**Quick Start Guide for ICFPA/NCASI Spreadsheets for Calculating
Greenhouse Gas Emissions from Wood Products Manufacturing**

**Workbook Version 3.2, for the Canadian GHG Program for Reporting Annual Emissions
with NCASI Data Entry Forms**

Introduction. These spreadsheets are a Microsoft Excel file incorporating a Visual Basic interface that guides the user through the process of completing a greenhouse gas (GHG) emissions inventory for a manufacturing facility. The spreadsheets were developed by NCASI to facilitate development of emission inventories consistent with the Canadian GHG annual reporting program, and are based upon the ICFPA/NCASI GHG Calculation Tools for Wood Products Manufacturing which have been adopted by the World Resources Institute (WRI) and World Business Council for Sustainable Development (WBCSD) as sector specific tools for the wood products industry within the GHG Protocol Corporate Reporting Standard. Version 3.2 of the Calculation Tools, presented in this Quick Start Guide, contains emission factors, fuel property characteristics, and physical unit conversion factors drawn from the most recent Canadian Standards Association (CSA) GHG Challenge Registry guidance[1] (formerly the Canadian Voluntary Challenge and Registry, or VCR). Emission factors for biomass fuels are drawn from other sources (as specified in the data tables of the Excel spreadsheet) due to errors in the factors provided in the CSA guide. Default emission factors for mobile sources (required for use in calculating emissions from on-site transportation sources) are from a prior version of the CSA guide[2] (most of the revised factors for mobile sources in CSA (2009) pertain to on-road vehicles, the Canadian GHG reporting program only requires that direct emissions from mobile sources corresponding to on-site transportation be reported – most of these sources at pulp and paper mills will not be on-road vehicles). These emission factors can be selected as defaults when using the tools. The user can, however, use facility-specific emission factors, rather than the default values, if this information is available (entered by the user as custom emission factors). ***This version of the Calculation Tools will produce the same results as other versions if the same emission factors are used; however, the results may be presented in a different format.***

To get started, open the Excel file and, if prompted, enable macros. An introduction screen will appear with background information on the tools. Press [Continue][3] and the user agreement will appear. Press [Accept Conditions] to proceed. Pressing [Decline] will close the file.

Operations in Inventory. After the user agreement conditions are accepted, a form will appear that can be used to assign a name and provide other clarifying information for the inventory. Simply type text into the white boxes. When finished, press [Next] to proceed. The next two forms provide a venue for specifying the manufacturing operations that are included in the inventory. Clicking in the white boxes will indicate that the listed operations are included in the inventory. Clicking on [Next] (or [Finish] on the last form) will bring up the next form.

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[1] Challenge Registry Guide to Entity & Facility-Based Reporting – Canadian Standards Association (CSA) Climate Change, GHG Registries (formerly VCR Inc.), Version 6.0, October 2009.
[2] Challenge Registry Guide to Entity & Facility-Based Reporting – Canadian Standards Association (CSA) Climate Change, GHG Registries (formerly VCR Inc.), Version 4.0, February 2005.
[3] Brackets [] indicate buttons that can be selected when using the calculations tools.

The information entered into the *Operations in Inventory* pages is not used in calculating GHG emissions. The purpose of this information is to better understand the operational boundaries of the inventory and to develop a record of those boundaries.

Main Data Entry Forms. After entering information on operational boundaries, a data entry form with seven selectable buttons along the top edge will be displayed. These are the main data entry forms where fuel consumption and other data required for developing the GHG emissions inventory can be entered into the calculation tools spreadsheet. The user can access data entry forms for several categories of emission sources by clicking on the appropriate button at the top of this main form. As a different button is selected, the contents of the main form change to display the relevant input parameters for the source type selected. The user can follow any order of source type while entering data.

Most of the source category-specific forms within the main data forms include [Info/Help] which, when selected, will display detailed instructions for entering data into the form.

Most of the category-specific forms also include buttons near the bottom right corner that can be used to display emission calculation results corresponding to previously entered data. [View Source Table] will present an overview of emission calculation results for the source category corresponding to the form from which the button was selected. [View Summary Table] will present an overview of the inventory results, based on data from all source categories already entered. [Close Data Entry Form] will close the data entry forms and return the user to the underlying spreadsheet, where calculations are actually performed. The data entry forms can be re-started from the underlying spreadsheet by selecting [Open Data Entry Form] on most of the worksheets of the underlying spreadsheet.

