

Greenhouse Emissions Calculator User Guide

Introduction

The GHG Calculator spreadsheet is a tool intended for use in assessing the short-term and long-term greenhouse gas sequestration and emissions resulting from timber harvest activities.

The estimated quantity of carbon sequestration is determined from the estimated growth of trees onsite and from carbon stored in wood products and landfills. The calculation of carbon dioxide emissions include harvested wood that does not end up in wood products or landfills, plus non-biological emissions associated with site preparation, timber falling, yarding, loading, trucking and milling.

In many cases a timber harvest project will include harvest units with distinctly different silvicultures and associated future harvest entry schedules. For example, a THP might include hardwood rehabilitation units which will not be re-entered for 40-60 years as well as selection units that will be harvested regularly on a 15-year re-entry schedule. In such cases a separate copy of the GHG Calculator spreadsheet should be filled out for each silviculture type and the results summed or averaged, as appropriate.

Overview of GHG Calculator Spreadsheet Worksheets

The GHG Calculator is an Excel spreadsheet file, consisting of five worksheets. The user enters information on four of the worksheets in the colored cells under Steps 1 through 17. Calculations and formulas are in the various white cells, using the assumptions as described in the header cells.

The five worksheets are as follows:

1. Inventory, Growth and Harvest

In this worksheet – including Steps 1 through 8 – the user enters general information regarding harvest and growth projections and assumptions.

The user specifies planned/projected harvests over at least the next 100 years, the current inventory, estimated growth rates and estimated harvest volumes for each harvest entry. Conifer stocking is described in MBF/acre and hardwood stocking in basal area/acre.

2. Harvesting Emissions

User entries in this worksheet – Steps 9 through 14 – consist of an estimate of the daily production rate in MBF brought to landings per day, and the number of

pieces of equipment (yarders, loaders, tractors, skidders, helicopters) used on landings. Users also enter estimated volume per truck and round-trip haul time as a basis for estimating trucking emissions.

3. Milling and Wood Products

In this worksheet the user enters the percentage of conifer and hardwood volumes that are delivered to a mill (Steps 15 & 16). Emissions associated with milling lumber and sequestration of carbon in wood products are calculated here.

Note that when trees (typically hardwoods) are chipped or treated (killed) and left onsite, it is assumed that an immediate emission occurs. Thus such volume is not included in wood product sequestration calculations.

4. Annual Tracking

This worksheet tracks stocking by year over the planning horizon. It is used to estimate the time needed to recoup the emissions associated with biological emissions during harvest. No inputs from the user are required.

5. Project Sequestration and Summary

This worksheet summarizes all previously calculated sequestration and emissions. The user inputs the number of project acres (Step 17) so that the total project sequestration and emissions can be calculated from the per-acre values.

Using the GHG Calculator

Guidance is provided in the worksheets at each step regarding what information is required. In some cases additional information may be useful in entering data at each step, as presented below.

Step 1 – Future Harvest Entries

It is assumed that a harvest is taking place in the current year ('Year 0'). In the cells below Year 0, the user enters future years in which projected harvest entries will occur. The intent is to provide a demonstration of long-term emissions associated with current and anticipated future harvest events. This sequence of years should meet the following specifications:

- The sequence should extend to or beyond 100 years,
- It should end with a full cycle, i.e., if it is an even-aged regime, it should end with a regeneration harvest,
- Any entry requiring a Timber Harvest Plan should be shown (commercial thins and seed tree removal will be shown, pre-commercial thins will not).

Table 1 below shows three examples of how Step 1 columns might be filled out. Column A is an even-age clearcut regime, harvests at 65 years of age with no intermediate thinnings. Column B is a selection regime with entries every 15 years. Column C is an

even-age clearcut regime, regeneration harvest at 80 years of age with commercial thins at age 40 and 60, with the current harvest being the age 40 thinning.

