

CCX Protocol for Crediting Carbon in Long Lived Wood Products

Purpose

This section establishes the conditions that a CCX Member such as NCOC in the forestry sector must meet in order to have carbon sequestered in long-lived wood products included in the calculation of CCX Carbon Financial Instrument (CFI's) from increased forest carbon stocks.

Protocols defining general provisions, rules for estimating carbon in long-lived wood products, and guidelines for verification under two eligibility scenarios are included in this section.

1. The protocol for crediting carbon in long lived wood products for commercial forest product companies registered in CCX.
2. The protocol for crediting carbon in long-lived wood products for CCX forest offset providers/aggregators.

General provisions

1. Entities that participate in the CCX forestry program¹ must provide evidence of sustainable forest management of all their managed forestland. Accepted sustainable certification can be from agencies or systems that have been endorsed by the PEFC², the Forest Stewardship Council, or other certification programs approved by CCX Committee on Forestry. A complete list of CCX approved certification systems is available in Appendix 1.
2. The quantity of long-lived wood products to be included in the determination of net carbon stock changes will be the fraction of carbon in long-lived wood products in use and landfills at the end of 100 years, based on the U.S. Department of Energy 1605b technical guidelines for forest products.
3. The CCX Forestry Committee is responsible for reviewing all proposed interpretations and modifications and shall have final decision-making authority regarding this document, except for matters that may directly benefit the majority of Committee Members. All figures, formulae, coefficients, and statistical and quantification methods and procedures contained in this section are subject to revision by the CCX Forestry Committee. All references to the rights and obligations of Members shall refer only to those CCX Members participating in the CCX forestry program.

¹ CCX forestry program includes programs for commercial forestry as well as offset projects

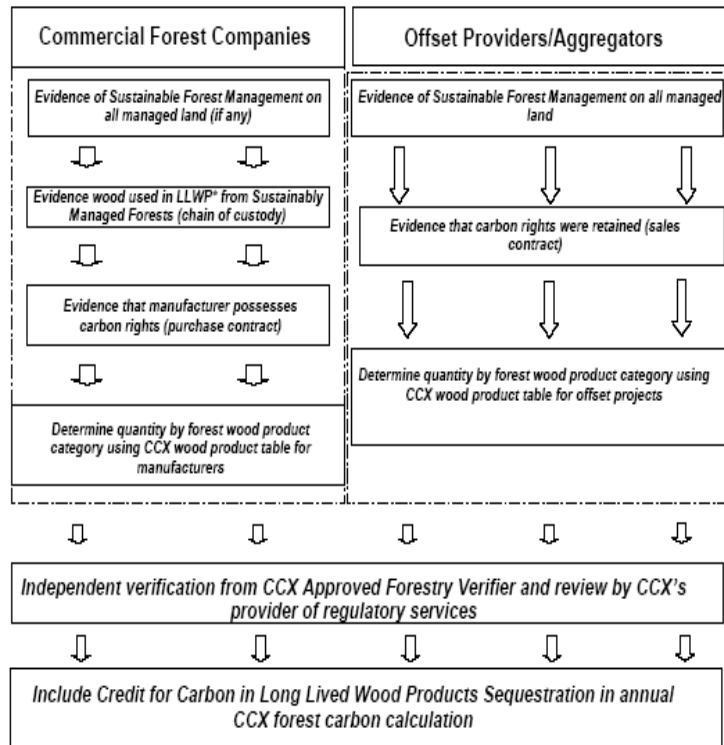
² The PEFC Council (Programme for the Endorsement of Forest Certification schemes) is an independent, non-profit, non-governmental organization, founded in 1999 which promotes sustainably managed forests through independent third party certification. The PEFC provides an assurance mechanism to purchasers of wood and paper products that they are promoting the sustainable management of forests.

4. Each CCX Member's annual forest carbon reports must be verified by an independent CCX-approved verifier. Costs of such verification shall be borne by the Member. All reports are also subject to review by CCX and its provider of regulatory services. Each CCX Member shall maintain readily accessible records containing the data, calculations, conversion factors, spreadsheets and other information that provide the basis for substantiating reports of carbon stored in long-lived wood products. All such records shall be maintained through 2011 and subsequently in accordance with any post-2010 CCX commitments and internal company procedures on document retention.
5. CCX Members registering carbon in long-lived wood products will not be required to maintain an escrow in the forest carbon reserve pool for the quantity of credits from the long-lived portion of their total forest carbon.
6. The quantification tables presented in this protocol are applicable for product carbon sequestered in the United States only. Similar tables may be developed for other regions.

