

Estimated environmental impacts were calculated using the Environmental Paper Network's Paper Calculator(tm). When used publicly, it is required that the information is properly cited as "Environmental impact estimates were calculated using the Environmental Paper Network Paper Calculator Version 4.0. For more information visit www.papercalculator.org".

	PAPER AIRBAG - 100% RECYCLED	PAPER AIRBAG - 100% VIRGIN
Paper Type:	Linerboard	Linerboard
Quantity:	1322.772 Pounds	1322.772 Pounds
% Recycled:	100%	0%
	0 U.S. short tons	2.7 U.S. short tons <i>2.7 U.S. short tons more</i>
	9.1 million BTUs	19.1 million BTUs <i>10 million BTUs more</i>
	3,160 pounds CO ₂ equiv.	12,100 pounds CO ₂ equiv. <i>8,940 pounds CO₂ equiv. more</i>
	7,820 gallons	11,700 gallons <i>3,880 gallons more</i>
	243 pounds	267 pounds <i>24 pounds more</i>
NITROGEN OXIDES (NO _x)	812 O ₃ equiv/m ^{3*}	386 O ₃ equiv/m ^{3*} <i>426 less</i>
PURCHASED ENERGY	9.1 million BTUs	10.8 million BTUs <i>1.7 million BTUs more</i>
PARTICULATES	365 PM _{2.5} equiv/m ^{3*}	161 PM _{2.5} equiv/m ^{3*} <i>204 less</i>
SULFUR DIOXIDE (SO ₂)	2.8 pounds	5.6 pounds <i>2.8 pounds more</i>
VOLATILE ORGANIC COMPOUNDS (VOCs)	0.05 pounds	0.1 pounds <i>0.06 pounds more</i>
TOTAL REDUCED SULFUR (TRS)	0.07 pounds	0.1 pounds <i>0.06 pounds more</i>
HAZARDOUS AIR POLLUTANTS (HAPs)	0.8 pounds	1.2 pounds <i>0.4 pounds more</i>
CHEMICAL OXYGEN DEMAND (COD)	11.4 pounds	17.4 pounds <i>6.0 pounds more</i>
BIOCHEMICAL OXYGEN DEMAND (BOD)	4.2 pounds	6 pounds <i>1.8 pounds more</i>
TOTAL SUSPENDED SOLIDS (TSS)	3.5 pounds	12.7 pounds <i>9.2 pounds more</i>
FOREST DISTURBANCE	0 acres	0.6 acres <i>0.6 acres more</i>

THREATENED SPECIES	0 species	11 species <i>11 more</i>
OCEAN ACIDIFICATION	921 pounds H ₂ CO ₃	2,750 pounds H ₂ CO ₃ <i>1,829 pounds more</i>
MERCURY EMISSIONS	19.9 milligrams	28.3 milligrams <i>8.4 milligrams more</i>
DIOXIN EMISSIONS	298 micrograms	817 micrograms <i>519 micrograms more</i>
FRESHWATER DISTURBANCE	See below	See below
HERBICIDES	See below	See below
OCEAN WARMING	See below	See below
WETLAND DISTURBANCE	See below	See below

Explanation of Data Values



Wood use measures the amount of wood required to produce a given amount of paper. Results are reported in fresh/green U.S. short tons of wood. The methodology does not include the forest residues left behind during pulpwood harvest in the forests (i.e., slash, roots). If forest residues were included it could be twice the number, as roughly 50% of biomass is left after harvest.

- PAPER AIRBAG - 100% RECYCLED uses 0 U.S. short tons, made from about 0 trees
- PAPER AIRBAG - 100% VIRGIN uses 2.7 U.S. short tons, made from about 16.2 trees
PAPER AIRBAG - 100% VIRGIN uses 2.7 U.S. short tons more



Total energy measures all energy required over the paper's life cycle, including all renewable and nonrenewable resource use, including black liquor and all wood sources.

- PAPER AIRBAG - 100% RECYCLED uses 9.1 million BTUs, equivalent to 10.8 residential refrigerators operated/year
- PAPER AIRBAG - 100% VIRGIN uses 19.1 million BTUs, equivalent to 22.8 residential refrigerators operated/year
PAPER AIRBAG - 100% VIRGIN uses 10 million BTUs more, a difference of 12 residential refrigerators operated/year



Greenhouse gases/climate change impacts measures carbon dioxide or CO₂ from burning fossil fuels, methane from paper decomposing in landfills and short-lived climate pollutants (such as black carbon and organic carbon) which contribute to climate change by trapping energy from the sun in the earth's atmosphere. This impact category also includes forest carbon storage loss from logged forests.

