



BILLERUDKORSNÄS

Pure Design™

Environmental Product Declaration



www.billerudkorsnas.com



THE INTERNATIONAL EPD® SYSTEM

BillerudKorsnäs

BillerudKorsnäs focuses on offering the packaging market sustainable materials (world-leading paper and board material) and new solutions that increase customers' profitability while at the same time reducing the overall environmental impact.

BillerudKorsnäs is driven by sustainability as a natural and integral part of the whole business and value chain. The raw material comes from responsibly managed forests and manufacturing takes place in resource-efficient production units that are constantly improved to minimize their environmental impact. BillerudKorsnäs has 8 production sites in Sweden, Finland and the UK. Production capacity is close to 3,000 ktonnes, with integrated pulp production. The range of products includes liquid packaging board, cartonboard, liners, fluting, sack- and kraft paper, speciality paper and pulp.

Through our products and solutions, we aim to be part of the response to the world's current major challenges.





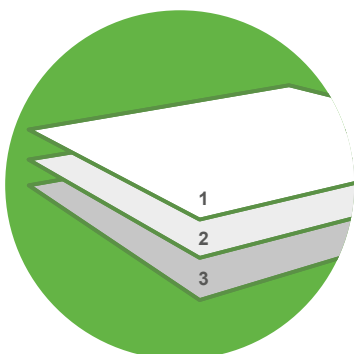
BillerudKorsnäs' operations for production in Sweden, Finland and the UK are fully certified in accordance with

- ISO 9001:2008 Quality Management System
- ISO 14001:2004 Environmental Management System
- PEFC™ Chain of Custody, license code PEFC/05-33-114
- FSC® Chain of Custody, license code FSC-C004906

In addition, certifications for food safety management systems, in accordance with ISO 22000/FSSC 22000, are in place where products are aimed for food contact.

This is an Environmental Product Declaration for Pure Design™, registered in the International EPD System (www.environdec.com). The declaration has been developed based on the results of a Life Cycle Assessment (LCA) and the Product Category Rules for Processed paper and paperboard (PCR 3214). Information and data given in this EPD can be used as upstream data by a customer who will perform a new EPD within the system boundaries given in a related PCR.

GÄVLE MILL – THE PRODUCTION SITE FOR PURE DESIGN



DECLARATION OF CONTENTS

1. Clay coated top side
2. Bleached chemical pulp
3. Unbleached chemical pulp

Pure Design	Distribution
Bleached chemical pulp	58%
Unbleached chemical pulp	18%
Coating/fillers	24%

PURE DESIGN

Pure Design (formerly BillerudKorsnäs Design) is a fully coated, 100% primary fibre based white top kraftliner with an excellent print surface for high quality images and eye-catching effects. The even print surface gives minimal variations in colour reproduction, high gloss and a good printing economy. Pure Design is used for premium corrugated packaging applications and is mainly developed for pre-print in flexo and offset. However, this product is extensively used also for post-print applications with flexo, screen, digital, and offset print. With 100% primary fibre, Pure Design offers high resistance to moisture and suitability for direct food contact. Typical applications are shelf-ready packaging and display solutions for premium brands. Pure Design is available in grammages from 130 to 200 gsm (27–41 lb/MSF).*

* Within the paper industry lb/MSF stands for pounds per 1,000 square feet, while gsm is an acronym for grams per square metre.



SYSTEM BOUNDARIES

The international EPD system is a hierarchic approach based on the international standards:

- ISO 9001, Quality management system
- ISO 14001, Environmental management system
- ISO 14025, Type III environmental declarations
- ISO 14044, LCA – Requirements and guidelines