A conceptual flow chart illustrating essential quantification and eligibility requirements for crediting carbon sequestered in long-lived wood products is presented in figure 1.

The next section describes each of the defined scenarios in detail.

Figure 1. Conceptual Flow Chart for Crediting Carbon Sequestered in Long Lived Wood Products (LLWP)



* -- Long-lived wood products

Note: Timber purchasers may acquire these rights from landowners provided that this can be documented according to chain of custody documentation outlined in this document. Rights cannot be transferred beyond the timber producer at this time.

Case 1: Protocol for crediting carbon in long lived wood products for commercial forest companies

This section establishes the conditions that a CCX Member in the commercial forestry sector must meet in order to include carbon sequestered in long-lived wood products in its annual CCX forest carbon quantification.

This section details eligibility and quantification procedures established for registering carbon offsets for long-lived wood products alone. Procedures established for quantifying forest carbon stock changes from growth are described in Chapter 8 of the CCX Rulebook. Contact NCOC for information.

General conditions

1. The Member must provide, on an annual basis, third party verified information documenting the quantity of long-lived wood products produced under each product category³.
2. The wood product to carbon conversion factors will be based on prescribed default product utilization coefficients presented in the CCX wood products calculator. Members who wish to use different conversion factors that may be more appropriate for their situation must have alternate factors approved by the CCX Committee on Forestry.
3. Members may include in their calculation long lived wood products produced from purchased wood. Long-term carbon storage associated with products produced from purchased wood is recognized if:
 - a. The seller of the wood transfers carbon rights in the sales contract to the Member.
 - b. The member will receive credits for carbon in products produced from purchased wood only for the portion of purchased wood coming from forests that have certification for sustainable forest management. In such cases, carbon credits from long-lived wood products will be applied *pro rata* across all produced wood products.
 - c. Independent third party verification for purchased wood will be done through chain of custody certification. Chain of custody practices for commercial forest companies must be certified by the Forest Stewardship Council or the Sustainable Forestry Initiative if purchased wood is to be credited.
4. Rules governing banking and sales of CCX Carbon Financial Instruments and Super Reductions will apply as established by Chapter 8 of the CCX Rulebook.

³ Wood product categories and long-lived wood product crediting factors are provided in Appendix 1 of this document.

Quantification

Members electing to quantify and report carbon sequestration in long-lived wood products need to provide documented and verified evidence of the following:

1. Forest land holdings, if any, are carbon stable as established by the Carbon stable Accounting Approach⁴.

Members shall:

- a. Obtain certification from a CCX-approved schemes for sustainable forest management that the Member's commercial forest lands are managed sustainably; and,
 - b. If the member is not registering its forest carbon changes, the member must provide a warranty signed by a corporate officer that, excluding land sales and catastrophic events, there will be no net decrease in overall carbon stocks held in the Member's commercial forestry inventory during the CCX Market Period (2003-2010).
2. Members should estimate and report annually the fraction based upon carbon in primary wood products remaining in end use after 100 years from production using factors provided in the CCX Wood products calculator. The crediting rates for included product categories are provided in Appendix 2 of this document. Members who wish to use different conversion factors that may be more appropriate for their situation must have alternative conversion factors approved by the CCX Committee on Forestry.

Recognized product categories for crediting include the following:

1. Softwood lumber/ Laminated veneer lumber/glulam lumber/ I joints
2. Hardwood lumber
3. Softwood plywood
4. Oriented strandboard
5. Nonstructural panels
 - a. Hardwood veneer/plywood
 - b. Particleboard/Medium density fiberboard
 - c. Hardboard
 - d. Insulation board
6. Paper

A hypothetical numerical example of quantification procedures is provided in Appendix 3.

⁴ CCX Rulebook, Chapter 8 Section 8-3.