Table 1. Examples of Step 1 Harvest Year Entries

<u>Column A</u>	<u>Column B</u>	<u>Column C</u>
0	0	0
65	15	20
130	30	40
	45	80
	60	100
	75	120
	90	
	105	

As noted in the worksheet instructions, this harvest sequence should be based on a management plan whenever one is available.

Step 2 – Conifer Inventory

Enter an estimate of the current conifer inventory, in MBF/acre.

Step 3 – Hardwood Inventory

Enter an estimate of the current hardwood inventory, in basal area/acre.

Step 4 – Conifer Growth Rate

Enter an estimate of the average annual conifer volume growth between harvests. As noted in the worksheet, this estimate should be expressed in BF/acre/year; thus typical values would be expected to be in the range of 300-1200. Also as noted in the worksheet directions, growth estimates should be based on a management plan and model results if available.

Note that growth estimates entered in Step 4 (& Step 5) apply to the period between harvests that occurs *after* the harvest on the line in which it is entered. Thus an entry of ‘600’ in cell E6 indicates that volume growth will average 600 BF/acre/year between the first harvest in year 0 (cell B6) and the second harvest in the year shown in cell B7.

Step 5 – Hardwood Growth Rate

Enter an estimate of the average annual hardwood growth between harvests, expressed in basal area/acre/year. Where available, base this estimate on a management plan and model results.

Step 6 – Conifer Harvest Volume

Enter an estimate of the conifer volume to be harvested in each entry, expressed in MBF/acre.

Step 7 – Hardwood Harvest/Treatment

Enter an estimate of the hardwood basal area that is harvested or treated (though it may be left onsite), expressed in basal area/acre.

Step 8 – Site Preparation

As noted in the worksheet instructions, for each harvest entry enter ‘Heavy’, ‘Medium’, ‘Light’, or ‘None’ to indicate the level of site preparation activity that will follow harvesting activities. In typing in each word, case is not important but it must be spelled correctly and cannot have a space or other characters following the word.

The Harvesting Emissions worksheet (Steps 9 – 14) makes reference to activities at a landing, i.e., daily production, pieces of equipment, etc. at a ‘landing’. Many THPs of course utilize multiple actual on-the-ground landings, with variable time spent at each landing and variable amounts of equipment present at each. If a THP project has multiple landings, the procedure to fill out this worksheet is to combine all actual landings into one assumed project-wide ‘landing’, with production and pieces of equipment summed for the project as a whole.

Step 9 – Daily Logging Production

Enter an estimate of the daily logging production, i.e., the average daily MBF of all species delivered to landing(s).

Step 10 – Yarders/Loaders

Enter the number of yarders and loaders in use on project landing(s) per day. Entries may be made for partial days; for example, if a yarder is used on a full-time basis and a loader about half the time, then enter ‘1.5’ here.

Step 11 – Tractors/Skidders

Enter the number of tractors and skidders in use on project landing(s) per day, including partial days if appropriate.

Step 12 – Helicopters

Enter the number of helicopters in use on project landing(s) per day, including partial days if appropriate.

Step 13 – Truck Loads

Enter the estimated average truck load (in MBF, all species).

Step 14 – Haul Length

Enter the estimated length of the round-trip haul from the landing(s) to the mill, in hours.

Step 15 – Conifer Delivered to Sawmills

Enter the percentage of conifer volume delivered to sawmills.

Step 16 – Hardwood Delivered to Sawmills

Enter the percentage of hardwood volume delivered to sawmills.

Step 17 – Project Acres

On the Summary worksheet enter the number of acres in the project. The number of project acres entered here should include only *harvested* project acres; that is to say, acres within a THP boundary that are not harvested should not be included here.

The Sequestration Summary worksheet totals the emissions from all sources on a per-acre basis and on a total project area basis. Additionally, the number of years it takes for emissions from tree loss (not including non-biological emissions) to be recouped as a result of tree growth plus carbon sequestered in wood products is calculated and displayed (cell D3).