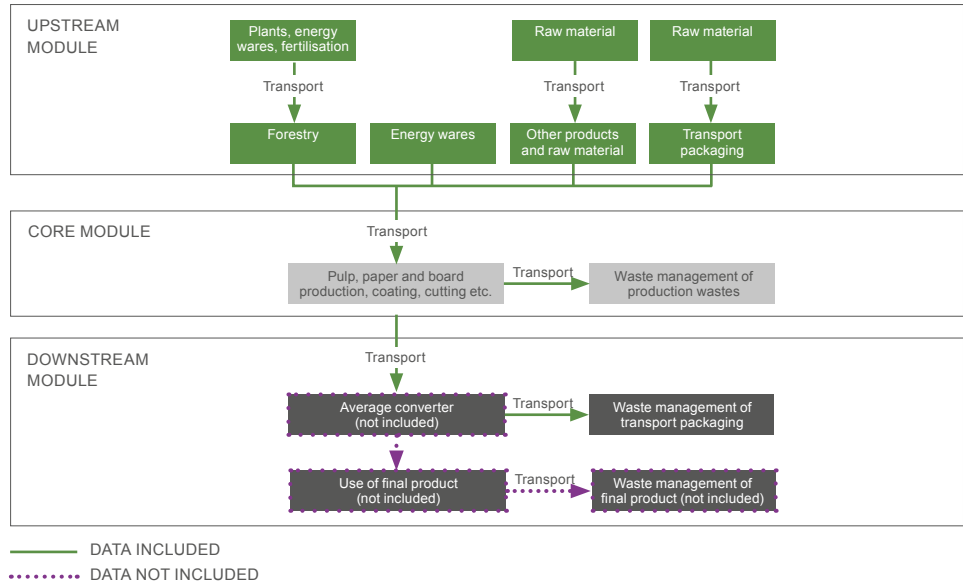
The systems are divided into three life cycle phases:

UPSTREAM: Forestry, production of fertilisers, energy wares and chemicals, auxiliary products and other raw materials, transport packaging.

CORE: Transportation of all materials (including wood) to the core processes,

production of internal and external pulp, production of paper and paperboard, cutting and packing of the products and treatment of waste generated from the production processes.

DOWNSTREAM: Distribution of the product to the customer and waste management of transport packaging.



ENVIRONMENTAL PERFORMANCE

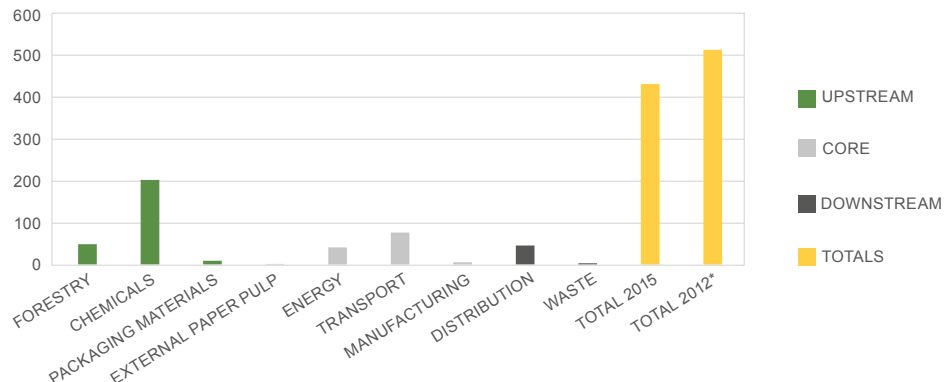
The environmental impact of three selected grammages representing a low, medium and high grammage within the product range are presented in the table below.

The declared unit is one tonne (1,000 kg) of the product delivered at the gate of an average converter/customer in Europe. As additional result, the environmental impact is presented also per 1,000 m².

The carbon footprint (greenhouse gas emissions over the life cycle) is presented as an average for the three grammages covered in the following diagram as global warming potential 100 years (GWP100) in kg CO₂ equivalents per tonne product. The 15.9% reduction compared to previous EPD is mainly a result of less use of fossil energy in the production plant.

AVERAGE GREENHOUSE GAS EMISSIONS PURE DESIGN 2015

kg CO₂eq/TONNE



*THE PREVIOUS EPD PUBLISHED 2013-12-19

These previous results are recalculated according to the new methodology and characterization factors stated by product category rules of today.



POTENTIAL ENVIRONMENTAL IMPACT PURE DESIGN

The table presents the potential environmental impact per declared unit as defined by the product category rules for processed paper and paper-board (CPC 3214). Data for the calculation is taken from the actual production of the product during 2015, without any corrections for production irregularities between grammages.