Reporting Schedule and Methods

Reports must be submitted in accordance with the CCX annual environmental compliance process that is set out in Section 7.2.3 of the CCX Rulebook. Carbon in long-lived wood products must be quantified and reported in metric tons of carbon dioxide equivalent.

Each Member shall specify in its reports which methods or procedures for quantifying applicable carbon pools it has employed and shall identify and explain any modifications made to the CCX-approved methods or procedures. Such changes must be approved by the CCX Forestry Committee. When more than one method consistent with these provisions is available, the Member's annual reports shall indicate which method was used.

Figure 1 Summary of Required Reports for Commercial Forest Companies Members

The annual report for commercial forest companies represents the consolidated report with potential reporting for both forest growth carbon and wood products carbon. Annual Report:

- Commercial forest companies have the option of reporting a) forest growth carbon only; b) wood products carbon only; or c) both forest growth carbon and wood products carbon.
- Projected or measured increase in Carbon stocks for Compliance Year, adjusted for silvicultural practices and acquisitions and dispositions (if applicable).
- Reduction in Carbon stocks in Compliance Year due to harvest, fire, pest and weather (if applicable).
- Production of long-lived wood products under CCX recognized categories in the compliance year
- Third party chain of custody verifying the amount of wood procured from certified forests under CCX recognized categories in compliance year.
- Estimated Carbon in long-lived wood products which is the 100-year value of carbon sequestered in total eligible product categories (for owned and procured wood) CCX will develop standardized reporting forms for long-lived wood products sequestration.

CCX will develop standardized reporting forms for long-lived wood products sequestration.

Case 2. Protocol for crediting carbon in long-lived wood products for CCX forest offset providers/ aggregators.

This section establishes the conditions that a CCX Participant Member (offset provider & aggregators) in the forest offset sector must meet in order to have carbon sequestered in long lived wood products included in the member's calculation of annual forest carbon sequestration.

General conditions

1. CCX forest offset providers/aggregators must register net forest carbon stock changes from growth that is quantified using the Model-based accounting approach described in Chapter 8 of CCX Rulebook. Contact NCOC for this information.
2. All claimed long-lived wood products must be produced on sustainably managed forests as evidenced by certification from agencies or schemes that have been endorsed by the PEFC⁵ or other certification programs approved by CCX Committee on Forestry.
3. The quantity of long-lived wood products to be included will be the fraction of carbon in long-lived wood products in use and landfills at the end of 100 years based on the Department of Energy 1605b technical guidelines for forestry. The wood product conversion factors will be based on prescribed default wood category utilization coefficients presented in the CCX calculator for participant members. These conversion factors by wood product categories are presented in Appendix 4 of this document.
4. The forest offset provider/aggregator must provide, on an annual basis, third party verified information documenting the quantity of wood products harvested by category, species and region.
5. CCX aggregators who register wood products carbon are responsible for maintaining a sound database and monitoring management system capable of tracking annually each individual owner's forest land holding enrolled in the program, records of management activity, and any sales of harvested wood. All of these records must be available for audit. CCX will provide guidelines for the data that needs to be maintained by aggregators for enrolled small forestry offset projects.

⁵ The PEFC Council (Programme for the Endorsement of Forest Certification schemes) is an independent, non-profit, non-governmental organization, founded in 1999 which promotes sustainably managed forests through independent third party certification. The PEFC provides an assurance mechanism to purchasers of wood and paper products that they are promoting the sustainable management of forests.

6. CCX aggregators must establish contractual agreements with CCX-enrolled forest land owners that provide that carbon rights from long-lived wood products will be exclusively traded through the respective aggregator. In addition, any violation of program rules should be promptly reported to the Exchange. The CCX Committee on Forestry may prescribe additional measures to ensure that no double counting of carbon rights from carbon registered by enrolled participants is carried out.
7. Timber purchasers may acquire these rights from landowners provided that this can be documented according to chain of custody documentation outlined in this document. Long lived wood products carbon rights cannot be transferred beyond the timber producer at this time.

Quantification

Participant members electing to quantify and report carbon sequestration in long-lived wood products need to report harvest quantity by CCX recognized wood product categories. CCX CFIs will be issued for the calendar year based on the fraction of carbon in long-lived wood products in use and landfills after 100 years from the harvest wood.

