

Use of EPA's Emission Factors Hub's Waste Emission Factors vs. the Waste Reduction Model (WARM): Guidance for Organizations

EPA developed this resource to help organizations better understand two EPA-developed tools and when the tools may meet the needs of stakeholders. This resource clarifies when organizations should use waste emission factors to develop a Scope 3 GHG emissions inventory and when to use the WARM Tool as a decision-making tool for waste management activities (e.g. recycling) and to communicate the environmental benefits of such efforts.

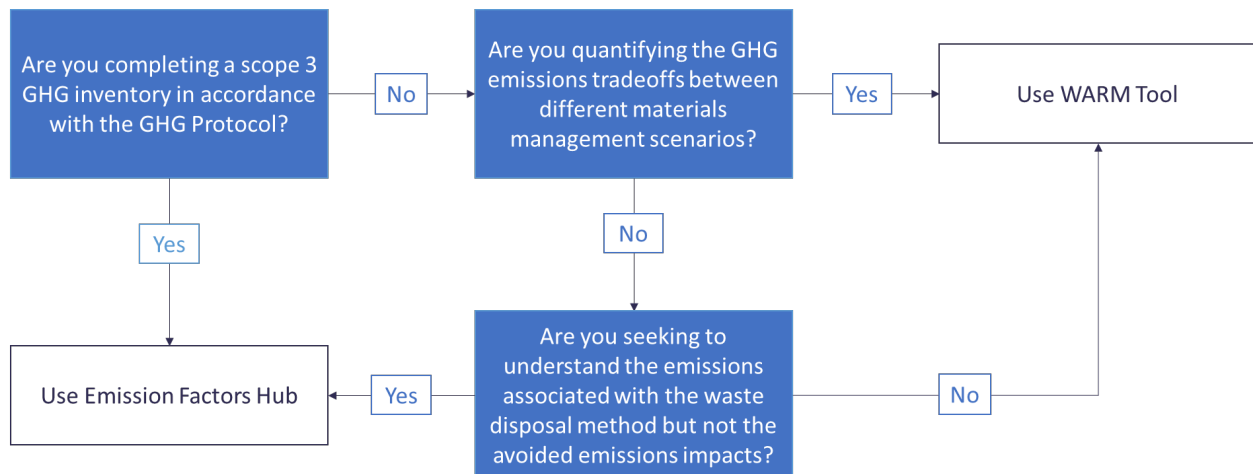
What is WARM and what is the Emission Factors Hub's waste emission factors?

- The **WARM Tool** [<https://www.epa.gov/warm>] calculates and totals GHG emissions of baseline and alternative waste management practices—source reduction, recycling, combustion, composting, anaerobic digestion and landfilling. WARM version 15 models 6 management practices and 60 materials. WARM version 15 can be downloaded here: <https://www.epa.gov/warm/versions-waste-reduction-model-warm#15>
- The waste GHG emission factors in the Center for Corporate Climate Leadership's **Emission Factors Hub** [<https://www.epa.gov/climateleadership/center-corporate-climate-leadership-ghg-emission-factors-hub>] are intended to be used to calculate emissions from scope 3 category 5: Waste generated in operations and scope 3 category 12: End of life treatment of sold products for a corporate inventory. If a company has waste data by material type and weight (e.g., short ton) generated in a specified time period (usually one year), GHG emissions can be calculated by multiplying by the factors in the Emission Factors Hub. The Emission Factors Hub can be downloaded at: <https://www.epa.gov/climateleadership/center-corporate-climate-leadership-ghg-emission-factors-hub>.
- Both EPA's WARM tool and the Emission Factors Hub rely on the same underlying data from EPA's WARM Tool. However, these tools have different applications and are not interchangeable.

When and why should these tools be used?