	UPSTREAM kg/tonne	CORE kg/tonne	DOWNSTREAM kg/tonne	TOTAL kg/tonne	TOTAL kg/1,000 m ²
PURE DESIGN 130 GSM (27 lb/MSF)					
Global warming potential excl biogenic carbon (CO ₂ eq.)	277.6	128.7	48.2	454.4	59.1
Global warming potential incl biogenic carbon (CO ₂ eq.)	-775.9	1,458.4	51.6	734.1	95.4
Acidification potential (SO ₂ eq.)	2.00	2.33	0.12	4.46	0.58
Eutrophication potential (PO ₄ ³⁻ eq.)	0.48	1.04	0.13	1.65	0.21
Photochemical oxidant formation potential (C ₂ H ₄ eq.)	0.18	0.33	-0.01	0.50	0.07
PURE DESIGN 145 GSM (30 lb/MSF)					
Global warming potential excl biogenic carbon (CO ₂ eq.)	249.9	124.5	48.2	422.6	61.3
Global warming potential incl biogenic carbon (CO ₂ eq.)	-863.2	1,480.1	51.6	668.5	96.9
Acidification potential (SO ₂ eq.)	1.59	2.24	0.12	3.95	0.57
Eutrophication potential (PO ₄ ³⁻ eq.)	0.44	1.01	0.13	1.58	0.23
Photochemical oxidant formation potential (C ₂ H ₄ eq.)	0.16	0.33	-0.01	0.48	0.07
PURE DESIGN 200 GSM (41 lb/MSF)					
Global warming potential excl biogenic carbon (CO ₂ eq.)	250.7	117.7	48.2	416.6	83.3
Global warming potential incl biogenic carbon (CO ₂ eq.)	-969.4	1,514.2	51.6	596.4	119.3
Acidification potential (SO ₂ eq.)	1.47	2.08	0.12	3.67	0.73
Eutrophication potential (PO ₄ ³⁻ eq.)	0.42	0.98	0.13	1.53	0.31
Photochemical oxidant formation potential (C ₂ H ₄ eq.)	0.15	0.33	-0.01	0.48	0.10

USE OF RESOURCES

The following table presents the total resources used in the upstream, core and downstream phases for three selected grammages representing a low, medium and high grammage within the product range. Data for the calculation is taken from the actual production of the product during 2015, without any corrections for production irregularities between grammages.

	UPSTREAM	CORE	DOWNSTREAM	TOTAL	UNIT
PURE DESIGN 130 GSM (27 lb/MSF)					
Material resources, renewable					
Biomass	539			539	kg/tonne
Other	173.5	1.9	10.5	185.9	kg/tonne
Material resources, non-renewable					
Gravel	48.3	14.7	1.4	64.4	kg/tonne
Inert rock	50.2	0.36	0.072	50.7	kg/tonne
Limestone (calcium carbonate)	159.5	0.44	0.010	159.9	kg/tonne
Sodium chloride (rock salt)	33.5	0.33	0.012	33.9	kg/tonne
Other	19.6	8.6	0.22	28.5	kg/tonne
Energy resources, renewable					
Energy from biomass	345.0	14,389.0	36.5	14,770.5	MJ/tonne
Energy from hydropower	210.8	1,370.1	50.7	1,631.6	MJ/tonne
Other	104.1	2.5	21.9	128.4	MJ/tonne
Energy resources, non-renewable					
Crude oil (resource)	54.1	34.8	7.1	96.0	kg/tonne
Hard coal (resource)	21.4	1.4	3.5	26.3	kg/tonne
Natural gas (resource)	43.3	1.8	1.3	46.4	kg/tonne
Uranium (resource)	1.9	0.1	0.3	2.3	g/tonne
Other	16.5	0.7	9.5	26.6	kg/tonne
Secondary resources					
Electricity use at manufacturing		643.0		643.0	kWh/tonne
Water use					
Total water use	33.8	107.4	0.2	141.4	m ³ /tonne
Water use at manufacturing		87.4		87.4	m ³ /tonne