- PAPER AIRBAG - 100% RECYCLED produces 3,160 pounds of CO₂ equiv., equivalent to 0.3 cars/year
- PAPER AIRBAG - 100% VIRGIN produces 12,100 pounds of CO₂ equiv., equivalent to 1.1 cars/year
PAPER AIRBAG - 100% VIRGIN produces 8,940 pounds CO₂ equiv. more, a difference of 0.8 cars/year



Water consumption measures the amount of process and cooling water that is consumed or degraded throughout the life cycle of the paper product.

- PAPER AIRBAG - 100% RECYCLED uses 7,820 gallons, equivalent to 5.6 clothes washers operated/year
- PAPER AIRBAG - 100% VIRGIN uses 11,700 gallons, equivalent to 8.4 clothes washers operated/year
PAPER AIRBAG - 100% VIRGIN uses 3,880 gallons more, a difference of 2.8 clothes washers operated/year



Solid waste measures sludge and other wastes generated during pulp and paper manufacturing, and used paper disposed of in landfills and incinerators.

- PAPER AIRBAG - 100% RECYCLED produces 243 pounds of solid waste, equivalent to 55.5 people generating solid waste/day
- PAPER AIRBAG - 100% VIRGIN produces 267 pounds of solid waste, equivalent to 61 people generating solid waste/day
PAPER AIRBAG - 100% VIRGIN produces 24 pounds more, a difference of 5.5 people generating solid waste/day

Nitrogen oxides/ground level ozone (NO_x, which includes NO and NO₂) measures products of the combustion of fuels that contain nitrogen. NO_x can react with volatile organic compounds and sunlight in the lower atmosphere to form ozone, a key component of urban smog. NO_x forms ozone and can also, in parallel, lead to acid rain. *The measurement of NO_x in this calculator is a complex equation that takes into account human exposure across a sample of locations of pulp and paper mills. For more information please see the *Methodology* document under the Resources tab of this website (<https://c.environmentalpaper.org/pdf/SCS-EPN-PC-Methods.pdf>).

- PAPER AIRBAG - 100% RECYCLED produces 812 persons x hrs. x pounds O₃ equiv/m³, equivalent to 1.03 gasoline powered passenger cars/year
- PAPER AIRBAG - 100% VIRGIN produces 386 persons x hrs. x pounds O₃ equiv/m³, equivalent to 0.5 gasoline powered passenger cars/year
- PAPER AIRBAG - 100% VIRGIN produces 426 persons x hrs. x pounds O₃ equiv/m³ less, a difference of 0.5 gasoline powered passenger cars/year

Purchased energy is a subset of total energy, and measures how much energy comes from purchased electricity and other fuels.

- PAPER AIRBAG - 100% RECYCLED uses 9.1 million BTUs, equivalent to 10.8 residential refrigerators operated/year
- PAPER AIRBAG - 100% VIRGIN uses 10.8 million BTUs, equivalent to 12.9 residential refrigerators operated/year
- PAPER AIRBAG - 100% VIRGIN uses 1.7 million BTUs more, a difference of 2.1 residential refrigerators operated/year

Particulates/PM_{2.5} impacts measures the effect of particulate matter (PM) emissions from pulp/paper production, contributing to smog. Particulates are small airborne particles generated during combustion, and pose a range of health risks, including asthma and other respiratory problems, when inhaled. *The measurement of particulates in this calculator is a complex equation that takes into account human exposure across a sample of locations of pulp and paper mills. For more information please see the *Methodology* document under the Resources tab of this website (<https://c.environmentalpaper.org/pdf/SCS-EPN-PC-Methods.pdf>).

- PAPER AIRBAG - 100% RECYCLED produces 365 persons x hrs. x pounds PM_{2.5} equiv/m³, equivalent to 13.8 gasoline powered passenger cars/year
- PAPER AIRBAG - 100% VIRGIN produces 161 persons x hrs. x pounds PM_{2.5} equiv/m³, equivalent to 6.08 gasoline powered passenger cars/year
- PAPER AIRBAG - 100% VIRGIN produces 204 persons x hrs. x pounds PM_{2.5} equiv/m³ less, a difference of 7.7 gasoline powered passenger cars/year

Sulfur Dioxide (SO₂) and other acidifying emissions/regional acidification measures chemical compounds such as sulfur dioxide, nitrogen oxides, and other acids (e.g. ammonia) that are produced when boilers burn fuel containing sulfur and other acid-producing substances. Of the fuels used in the paper industry, oil and coal generally contain the highest quantities of sulfur. These acidifying emissions contribute to air pollution problems like acid rain and smog. This category includes SO₂ emissions, but also other acids and emissions like NO_x.

