



Paper Calculator

presented by environmental paper network

Paper Calculator™ v4.1 Methodology Summary

This document provides an overview of the Paper Calculator™ v4.1 methodology. For more detailed information, refer to the [Life Cycle Assessment Methodology Document for the Environmental Paper Network Paper Calculator v4.1.pdf](#). Version 4.1 is the current release of the Paper Calculator, launched on [Month Day, Year].

Overview

The Paper Calculator is a publicly available web-based tool that estimates and compares the environmental impacts of different paper choices, including the benefits of reducing paper use. Its methodology is based on life cycle assessment (LCA), which measures impacts across a product's full life cycle – from raw material extraction through disposal. Using primarily aggregated North American industry data, the Paper Calculator provides science-based guidance and is maintained with input from a coalition of non-profit organizations, independent LCA practitioners, and industry experts.

Methodology Standards

The Paper Calculator methodology aligns with internationally recognized standards and guidelines, including:

- [ISO 14044](#)
- [Draft LEO-S-002 standard](#)
- [Product Category Rule \(PCR\) for Pulp and Paper](#)
- [Product Category Rule Module for Roundwood](#)
- [LCIA Methodology for PCR Modules](#)

System Boundaries

The system boundary follows a cradle-to-grave approach, covering raw material extraction, production, transportation, and end-of-life disposal.

Data Sources

Representative data from more than 300 North American pulp and paper mills (U.S. and Canada) were drawn from the RISI Mill Asset Database and aggregated by paper grade. Life cycle inventory modeling was conducted in openLCA v1.5, using background datasets from Ecoinvent v3.3, RISI, and the U.S. LCI Database.

To ensure regional relevance, North American datasets were prioritized, with European or global averages applied where data gaps existed. Terrestrial ecosystem impacts and forest carbon storage loss were assessed using U.S. Forest Service inventories, the Canadian National Forest Inventory, and the IUCN Red List. Data on hazardous air pollutants and dioxins were drawn from the U.S. EPA Toxic Release Inventory and Canada's National Pollutant Release Inventory.

For the end-of-life phase, recycling rates are based on U.S. EPA *Municipal Solid Waste (MSW)* reports. Based on MSW data, 80% of non-recycled materials are assumed to go to municipal landfill and 20% to incineration. The following recycling rates are used:

- Coated freesheet, Uncoated freesheet, Coated groundwood, Supercalendered, Uncoated groundwood: 47.4%
- All paperboards, linerboard, and corrugating medium: 80.9%
- Tissue papers: 0%

Toilet paper is modeled as disposed via sewer with wastewater treatment, using U.S. Life Cycle Inventory (USLCI) data to represent average U.S. wastewater treatment conditions. A complete list of datasets is available in the comprehensive [Methodology Report](#).

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Allocation Procedures

Consistent with ISO 14044, allocation was minimized wherever possible. When allocation was required, a mass-based approach was used to distribute inputs and outputs according to the relative mass of products.

For recycled papers, the 100-0 cut-off method was applied, assigning environmental impacts only to the current life cycle. Landfill avoidance credits for recycled paper are not included in the core results but are presented separately in a sensitivity analysis in the comprehensive [Methodology Report](#).

Greenhouse Gas Emissions

The Paper Calculator estimates greenhouse gas (GHG) and short-lived climate pollutant emissions across the full paper life cycle, including energy use, biomass and fossil fuel combustion, transportation, and forest carbon changes. Forest carbon storage loss is included to account for the effects of forest disturbance.

Emissions are converted to carbon dioxide equivalents (CO₂e) using *Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6, 2023)* values and are expressed per unit of paper over a 20-year time horizon. A complete list of emission factors is available in the comprehensive [Methodology Report](#).

Transportation

Transportation impacts are included on a national average basis.

What's New in v4.1

Paper Calculator Version 4.1 features updated climate data, revised recycling rates, and improved modeling for paper grades and end-of-life scenarios. It also adds new options for viewing results in metric or imperial units. [See the complete summary of updates in Version 4.1](#).

Limitations

Results reflect industry-average conditions and are not intended to represent the environmental performance of individual mills or companies.