PURE DESIGN 145 GSM (30 lb/MSF)	UPSTREAM	CORE	DOWNSTREAM	TOTAL	UNIT
Material resources, renewable					
Biomass	570			570	kg/tonne
Other	164.9	1.9	10.5	177.3	kg/tonne
Material resources, non-renewable					
Gravel	45.7	14.7	1.4	61.8	kg/tonne
Inert rock	47.4	0.36	0.072	47.9	kg/tonne
Limestone (calcium carbonate)	141.2	0.44	0.010	141.6	kg/tonne
Sodium chloride (rock salt)	32.2	0.31	0.012	32.6	kg/tonne
Other	16.0	8.7	0.22	24.9	kg/tonne
Energy resources, renewable					
Energy from biomass	374.5	14,668.4	36.5	15,079.4	MJ/tonne
Energy from hydropower	198.1	1,377.5	50.7	1,626.3	MJ/tonne
Other	100.3	2.5	21.9	124.7	MJ/tonne
Energy resources, non-renewable					
Crude oil (resource)	49.9	33.3	7.1	90.2	kg/tonne
Hard coal (resource)	18.4	1.4	3.5	23.2	kg/tonne
Natural gas (resource)	38.4	1.7	1.3	41.4	kg/tonne
Uranium (resource)	1.8	0.1	0.3	2.2	g/tonne
Other	14.7	0.6	9.5	24.8	kg/tonne
Secondary resources					
Electricity use at manufacturing		646.0		646.0	kWh/tonne
Water use					
Total water use	29.8	107.9	0.2	137.8	m ³ /tonne
Water use at manufacturing		87.8		87.8	m ³ /tonne
PURE DESIGN 200 GSM (41 lb/MSF)					
Material resources, renewable					
Biomass	623			623	kg/tonne
Other	152.2	2.0	10.5	164.6	kg/tonne
Material resources, non-renewable					
Gravel	45.8	14.7	1.4	61.9	kg/tonne
Inert rock	44.2	0.36	0.072	44.6	kg/tonne
Limestone (calcium carbonate)	113.4	0.45	0.010	113.8	kg/tonne
Sodium chloride (rock salt)	31.7	0.29	0.012	32.0	kg/tonne
Other	14.0	8.7	0.22	22.9	kg/tonne
Energy resources, renewable					
Energy from biomass	367.1	15,110.5	36.5	15,514.1	MJ/tonne
Energy from hydropower	189.4	1,394.5	50.7	1,634.6	MJ/tonne
Other	97.0	2.6	21.9	121.4	MJ/tonne
Energy resources, non-renewable					
Crude oil (resource)	53.6	31.0	7.1	91.7	kg/tonne
Hard coal (resource)	16.9	1.3	3.5	21.7	kg/tonne
Natural gas (resource)	40.7	1.6	1.3	43.6	kg/tonne
Uranium (resource)	1.7	0.1	0.3	2.1	g/tonne
Other	13.5	0.6	9.5	23.6	kg/tonne
Secondary resources					
Electricity use at manufacturing		654.0		654.0	kWh/tonne
Water use					
Total water use	24.2	109.7	0.2	134.0	m ³ /tonne
Water use at manufacturing		89.4		89.4	m ³ /tonne
WASTE					
		PURE DESIGN 130 GSM (27 lb/MSF)	PURE DESIGN 145 GSM (30 lb/MSF)	PURE DESIGN 200 GSM (41 lb/MSF)	UNIT
Hazardous waste		0.10	0.09	0.09	kg/tonne
Other waste		340	306	247	kg/tonne



ADDITIONAL ENVIRONMENTAL INFORMATION: POTENTIAL ENVIRONMENTAL GAIN

Waste minimisation

All products produced at the Gävle mill are based on primary fibres with high strength properties enabling reduction of packaging weight.

Recyclability and recovery

Pure Design is recoverable through material recycling and energy recovery in accordance with the material requirements in EN 13430:2004 and EN 13431:2004.

Waste handling

All board and paper products produced by BillerudKorsnäs meet the targets specified in the EU's waste management hierarchy within the EU Waste Framework Directive 2008/98/EC as well as the essential requirements of the EU Packaging Waste Directive 94/62/EC.

Biodegradability

BillerudKorsnäs products are based on pulp consisting of cellulose, hemicellulose and some lignin which will be degraded by micro-organisms in nature. The decomposition time required depends on several factors such as temperature, humidity, microbiological activity, and pH. For a product to be classified as

biodegradable, at least 90% shall be biodegraded under aerobic conditions, according to the standard EN 13432:2000. As this varies between products and grammages, more information is provided by BillerudKorsnäs upon request.

Uptake of carbon dioxide in growing forests

Carbon stocks are increasing in Swedish forest ecosystems, mainly in the living biomass, due to the fact that the forest growth rate is higher than the harvest rate. The high growth rate is a result of silvicultural legislation and sustainable forest management practices. The long-term forest management is to a large extent driven by the demand for round wood from the forest industry. According to the Swedish Environmental Protection Agency, an amount corresponding to more than 80% of all greenhouse gas emissions in Sweden 2015 was captured by the net forest growth. Future scenarios for harvest rates in Sweden over the next 20 years conclude that the harvest rate will remain significantly lower than the growth rate.