Recognized wood product categories include:

1. Softwood saw timber
2. Softwood pulpwood
3. Hardwood saw timber
4. Harwood pulpwood

Forest offset providers must use the DOE product-based estimates for estimating long lived wood products carbon. These estimates use the harvest volume of wood available for subsequent processing as the starting point for estimating carbon in long lived wood products. The main variables required for the estimation is independently verified measure merchantable wood under CCX-recognized wood product categories.

Verification requirements may involve audit of sales receipts from the enrolled forest landowner. The receipts must specify the wood products categories (softwood saw log, softwood pulpwood, hardwood saw logs and hardwood pulpwood) being sold.

Using above procedures outlined in the DOE 1605b technical guidelines for forestry, CCX has developed factors that convert the volume of harvested wood by category, to long-lived carbon in use and landfills at the end of 100 years across wood categories. These factors are presented in Appendix 4 of this document.

The quantity of carbon dioxide in long lived wood products at the end of 100 years is computed using the following formula:

$$\text{Carbon_Products}_R = \sum_C \text{Wood Product Category}_{R,C} * \text{Harvest Volume}_{R,C}$$

Where

R = Region

C = Wood product category (Softwood saw log; Softwood pulpwood, Hardwood saw log and Hardwood pulpwood)

Carbon in use and landfills after 100 years in long-lived wood products for participant members is determined as follows:

1. If the harvest is reported in volume, the harvest must be converted into weight using conversion factors reported in the appendix.
2. If the harvest is reported in weight, determine the dry tons of carbon in CCX recognized wood product categories. This process involves converting green tons of harvested wood to dry tons across CCX wood product categories using a factor of 0.5 and converting dry tons across wood product categories to carbon tons using a factor of 0.5.
3. Distribute carbon tons by wood product category.
4. Use CCX prescribed conversion factors to calculate the quantity in use and landfills after 100 years by wood product category.
5. Convert to metric tons of carbon dioxide. This is done by multiplying by 3.67 to convert from carbon to carbon dioxide and then by 0.907 to convert to metric tons.

Hypothetical Example 1 – Harvest Reported in Weight

Consider a harvest in the North East produced 4,000 tons green weight of round wood. Further, assume that the harvest was distributed across wood product categories in following fashion:

1. Softwood saw timber: 7.9%
2. Softwood pulpwood: 5.1%
3. Hardwood saw timber: 46.5%
4. Harwood pulpwood: 40.5%

The 100 year in-use carbon dioxide in long-lived wood products (expressed in metric tons) is determined as follows.

Step 1: Convert green weight of roundwood to dry tons: $(4000 \text{ green tons} * 0.5 \text{ (green tons / dry tons)}) = 2,000 \text{ dry tons}$

Step 2: Convert dry tons to carbon tons: $(2,000 \text{ dry tons} * 0.5 \text{ (dry tons / carbon tons)}) = 1,000 \text{ carbon tons}$

Step 3: Distribute carbon tons across categories:

1. Softwood saw timber: 79 carbon tons
2. Softwood pulpwood: 51 carbon tons
3. Hardwood saw timber: 465 carbon tons
4. Harwood pulpwood: 405 carbon tons

Step 4: Estimate 100 year in use value by wood product category (Appendix 4)

1. Softwood saw timber: $79 \text{ tons of carbon} * 0.318 = 25.122 \text{ tons}$
 2. Softwood pulpwood: $51 \text{ tons of carbon} * 0.090 = 4.59 \text{ tons}$
 3. Hardwood saw timber: $465 \text{ tons of carbon} * 0.316 = 146.94 \text{ tons}$
 4. Harwood pulpwood: $405 \text{ tons of carbon} * 0.261 = 105.705 \text{ tons}$
- Total = 282.357 tons of carbon

Step 5: Convert to metric tons of Carbon dioxide:

$$(282.357 * 3.67 * 0.907) = 939.88 \text{ metric tons of CO}_2$$

Hypothetical Example 2 – Harvest Reported in Volume

Consider a harvest of maple-beech-birch forest in the Northeast that produced 200 MBF of hardwood saw timber and 1,000 cords of hardwood pulpwood.