- PAPER AIRBAG - 100% RECYCLED produces 2.8 pounds SO₂ equiv., equivalent to 0.9 eighteen-wheelers/year
- PAPER AIRBAG - 100% VIRGIN produces 5.6 pounds SO₂ equiv., equivalent to 1.8 eighteen-wheelers/year
- PAPER AIRBAG - 100% VIRGIN produces 2.8 pounds SO₂ equiv. more, a difference of 0.9 eighteen-wheelers/year

Volatile organic compounds (VOCs) measure a broad class of organic gases, such as vapors from solvent and gasoline. VOCs react with nitrogen oxides (NO_x) in the atmosphere to form ground-level ozone, the major component of smog and a severe lung irritant.

- PAPER AIRBAG - 100% RECYCLED produces 0.05 pounds, equivalent to 198 miles driven in a car/year
- PAPER AIRBAG - 100% VIRGIN produces 0.1 pounds, equivalent to 461 miles driven in a car/year
- PAPER AIRBAG - 100% VIRGIN produces 0.06 pounds more, a difference of 263 miles driven in a car/year

Total reduced sulfur (TRS) measures emissions of the compounds that cause the odor associated with kraft pulp mills. Exposure to TRS emissions has been linked to symptoms including headaches, watery eyes, nasal problems, and breathing difficulties.

- PAPER AIRBAG - 100% RECYCLED produces 0.07 pounds
- PAPER AIRBAG - 100% VIRGIN produces 0.1 pounds
- PAPER AIRBAG - 100% VIRGIN produces 0.06 pounds more

Hazardous air pollutants (HAPs) measures any of a group of 188 substances identified in the 1990 U.S. Clean Air Act

amendments because of their toxicity. Two of the most common occurring in air are formaldehyde and acrolein.

- PAPER AIRBAG - 100% RECYCLED produces 0.8 pounds, equivalent to 0.2 passenger cars/year
- PAPER AIRBAG - 100% VIRGIN produces 1.2 pounds, equivalent to 0.2 passenger cars/year
- PAPER AIRBAG - 100% VIRGIN produces 0.4 pounds more, a difference of 0.07 passenger cars/year

Chemical oxygen demand (COD) measures the amount of oxidizable organic matter in the mill's effluent. Since wastewater treatment removes most of the organic material that would be degraded naturally in the receiving waters, the COD of the final effluent provides information about the quantity of more persistent substances discharged into the receiving water.

- PAPER AIRBAG - 100% RECYCLED produces 11.4 pounds COD, equivalent to 0.07 homes/year
- PAPER AIRBAG - 100% VIRGIN produces 17.4 pounds COD, equivalent to 0.1 homes/year
- PAPER AIRBAG - 100% VIRGIN produces 6.0 pounds more, a difference of 0.04 homes/year

Biochemical oxygen demand (BOD) measures the amount of oxygen that microorganisms consume to degrade the organic material in the wastewater. Discharging wastewater with high levels of BOD can result in oxygen depletion in the receiving waters, which can adversely affect fish and other organisms.

- PAPER AIRBAG - 100% RECYCLED produces 4.2 pounds BOD, equivalent to 0.02 homes/year
- PAPER AIRBAG - 100% VIRGIN produces 6 pounds BOD, equivalent to 0.03 homes/year
- PAPER AIRBAG - 100% VIRGIN produces 1.8 pounds more, a difference of 0.01 homes/year

Total Suspended Solids (TSS)/Freshwater eutrophication measures solid materials suspended in mill effluent, which can adversely affect bottom-living organisms upon settling in receiving waters and can carry toxic heavy metals and organic compounds into the environment.

- PAPER AIRBAG - 100% RECYCLED produces 3.5 pounds TSS, equivalent to 0.02 homes/year
- PAPER AIRBAG - 100% VIRGIN produces 12.7 pounds TSS, equivalent to 0.06 homes/year
- PAPER AIRBAG - 100% VIRGIN produces 9.2 pounds more, a difference of 0.04 homes/year

Forest disturbance measures the impact of paper production on forest ecosystems and biodiversity. The indicator compares the ecosystem integrity of a harvested site to intact forests over 80 years old in the region, using on-the-ground measurements. It also considers the recovery potential which would be possible on the site if harvesting were halted, reflecting the long-term implication of forest management at suppressing ecosystem integrity.