Stationary Combustion. Select this button on the main form to enter data on fuel consumption in stationary combustion sources such as power boilers, furnish dryers, direct-fired turbines, and so on. Follow the steps listed on the data form to enter data. Some sequences must be followed in order for the forms to function correctly. For example, the fuel type must be selected from the drop down box of options listed in the Step 1 frame prior to selecting the specific fuel consumed in the drop down box of options within the Step 2 frame. Then the measurement units used to quantify fuel consumption can be selected from the drop down box and the quantity of fuel consumed can be entered. Click on [Select Emission Factors Here] to display a window where the fuel-specific emission factors to use in the calculations can be specified. Default emission factors for the three main GHGs (CO_2, CH_4, and N_2O) are provided for most fuels.[4] Selecting *default* for a GHG will display that fuel's default emission factor and associated units. If the user has access to an emission factor that is more appropriate for use than the default factor, selecting *custom* for a GHG will enable the adjacent text boxes so that a numerical quantity can be entered, and an associated measurement unit can be chosen from the drop down box. If a biofuel was chosen from the main data form, the emission factor selection form will provide an option to also estimate emissions of biomass CO_2 (emissions of biomass combustion CO_2 are reported separately from other emissions). Selecting [Accept Emission Factors] will return the user to the main form or will display another window where an emission factor for biomass combustion CO_2 can be entered (either default or custom) if these emissions are to be included in the

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[4] Default emission factors are drawn from the CSA guidance documents, where appropriate, as discussed earlier. See the underlying calculation tools spreadsheet pages for additional details on default emission factors.

analysis. ***Note that the Canadian GHG reporting program requires that biomass combustion CO₂ emissions be estimated and reported (separately from other emissions)***.

The Calculation Tools provide a visual means to identify whether the user elected to use the default emission factors provided with the tools or if the user entered a custom emission factor more appropriate for the specific operations at the facility. While default emission factors are written to the underlying spreadsheet in normal font, individual custom factors are entered in italics (both to the "Stationary Combustion" worksheet and to the "Raw Data Log" worksheet).

Once fuel consumption data have been entered and emission factors selected, press [Enter Data] to display a form where the user can review the data entries, then either accept the data as entered or elect to edit the entries. Accepting the data entries will return the user to the main form, which will now be blank because the data entered will have been processed and written to the underlying spreadsheet, where the emissions calculations are performed. Electing to edit the data entries will return the user to the main form with data entries still visible, where they can be edited and then entered.

This process can be repeated for each emission source to be included in the analysis.

Other – Mobile & Transportation. The Canadian GHG program requires reporting direct emissions from mobile sources associated only with on-site transportation. Emissions from off-site mobile/transportation sources should not be included. These tools include methods for estimating and reporting direct emissions from on-site mobile sources.

Emissions from mobile or transportation sources, such as warehouse equipment used for transporting raw materials and products within the mill, can be estimated from this tab in a manner similar to that presented for stationary sources. The data form includes a "Mobile Calculator" which can be used to calculate quantities of fuel consumed from data on distance traveled and vehicle fuel economy.

Other – Landfills. The landfills page contains three methods that can be used to estimate methane emissions from landfills receiving mill wastes. Select a method from one of the three buttons near the top of the landfills form, and a summary description of the method will be displayed, along with spaces where the data necessary to perform the emissions calculations for that method can be entered. Complete the required data entry steps for the landfill method chosen, then select [Enter Data] to complete entry for that source.

For method 3 of estimating landfill emissions, the data entry procedure is somewhat different than for other sources. This method requires entry of data for each year of the life of the landfill, and once data is entered for a year [Enter Data] is selected. The form includes prompts to guide the user through each year of data entry for this particular method.

Other – Anaerobic WWT. This form is used to enter data associated with anaerobic wastewater treatment (WWT) plants treating wastewaters. The form should not be used for aerated wastewater treatment systems. The anaerobic WWT form contains two methods that can be used to estimate methane emissions from non-aerated treatment plants accepting mill wastewaters. Enter data as required on the form, then select [Enter Data] to review the entries.

Optional – Indirect Emissions. Emissions associated with the import or purchase of electricity, steam, or hot water generated by a different facility would be characterized as indirect emissions. *The Canadian GHG reporting program does not require reporting of indirect emissions, but does provide a means for the optional reporting of these emissions*. The *Optional – Indirect Emissions* page provides a venue for entering data required to calculate emissions associated with energy imports. After selecting whether the imported energy is electricity or steam (select the steam button if emissions for hot water are to be estimated), enter the quantity and measurement units of the imported energy, then enter emission factors for each GHG to be included and select emission factor units from the drop down boxes. Emission factors can often be obtained from the seller of the energy. A text box is provided for documenting where the emission factors were obtained.

