**Quick Start Guide for ICFPA/NCASI Spreadsheets for Calculating
Greenhouse Gas Emissions from Pulp and Paper Manufacturing**

**Workbook Version 2.1, for the USDOE 1605(b) Voluntary Reporting of
Greenhouse Gases Program – with NCASI Data Entry Forms**

Introduction. These spreadsheets are a Microsoft Excel file incorporating a Visual Basic user interface that guides the user through the process of completing a greenhouse gas (GHG) inventory. The spreadsheets are based upon the enhanced version of GHG calculation tools tailored specifically for U.S. pulp and paper mills, announced in July 2003 in NCASI Corporate Correspondence CC 03-25. Since then, it has become clear that the DOE 1605(b) Voluntary Reporting program includes reporting guidance that could be inconvenient to follow when using existing versions of the tools. It has also become clear that the DOE guidelines are likely to become the standard reporting guidance in the U.S. Therefore, to facilitate development of emission inventories consistent with the DOE Voluntary Reporting program guidance, NCASI has developed a new version of the enhanced calculation tools. ***This DOE 1605(b) version of the calculation tools will produce the same results as earlier 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][1] 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 three 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.

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 boundries.

Main Data Entry Forms. After entering information on operational boundaries, a data entry form with ten 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 changes to display the relevant input parameters for the source type selected. The user can follow any order of source type while entering data.

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[1] Brackets [] indicate buttons that can be selected when using the calculations tools.

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 Sources. Select this button on the main form to enter data on fuel consumption in stationary combustion sources such as power boilers, recovery furnaces, lime kilns, 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.[2] ~~Clicking~~ Selecting~~on~~ [~~D~~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, ~~clicking on~~ [selecting c~~C~~ustom~~]~~ 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 climate neutral CO_2 for biomass consumption (emissions of climate neutral CO_2 from biomass fuels are not included in the GHG inventory results, but are reported as supporting information). Selecting [Accept Emission Factors] will return the user to the main form or will display another window where an emission factor for climate neutral CO_2 can be entered (either default or custom) if these emissions are to be included in the analysis.

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.

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[2] Default CO_2 emission factors are drawn from the DOE Instructions for Form 1605. Default CH_4 and N_2O emission factors, where available, are drawn from IPCC guidance documents. See the underlying calculation tools spreadsheet pages for details on default emission factors.

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

Transportation Sources. For transportation sources, such as automobile and truck fleets, data are entered in a very similar fashion as for stationary combustion sources. The primary difference is that transportation sources require the user to enter a fraction of total emissions from each source that are considered to be direct emissions. Direct emissions are emissions from a source which is owned or controlled by the company performing the inventory. For example, if the entity preparing the inventory fully owns or controls a truck fleet, it will enter 1 as the fraction considered to be direct emissions, corresponding to 100% of the total emissions. If the user elects to include emissions from a truck fleet that is only partially owned or controlled by the company, a fraction smaller than 1 can be entered (between 0 and 1). The remainder of the data entry process is analogous to the form for stationary combustion sources.

Other Mobile Sources. The process of entering data for other mobile sources, such as non-transportation vehicles like fork trucks, harvesting equipment, etc., is very similar to the data entry process for transportation sources.

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. The landfills form also includes a place where a fraction of total emissions considered to be direct (corresponding to the fraction of the landfill that the mill owns or controls) 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 will include prompts to guide the user through each year of data entry for this particular method.

Anaerobic WWT. This form is used to enter data associated with anaerobic wastewater treatment (WWT) plants treating mill 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. As in some other forms, this page incorporates a place to enter the fraction of total emissions that should be considered direct. Enter data as required on the form, then select [Enter Data] to review the entries.

Make-Up Carbonates. In some kraft mills, sodium carbonate and/or calcium carbonate are consumed to compensate for losses from the chemical recovery system. This page provides a place to enter quantities of these carbonate-based compounds that are consumed in the mill, for use in estimating fossil CO_2 emission estimates when the make-up chemicals are processed through the recovery cycle. Enter the requested data, then select [Enter Data].

CO_2 Imports & Exports. This page provides a place to enter amounts of fossil fuel-derived CO_2 imported to the mill site (such as that used for neutralization purposes) and amounts of

fossil fuel-derived CO_2 exported from the mill site (such as that exported to a precipitated calcium carbonate plant). Enter the requested data, then select [Enter Data].

Energy Imports. Emissions associated with the import or purchase of electricity, steam, or hot water generated by a different entity would be characterized as indirect emissions. The energy imports 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 DOE Instructions for Form 1605 (this button only works when the [Eelectricity] 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.

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). 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 them from fuel use information.

CHP Calculator. The CHP calculator can be accessed from either the energy imports or the 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). 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. The system's ratio of efficiency of heat production to efficiency of electrical power production is also required (the default ratio is 2.29, corresponding to 80% heat production efficiency and 35% power production efficiency). 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 the basic 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 accessed.

Direct Emissions Calculator. The direct emissions calculator can be activated from either the 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., emissions can be calculated for a boiler which burns both coal and biomass). For each fuel combusted, select the fuel type from the first drop down box (e.g., liquid fuel, solid fuel, gaseous fuel, or biomass fuel), then select the specific fuel type from the second drop down box. Enter the quantity consumed and measurement units for this fuel, then click [Select Emission Factors] and select default or custom factors for each gas 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 direct emissions calculator form will reappear, ready for entering any additional fuel burned in the combustion device. Enter the data for any additional fuels, if appropriate, then click on [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.