WARM USER'S GUIDE

Calculating Greenhouse Gas Emissions With the WAste Reduction Model

What is the WAste Reduction Model?

The WAste Reduction Model (WARM) is a Microsoft Excel spreadsheet application created by the U.S. Environmental Protection Agency (EPA) to help solid waste planners and organizations track and voluntarily report greenhouse gas (GHG) emission reductions from several different waste management practices. WARM can be downloaded from EPA's Web site at www.epa.gov/mswclimate.

WARM calculates and totals GHG emissions of baseline and alternative waste management practices—source reduction, recycling, combustion, composting, and landfilling. The application calculates emissions in metric tons of carbon equivalent (MTCE)[1] across a wide range of material types that compose municipal solid waste (MSW); it can break down emission results by type of GHG (carbon dioxide, methane, etc.). The user can construct various scenarios by simply entering data on the amount of waste handled by material type and by management practice. WARM then automatically applies emissions factors specific to material type and management practice to calculate the GHG emissions of each scenario. Several key inputs, such as landfill gas collection and transportation distances to MSW facilities, can be modified by the user.

The GHG emissions factors were developed following a life-cycle assessment methodology specific to GHG emissions. EPA's report *Greenhouse Gas Emissions From Management of Selected Materials in Municipal Solid Waste* (EPA 530-R-98-013) describes this methodology in detail. For a free copy of this report, visit www.epa.gov/mswclimate or call EPA's RCRA hotline at 800-424-9346.

Who Should Use WARM?

WARM was developed for solid waste managers (from state and local governments and other organizations) who want to calculate the GHG emissions associated with different waste management options. Emissions estimates provided by WARM are intended to support voluntary GHG measurement and reporting initiatives. These initiatives include waste management components of climate change action plans, the Department of Energy's 1605(b) voluntary program for reporting GHG emissions, and other waste management projects for which an understanding of GHG emissions is desired.

Using WARM

- To use WARM, you will need Microsoft Excel version 5.0 or higher.
- Before using WARM, you first need to gather data on your current (baseline) waste management practices and a proposed

[1]MTCE is a unit of measurement that expresses the heat-trapping effects of various greenhouse gas emissions in carbon equivalents. An international protocol has established carbon dioxide (CO_2) as the reference gas.

alternative scenario. You should know how many tons of waste you manage (or would manage) for a given time period under each scenario by material type and by management practice, as listed below.

- Once you've gathered these data, you're ready to get started with WARM. Upon opening the spreadsheet, WARM will prompt you with "Open as read-only?" If you plan to save your work in WARM, click "No." Otherwise, click "Yes." Next, WARM will prompt you with "This document contains links. Re-establish links?" Simply click "No."

- Now, click on the "Analysis Inputs" tab at the bottom center of the screen to open the input sheet. Follow the instructions for Steps 1 and 2 to fill in the tables describing your baseline and proposed alternative waste management scenarios.

MSW Material Types Recognized by WARM

Newspaper	Glass	Food Waste
Office Paper	HDPE	Yard Waste
Mixed Paper*	LDPE	Grass
Steel Cans	PET	Branches
Aluminum Cans	Corrugated Boxes	Leaves

** general, primarily residential, or primarily from offices*

- Fill in the data requested in Steps 3–6. In these steps, WARM is asking for additional waste handling information to allow it to customize its calculations to your waste management situation. For example, you are asked for data on transportation distances and on your landfill gas and ferrous metal recovery systems, if applicable. If you don't have the requested data available, WARM will use national averages as defaults.

- Once you've completed Steps 1–6 on the "Analysis Inputs" sheet, WARM has the information it needs to calculate the GHG emissions attributable to each scenario you've specified. Emissions calculations are presented on three separate output sheets, as described below. From the "Analysis Inputs" sheet, click on a tab at the bottom of the screen for the results sheet you want to view first.

—The "Analysis Results" sheet shows GHG emissions for each scenario in units of MTCE. You can compare the total impact of the baseline and alternative scenarios, or, if you want more detail, you can scroll down to view GHG emissions per material type and management practice.

MSW Managment Practices Recognized by WARM

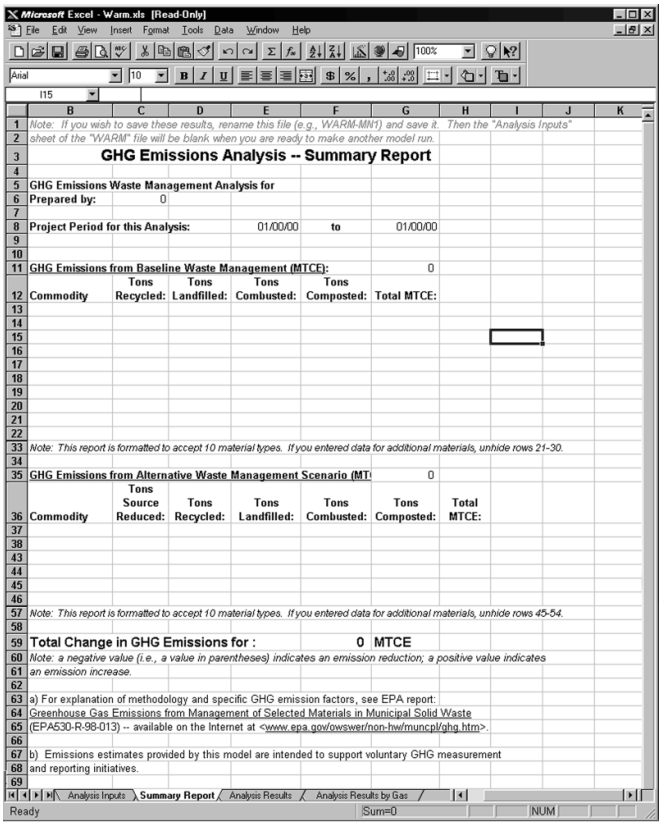
Source Reduction	Recycling	Combustion
	Landfill	Composting

—The "Analysis Results by Gas" sheet provides a breakout of emissions of specific GHGs per material type under each scenario. The specific GHGs are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and perfluorocarbons (CF_4 and C_2F_6).

—The "Summary Report" sheet provides a concise report of GHG emissions from the baseline and alternative waste management scenarios, as well as a net total MTCE figure.

Assistance

If you need additional asistance with using WARM, please email Henry Ferland at ferland.henry@epa.gov or Eugene Lee at lee.eugene@epa.gov.



WARM Summary Report