This form also has two buttons that can be used to assist in selecting emission factors. [Lookup Factors] can be selected to display an electronic table of purchased electricity emission factors drawn from the CSA guidance document (this button only works when the electricity type of energy is selected). If the imported energy was generated in a combined heat and power system, select [CHP Calculator] to display a form that can develop an emission factor associated with the CHP-generated energy. Once the required information is entered, press [Enter Data] to review it, then accept or edit the entries.

Optional – Energy Exports. This page can be used to estimate the emissions associated with power, steam, or hot water generated by the company performing the inventory but sold or exported to another end user. The results of the calculations reflect the amount of direct emissions already calculated (typically from stationary combustion sources) that are associated with exported energy (therefore, these emissions are a subset of total direct emissions). This information is not required by the Canadian GHG reporting program. However, some facilities may find it useful to highlight the portion of the facility's direct emissions associated with energy that was exported to a different facility rather than being consumed at the generating facility.

The data entry form requires entry of the total quantity of energy produced and associated measurement units, the total GHG emissions generated during production of the energy, and the quantity of energy that was exported (along with the measurement units). If the total emissions associated with producing the energy are not known, [CHP Calculator] or [Direct Emissions Calculator] can be selected to calculate emissions from fuel use information.

CHP Calculator. The CHP calculator can be accessed from either the *Optional – Indirect Emissions* or the *Optional – Energy Exports* main data entry forms. The CHP calculator allocates total system GHG emissions among the electricity and heat outputs of the CHP system, and returns the results (either emission factors or total emissions) to the form from which the CHP calculator was activated. Emissions are allocated based upon the "efficiency method," which allocates emissions according to the amount of fuel used to produce each energy output (as indicated by the efficiencies of producing power and of producing heat). This approach is consistent with that suggested by Environment Canada. Required input data for the CHP calculator include total heat production, total power production, total fuel use, and total GHG emissions from the CHP system. If the total fuel consumption and total GHG emissions from the CHP system are not known, the [Direct Emissions Calculator] can be activated and used to calculate these parameters based on fuel input quantities. Once these basic data have been

entered, press [Calculate Ratio] to display the minimum and maximum ratios of efficiencies (the bounds around the ratio) allowed by the CHP system energy balance. Entry of the CHP system's ratio of efficiency of heat production to efficiency of electrical power production is required in order to complete the allocation. The default ratio is 2.29, corresponding to 80% heat production efficiency and 35% power production efficiency. Enter a ratio in the space provided. Once the data are entered into the CHP calculator form, press [Calculate Emissions] to perform calculations and display the results. If the calculation results are not reasonable, press [Return to CHP Calculator] to re-enter data. If the results appear reasonable, press [Accept Results] to return the appropriate results (emission factors or total emissions) to the form from which the CHP calculator was activated.

Direct Emissions Calculator. The direct emissions calculator can be activated from either the *Optional – Energy Exports* page or from the CHP calculator. This utility calculates total GHG emissions from total fuel consumption. It functions much like the stationary combustion sources main data entry form. However, the direct emissions calculator allows entry of quantities of multiple fuels fed to the same combustion device (e.g., total emissions can be calculated for a boiler which burns both oil and biomass). ***Due to limitations in the fuel-specific data provided in the CSA guidance upon which this version of the tool is based, the Direct Emissions Calculator is not capable of accepting consumption data for solid fossil fuels (e.g., coal).***

For each fuel combusted, select the fuel type from the first drop down box (e.g., liquid fossil, gaseous fossil, or biofuels), then select the specific fuel type from the second drop down box. Enter the quantity consumed and select the measurement units for this fuel from the drop down box, then click [Select Emission Factors] and select default or custom factors for each GHG to be included in the analysis. Accept the factors entered, then click [Enter Data for fuel selected in step 2] within the step 4 frame. Once this button is selected, the data entry spaces within the *Direct Emissions Calculator* form will become blank, and the form will be ready for entering any additional fuel burned in the combustion device. Enter the data for any additional fuels, as appropriate, in the same manner as that used for the first fuel then click [Sum] within the step 5 frame to complete the calculations. The results will be displayed in the step 5 frame. Select [Accept Values] to return the calculation results to the form from which the *Direct Emissions Calculator* was accessed.

Finish. The finish form provides several options for saving the underlying spreadsheet to which data have been written, for clearing all data previously entered into the underlying spreadsheet, for closing the Visual Basic data entry forms and accessing the underlying spreadsheet, and for easily viewing a summary of the inventory results based upon data entered into the other forms.

When data entry for a GHG emissions inventory has been completed, the individual underlying spreadsheet worksheets can be printed out and used to document the results of the inventory.