Step 1: Convert volumes to common unit (thousand cubic feet – Appendix 5): Sawtimber: $200 \text{ MBF} * 0.146 = 29.2 \text{ MCF}$

Pulpwood: $1,000 \text{ cords} * 0.075 = 75 \text{ MCF}$

Step 2: Convert volumes to metric tons of carbon (Appendix 6):

Sawtimber: $29.2 \text{ MCF} * 18.96 \text{ lb c/cu ft} = 553.6 \text{ thousand pounds}$
 $553.6 \text{ thousand pounds} / 2.204 = 251.2 \text{ metric tons carbon}$

Pulpwood: $(75 * 18.96) / 2.204 = 645.2 \text{ metric tons carbon}$

Step 3: Estimate 100 year in-use value by wood product category (Appendix 4)

Sawtimber: $251.2 * 0.316 = 79 \text{ metric tons}$

Pulpwood: $645.2 * 0.261 = 168 \text{ metric tons}$

Step 4: Convert to metric tons of carbon dioxide equivalent

$(79 + 168) * 3.67 = 909 \text{ metric tons of carbon dioxide equivalent}$

Appendix 1. CCX Approved Certification Schemes for Sustainable Forest Management⁶

Country	Name	Schemes
Australia	Australian Forestry Standard Limited	Australian Forest Certification Scheme
Austria	PEFC Austria	Austrian Forest Certification Scheme (2006)
Belarus	Belarusian Association of Forest Certification	
Belgium	WoodNet - Commission PEFC Belgique	Belgian Forest Certification Scheme
Brazil	National Institute of Metrology, Standardization and Industrial Quality	Cerflor - Brazilian Program of Forest Certification
Canada	CSA International; SFI Canada	CSA Sustainable Forest Management Program
Chile	CertforChile Forest Certification Corporation	CertforChile
Czech Republic	PEFC Czech Republic	Czech Forest Certification Scheme (2006)
Denmark	PEFC Denmark	Danish Forest Certification Scheme
Estonia	Estonian Forest Certification Council	Estonian Forest Certification Scheme
Finland	Finnish Forest Certification Council	Finnish Forest Certification Scheme
France	PEFC France	French Forest Certification Scheme (2006)
Gabon	PAFC Gabon	PAFC Gabon Forest Certification Scheme
Germany	PEFC Germany e.V	Revised German Forest Certification Scheme (2005)
Ireland	PEFC Council of Ireland	
Italy	PEFC Italy	Italian Forest Certification Scheme
Latvia	PEFC Latvia Council	Latvian Forest Certification Scheme
Lithuania	PEFC Lietuva (PEFC Lithuania)	Lithuanian Forest Certification Scheme
Luxembourg	PEFC Luxembourg	Luxembourg Certification Scheme for Sustainable Forest Management
Malaysia	Malaysian Timber Certification Council	
Norway	PEFC-Norway	Norwegian Living Forest Standard and Certification Scheme

⁶ http://www.pefc.org/internet/html/members_schemes/4_1120_59.htm

Poland	PEFC Polska	Polish Forest Certification Scheme
Portugal	Portuguese Forestry Sector Council	Portuguese Forest Certification Scheme
Russia	Partnership on the	
	Development of PEFC Forest	
	Certification	
Slovakia	Slovak Forest Certification Association	Slovak Forest Certification Scheme
Slovenia	Institute of Forest Certification Slovenia	Slovenian Forest Certification Scheme
Spain	PEFC España	Spanish Forest Certification Scheme
Sweden	Swedish PEFC Co-operative	Swedish Forest Certification Scheme
Switzerland	PEFC Switzerland and HWK-Zertifizierungsstelle	Swiss Q-label certification scheme
United Kingdom	PEFC UK Ltd.	UK Scheme for Sustainable Forest Management
		PEFC UK certification scheme for sustainable forest management (revised 2006)
United States	Sustainable Forestry Board	SFI - Sustainable Forestry Initiative
	(SFB)	
	American Forest Foundation	
	(AFF)	ATFS – Standard of Sustainability for group tree farms
International	Forest Stewardship Council (FSC)	Forest Stewardship Council (FSC)