- PAPER AIRBAG - 100% RECYCLED disturbs 0 acres, equivalent to the size of 0 football fields
- PAPER AIRBAG - 100% VIRGIN disturbs 0.6 acres, equivalent to the size of 0.4 football fields
- PAPER AIRBAG - 100% VIRGIN uses 0.6 acres more

Threatened species measures the possible number of species affected by logging for paper production in the North American region that are listed as Critically Endangered, Endangered, or Vulnerable in the IUCN Red List of Threatened Species (<http://www.iucnredlist.org>), though the exact impact will vary by forest of origin. The number of species is based on correlation with logging threats assessed by IUCN and the fiber basket of pulp and paper mills in the region. For more information see the Methodology Document (<https://c.environmentalpaper.org/pdf/SCS-EPN-PC-Methods.pdf>).

- PAPER AIRBAG - 100% RECYCLED impacts 0 species
- PAPER AIRBAG - 100% VIRGIN impacts 11 species
- PAPER AIRBAG - 100% VIRGIN impacts 11 more

Ocean acidification measures increased ocean acidity caused by CO₂, which has detrimental consequences for many marine organisms. This indicator considers CO₂ emitted during the production of pulp and paper, but also evaluates the amount of CO₂ that could be sequestered in trees if forest harvests used for papermaking were halted.

- PAPER AIRBAG - 100% RECYCLED produces 921 pounds H₂CO₃, equivalent to 0.2 cars/year
- PAPER AIRBAG - 100% VIRGIN produces 2,750 pounds H₂CO₃, equivalent to 0.7 cars/year
- PAPER AIRBAG - 100% VIRGIN produces 1,829 pounds H₂CO₃ more, a difference of 0.5 cars/year

Mercury emissions measure the amount of emissions during the production of pulp and paper. Mercury is a very toxic substance that persists in the environment for long periods of time. Emissions can therefore lead to contamination in the environment, including freshwater bodies and oceanic systems, subsequently exposing flora and fauna to elevated concentrations.

- PAPER AIRBAG - 100% RECYCLED produces 19.9 milligrams, equivalent to 5.0 compact fluorescent lights
- PAPER AIRBAG - 100% VIRGIN produces 28.3 milligrams, equivalent to 7.07 compact fluorescent lights
- PAPER AIRBAG - 100% VIRGIN produces 8.4 milligrams more, a difference of 2.1 compact fluorescent lights

Dioxin emissions measure the amount of dioxin emissions that are released to air and water from pulp and paper mills. Dioxins are persistent and bioaccumulative, and even small amounts of emission can contaminate local waterways and bioaccumulate in fish.

- PAPER AIRBAG - 100% RECYCLED produces 298 micrograms
- PAPER AIRBAG - 100% VIRGIN produces 817 micrograms
- PAPER AIRBAG - 100% VIRGIN produces 519 micrograms more

Freshwater disturbance measures the number of freshwater systems possibly affected by logging. Logging can impact streams, rivers and creeks by increasing erosion, removing riverside vegetation and removing large woody debris that many fish species require for habitat. Although this impact is important and relevant, no data is currently available to calculate results. Reflecting the critical nature of this impact category, it is reported here as relevant to pulp/paper production, although results cannot be evaluated at this time.

Herbicides measures the amount of toxic herbicides used in growing trees for paper production. Herbicides are applied to control the spread of non-desirable species. Although this impact is important and relevant, no data is currently available to calculate results. Reflecting the critical nature of this impact category, it is reported as relevant to pulp/paper production, although results cannot be evaluated at this time.

Ocean warming measures increased ocean temperatures linked to emissions of greenhouse gases. Although this impact is important and relevant to emissions and foregone growth from logging, no algorithm is currently available to calculate results. Reflecting the critical nature of this impact category, it is reported as relevant to pulp/paper production, although results cannot be evaluated at this time.

Wetland disturbance measures the acreage of wetlands possibly affected by logging. Logging can increase erosion, which will cause changes in the sediment, temperature and other characteristics of wetlands. Although this impact is important and relevant, no data is currently available to calculate results. Reflecting the critical nature of this impact category, it is reported as relevant to pulp/paper production, although results cannot be evaluated at this time.

If you have questions or would like more information about Paper Calculator V4.0, please see the Life Cycle Assessment Methodology document under the "Resources" tab of this website (<https://c.environmentalpaper.org/resources.html>) or contact us at info@environmentalpaper.org.