	WARM Tool	Waste emission factors in the Emission Factors Hub
Purpose	Supports GHG-based decision-making for materials management.	Support voluntary reporting under the GHG Protocol Corporate Accounting and Reporting Standard.
Function	Communicates life-cycle impacts, including avoided emissions across different waste management practices.	Assess Scope 3 emissions from waste generated in an organization's operations or from end-of-life treatment of sold products.
Use	Compares baseline and alternative materials management scenarios to determine the least environmentally impactful waste management practice	Used to report on emissions from third-party disposal and treatment of waste that is generated in the reporting company's owned or controlled operations in the reporting period.
Hypothetical Use Scenario	<i>Hypothetical Use Scenario:</i> A company is considering different ways it can manage waste. The considerations are source reduction, landfilling, recycling and composting. Before making a decision, the leadership at a company wants to understand the life cycle GHG impacts of these management methods. This company should use the WARM model.	<i>Hypothetical Use Scenario:</i> A company is completing a comprehensive scope 3 GHG inventory consistent with the GHG Protocol Scope 3 Standard. It determined that emissions from waste disposal (category 5) are relevant and it therefore needs emission factors to estimate GHG emissions for this category. This company should use the waste factors in the Emission Factors Hub.

The following decision tree summarizes when organizations should use the WARM Tool or the waste emission factors from the Emission Factors Hub to measure and communicate on the GHG emissions associated with waste management activities:



Key differences between WARM emissions data and the Emission Factors Hub’s waste emission factors:

Waste emission factors in the Emission Factors Hub: Under the GHG Protocol Corporate Accounting and Reporting Standard, companies should **not** report negative or avoided emissions associated with recycling or other materials management activities. Any claims of avoided emissions associated with recycling should **not** be included in, or deducted from, the scope 3 inventory. The waste emission factors in the Emission Factors Hub were adapted from WARM and modified to account for all future emissions that result from *the treatment of waste generated in the reporting period*. The waste emission factors exclude negative or avoided emissions from materials management efforts, such as recycling.

By comparison, the **WARM Tool** includes both emissions generated *and* emissions avoided across the life-cycle of materials based on both the baseline and alternative scenarios presented by the user.

For example, using the WARM model to examine alternative waste management scenarios, the act of landfilling 100 tons of aluminum cans results in approximately 2 MTCO_{2e}. Recycling 100 tons of aluminum cans results in a net savings of nearly 913 MTCO_{2e} which accounts for the net benefit of using recycled aluminum compared to virgin ore in the manufacturing processes. The net GHG emissions saved from the alternative recycling scenario is 913 MTCO_{2e} + 2 MTCO_{2e} = 915 MTCO_{2e}.

In contrast, when developing a scope 3 inventory for waste management activities, the emissions associated with the act of landfilling 100 tons of aluminum cans are 2 MTCO_{2e} and the emissions associated with the act of recycling are 6 MTCO_{2e}.

Guidance on communications:

For companies seeking to communicate to stakeholders the emissions resulting from their waste management activities and/or the environmental benefits of its waste management activities (e.g. recycling, composting, source reduction):

- Users of the Emission Factors Hub factors should present scope 3 emissions separately from any claims of avoided emissions from materials management activities.

- WARM results can be used to communicate potential lifecycle impacts from decisions made by the organization but shouldn't be presented as part of the organization's Scope 1, 2, and 3 inventories.
- WARM results can also be translated into common equivalencies such as acres of trees planted or number of cars taken off the road for a year. These conversions are supported by the EPA's Greenhouse Gas Equivalencies Calculator (<https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>).
- The GHG Protocol includes guidance on how companies can present avoided emissions in Section 9.5 of the GHG Scope 3 Protocol, where data are available [https://ghgprotocol.org/sites/default/files/standards/Corporate-Value-Chain-Accounting-Reporting-Standard_041613_2.pdf].

For more information:

- WARM documentation and guidance documents [<https://www.epa.gov/warm>]
- GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard [<https://ghgprotocol.org/standards/scope-3-standard>]