Appendix 2.List of Product Categories included in CCX Long Lived Wood Products Protocols⁷

		A	B	C	D
Product Category	Units	Factor to convert units of product to metric tons of carbon	Factor to convert units of product to metric tons carbon dioxide	Fraction remaining after 100 year end use and landfills	CCX Woods Products Crediting Factor (metric tons of CO₂)
Softwood lumber / laminated veneer lumber/	thousand board feet	0.443	1.624	0.639	1.038
Hardwood lumber	thousand board feet	0.765	2.805	0.554	1.554
Softwood plywood	thousand square feet, 3/8-inch basis	0.236	0.865	0.645	0.558
Oriented strand board	thousand square feet, 3/8-inch basis	0.275	1.008	0.696	0.702
Non structural panels (average)	thousand square feet, 3/8-inch basis	0.289	1.060	0.592	0.628
Hardwood veneer/ plywood	thousand square feet, 3/8-inch basis	0.286	1.049	0.592	0.621
Particleboard / medium density fiberboard	thousand square feet, 3/4-inch basis	0.587	2.152	0.592	1.274
Hardboard	thousand square feet, 1/8-inch basis	0.138	0.506	0.592	0.300
Insulation board	thousand square feet, 1/2-inch basis	0.220	0.807	0.592	0.478
Paper	Tons, air dry	0.496	1.819	0.151	0.275

Notes:

- i. Conversion from carbon to carbon dioxide uses standard conversion factor of 3.6667
- ii. CCX wood products crediting factor (column D) is the product of columns B and C

⁷ Source: Technical Guidelines for Voluntary Reporting of Greenhouse Gas Program. Forestry Tables- Table 1.7, Table 1.8, Table 1.9. Department of Energy, March 2006

Appendix 3 -- Hypothetical example for estimating Long lived wood product carbon for Commercial Forest Companies with CCX registered forest land

Consider a Member with the following production statistics for a reporting year:

Production from harvest wood from owned/managed forest land

- 1. Non structural panels : 1,500,000 thousand square feet 3/8 inch
- 2. Hardwood Lumber : 2,000,000 thousand board feet
- 3. Medium density fiberboard : 2,500,000 thousand square feet 3/4 inch

Production from purchased wood

- 1. Non structural panels : 2,500,000 thousand square feet 3/8 inch
- 2. Hardwood Lumber : 1,000,000 thousand board feet
- 3. Medium density fiberboard : 500,000 thousand square feet 3/4 inch

Let us assume that all of the owned forest land by member is certified as sustainably managed under a PEFC endorsed program. However, for the sake of this hypothetical example let us consider two scenarios with regards to purchased logs.

Scenario 1: All of the purchased logs are certified as sustainably managed under a CCX approved program and independently verified through chain of custody.

Scenario 2: Fifty percent of the purchased logs are certified as sustainably managed under a CCX approved program and independently verified through chain of custody.

The estimation of carbon stocks to be recognized under the protocol for long lived wood products is presented as follows.

Step 1. Estimation of the eligible stock of Long-Lived Wood Products for recognition under the protocol. The example assumes evidence of CCX approved certification program for sustainable forest management exists.

Column	Product category	Non structural panels (thousand square feet 3/8 inch)	Hardwood Lumber (thousand board feet)	Medium density fiberboard (thousand square feet 3/4 inch)
A	Scenario 1 and 2: Production from Own Sources	1,500,000	2,000,000	2,500,000
B	Scenario 1: 100% Purchased logs certified for sustainable forest management (Eligible purchased logs = 100%*Wood Products from	2,500,000	1,000,000	500,000

	<i>Purchased logs</i>)			
C	Scenario 2: 50% Purchased logs certified for sustainable forest management <i>(Eligible purchased logs = 50%*Wood Products from Purchased logs)</i>	1,250,000	500,000	250,000

Using the above figures, we can estimate total eligible production of wood products for crediting as follows:

Product	Units	Scenario 1 (A + B)	Scenario 2 (A + C)
Non structural panels	<i>(thousand square feet 3/8 inch)</i>	4,000,000	2,750,000
Hardwood Lumber	<i>(thousand board feet)</i>	3,000,000	2,500,000
Medium density fiberboard	<i>(thousand square feet 3/4 inch)</i>	3,000,000	2,750,000

Step 2: The total eligible production of long lived wood products is converted to metric tons of CO₂ using the CCX product conversion factors established in Appendix 1.