BILLERUDKORSNÄS' ENVIRONMENT TARGET AREAS

BillerudKorsnäs is actively pursuing improvement to minimize the environmental impact from all parts of the operations. It is BillerudKorsnäs' vision to entirely phase out fossil fuels from the production. To this end, the company replaces fossil fuels with bioenergy and continually invests in process optimization to decrease the use of resources and increase energy efficiency. BillerudKorsnäs' climate related targets were in late 2017 submitted for approval by the Science Based Targets initiative. The approval scientifically ensures that the company contributes to the global work to minimize greenhouse gas emissions and to combat global warming. Updated information is found on BillerudKorsnäs' website.

Fossil-free production in Sweden

- The proportion of biofuels used in the manufacturing processes shall be further increased, from 97.6% as in 2015, in order to get fossil fuels entirely phased out at all Swedish production sites.

Fossil-free transportation within Sweden

- The fuels used for BillerudKorsnäs' domestic truck transportation of wood and finished goods shall be fossil free.

Increased energy efficiency

- The amount of energy used in production shall be lowered. The energy efficiency is measured as the energy use per tonne of product produced.



DEFINITIONS

Acidification

Decrease of the pH value in terrestrial and water systems.

CTMP and BCTMP

CTMP is a kind of unbleached pulp, according to the production process a chemi-thermomechanical pulp. BCTMP is the same type but bleached.

Eutrophication

Eutrophication is the disturbance of the nutritional balance in the soil and waters due to an added amount of nutrition. In aquatic systems, this leads to increased production of biomass, which may lead to oxygen deficiency and fewer living organisms.

Global warming potential

Global warming is caused by increases in the atmospheric concentration of carbon dioxide (CO₂) and other greenhouse gases, such as methane and nitrous oxide, that absorb and reflect heat. The global warming potential (GWP) is declared as CO₂ equivalents. The amount of biogenic carbon (CO₂eq.) presented is captured from the atmosphere by forest growth during the upstream phase and stored in the specific product as carbon until it is released again during later phases. Carbon is still stored in the product when it reaches the customer.

Hazardous waste

Wastes such as chemical waste, used oil, soot and radioactive waste from the production of nuclear power are classified as hazardous.

Photochemical oxidant formation

Hydrocarbons and volatile organic carbons (VOCs) contribute to ground level ozone formation, which has toxic effects on humans and vegetation.

PCR

Product Category Rules specify Environmental Product Declaration requirements for a specified sector or product category.

See www.environdec.com

Uptake of carbon dioxide in growing forests

In photosynthesis, carbon dioxide from the atmosphere is removed and stored in the growing biomass. In Sweden, the forest growth rate is higher than the harvest rate, in forest land leading to a net removal of CO₂ from the atmosphere.

Water use

Water use at manufacturing is the total amount of water used for cooling and the production process at the board and paper mill. Water use in upstream, core, and downstream phases is the total amount of water used for all processes related to the product.

REFERENCES

Swedish Environmental Protection Agency

National Inventory Report Sweden 2017, Greenhouse Gas Emission Inventories 1990–2015

IVL report: Life cycle assessment of BillerudKorsnäs virgin fiber-based packaging materials, December 2017

VERIFICATIONS

EPD Program: The International EPD® System

Note: EPDs from different programs may not be comparable

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Europe

Data reference year: Production of pulp and paper/board–2015

Production of CTMP–2015

Product Category Rules (PCR) review was conducted by: The Technical Committee of the International EPD® System. Chair: Massimo Marino

Contact via info@environdec.com.

PCR moderator: Lucia Rigamonti.

PCR: Product category rules for processed paper

and paperboard (CPC 3214), Version 2016-04-01

Independent verification of the data according to

ISO14025 (external): Martin Erlandsson (martin.

erlandsson@ivl.se): 2018-02-16

Accredited or approved by: The International EPD® System

For more information: www.environdec.com

CONTACT

Mikael Andersson

Senior Vice President Division Board

Phone +46 (0) 555 410 00

For further information visit

www.billerudkorsnas.com

We challenge
conventional packaging
for a sustainable future

