American Carbon Registry, CCX, BC and RGGI [100] year period should be built into the Alberta Afforestation Protocol?

■ Yes

■ No, a liability period of \_\_\_\_ should be used.

Justification:

COMMENTS:

What are the requirements for a time period for liability? In wood? In the trees?

That will be discussed within the Harvested Wood Products section...to be continued



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### **Decision Point 5: Treatment of Harvested Biomass based on Final Use**

- Do you believe that afforestation projects initiated with the purpose of providing feedstock for biomass energy should be carbon neutral? ex. do you believe that 100% of the biomass stored in a tree (& soil) should be credited if trees are utilized for green energy?
  - Yes, Biomass to green energy projects should be treated differently.
  - No, Biomass to green energy projects should not be treated differently based on the final product produced.

#### **DISCUSSION:**

- Is a point for consideration – to set a precedent in protocols – considered biogenic
- –no one has done this yet
- -full credits would be earned if you could prove harvest going to green energy
- -Why not say every forest product is a green energy product? Unreasonable.
- There is no precedent for this internationally – there is consideration for other end uses
- Not considered in Kyoto (full discount if harvested)
- Decay rates similar to the displacement of fossil fuel – but need research and factors for end use products
- -(0.86 electricity – factor 0.65)
- -we will need to hire research and data compilation to determine these factors
- -in the meantime we could implement a first generation version assuming all end life harvested (what is the retained C in general products)
- e.g. not 100% credit not 100% debit – we would need to justify why % is being determined (as a discount factor) to present to Environment (conglomerate product factor) at a coarse level (high (long lived) short lived)
- -would need broader approval and consensus from 2<sup>nd</sup> round review
- -why not do it by species versus products (hardwoods, softwoods, etc)
- -cannot do it by species
- -could be a regional factor weighted factor
- -more like end life product
- -need to move away from theoretical in discussion – we have 3 potential streams
- 1 ,2 ,3 water flow
- -similar to CA approach (volunteer to run some models with 2 scenarios and 2 species (pine, poplar))
- **\*\*Agreement to try including in protocol – treating the two end use separately (research what US is doing)**
- -what about the branches and bark (wood waste)?
- Yes 100% credit

#### **Next Steps:**

1. **run some scenarios on calculating based on the fate of the final wood product.**



**Decision Point 6: Required Documents** In the California protocol, quantification of “Actual harvested wood volumes and species” is based on “verified third-party scaling reports” – are these readily available in Alberta?

*Actual harvested wood volumes and species must be based on verified third-party scaling reports, where available. Where not available the Forest Owner must provide documentation to support the quantity of wood volume harvested.*

What documents are readily available that can be used to verify the quantity of wood delivered?

#### DISCUSSION

Most likely looking at some regional factors that will account for all

-This could be problematic for many reasons - Mill efficiency data is not made public – this needs to be independently verified – and that

Products usage varies significantly

- Is there a standardized product – and could separate by some regions in Alberta
- will require work to request information for mill efficiency to determine some standard



## Wood Decay Factors:

-Some of these factors can be determined and researched then embedded into the protocol (this will be useful for the smaller project developers that would require this information for implementation)

-If the end result for the trees is pulp there will be no credits available

There is no point in the protocol as there will be no opportunity

-What type of approach could work for all types of end use products?

Mean rotation storage period – new research upcoming – benefit to growing trees – need good growth curves (measurement of volume

-How will this be verified? Growth curve based on plantation measurements from previous plot that will be compared with future (based on growth per year) – work in France (will circulate the papers for more exploration)

Is there way to look at program as opposed to individual projects? Is a carbon pool approach...?

**\*\*can circulate some more information on this approach – Pooling Account**

Is there a way to have two (or more) separate streams for end use? (I.e. three rotations then shut down)

**\*\*Will require more research and discussion**

Comment: like the sliding buffer approach

Comment: if rely on the economics of the offsets for the projects all these discounts (halved) projects won't move forward and there won't be investments made at the farm level

We haven't discussed yet that there are 3 or 4 year rotations also....

### Next Steps:

1. **Circulate information on Pooling Account/ Stock Approach**
2. **Additional discussion to be had**



**Decision Point 9: Introduction of Mandatory Periodic Verification Requirement**

- Proposed amendment to the Protocol to stating that reporting/verification must occur no less than every X years. Also proposed addition of a requirement that verification must occur for a period of y years after the final claim of offsets.
- Should 'X' be every 5 years? 10 years?
- Should 'y' be every 1 year?

Justification:

DISCUSSION

Dependent on the Approach to Reversals and Permanence Periods

The Sliding Buffer Approach encourages verification occurring every 5 years

-Mandatory verification/reporting periods

-Requirement for verification after final claim (harvested)

The buyer will be the one to demand verification

\*\*[-Have a requirement in the protocol for mandating verification at harvesting](#)

Project Developers will need to discuss rotation cycles and harvesting in reporting

Insert wording into protocol (assumption of end uses – based on percentages)