Product	CCX Products Conversion factor	Credits from long lived wood products (metric tons of CO ₂)	
		Scenario 1	Scenario 2
Non structural panels	0.628 per thousand square feet 3/8 inch	2,512,000	1,727,000
Hardwood Lumber	1.554 per thousand board feet	4,662,000	3,885,000
Medium density fiberboard	1.274 per thousand square feet 3/4 inch	3,822,000	3,503,500
Total		10,996,000	9,115,500

Appendix 4. Selected CCX factors for Average Disposition Patterns of Carbon as fractions of Roundwood by Region and Roundwood Category (assuming no bark on roundwood and excluding fuel wood)⁸

Region	Softwood Sawlog	Softwood Pulpwood	Hardwood Sawlog	Hardwood Pulpwood
Northeast	0.318	0.09	0.316	0.261
North Central	0.346	0.092	0.297	0.304
Pacific Northwest (East)	0.337	0.337	0.265	0.265
Pacific Northwest (West)	0.409	0.076	0.477	0.477
Pacific Southwest	0.355	0.355	0.265	0.265
Rocky Mountain	0.367	0.367	0.265	0.265
Southeast	0.336	0.141	0.304	0.188
South Central	0.334	0.162	0.285	0.176

Appendix 5. Volume Multipliers for Converting Timber and Chip Units into Thousand Cubic Feet (MCF)⁹

Unit	Factor
Bone Dry Tons	0.0713
Bone Dry Units	0.0825
Cords	0.075
Cubic Meters	0.0353
Cunits-Chips (CCF)	0.1
Cunits-Roundwood	0.1
Cunits-Whole tree chip	0.126
Green Tons	0.0315
MBF-Doyle	0.222
MBF-International 1/4"	0.146
MBF-Scribner ("C" or "Small")	0.165
MBF-Scribner ("Large" or "Long")	0.145
MCF-Thousand Cubic Feet	1
Oven Dried Tonnes	0.0758

⁸ Source: Technical Guidelines for Voluntary Reporting of Greenhouse Gas Program. Part I Appendix Forestry. Table 1.6 Average disposition patterns of carbon as fraction in roundwood by region and roundwood category. Pages 36-48 March 2006

⁹ American Forest & Paper Association, Sustainable Forestry Initiative Program Annual Progress Reporting Form.

Appendix 6. Basic Factors for Converting Merchantable Wood Yield to Carbon Yield by Species¹⁰

		Specific Gravity	Lbs. per Dry cu. foot	Percent Carbon	Lbs C per Cubic foot
Region	Forest Type				
SE	Loblolly Pine	0.47	29.33	0.531	15.57
SE	Longleaf Pine	0.54	33.70	0.531	17.89
SE	Oak-Hickory (SI = 79)	0.61	38.06	0.479	18.23
NE	Pines	0.41	25.58	0.521	13.33
NE	Spruce-fir	0.37	23.09	0.521	12.03
NE	Oak-hickory (all)	0.61	38.06	0.498	18.96
NE	Maple-beech-birch	0.61	38.06	0.498	18.96
NC	Pines	0.41	25.58	0.521	13.33
NC	Spruce-fir	0.37	23.09	0.521	12.03
NC	Oak-hickory	0.61	38.06	0.498	18.96
NC	Maple-beech	0.58	36.19	0.498	18.02
NC	Aspen-birch	0.46	28.70	0.498	14.29
West	Douglas-fir	0.45	28.08	0.512	14.38
West	Ponderosa pine	0.38	23.71	0.512	12.14
West	Fir-spruce	0.35	21.84	0.512	11.18
West	Hemlock-Sitka sp.	0.43	26.83	0.512	13.74
West	Lodgepole pine	0.42	26.21	0.512	13.42
West	Redwoods	0.42	26.21	0.512	13.42
West	Hardwoods	0.38	23.71	0.496	11.76

¹⁰ Birdsey 1996 (See also Appendices 2 & 3, Sampson and Hair 1996)