BILLERUD

BILLERUD FLUTE

Environmental Product Declaration

EPD®

In accordance with ISO 14025:2006

Programme:
The International EPD System,
www.environdec.com

Programme operator:
EPD International AB

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An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com

Content

EPD®
THE INTERNATIONAL EPD® SYSTEM

This is an Environmental Product Declaration for Billerud Flute, 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 2010:14 version 3.1 of 2022-07-07 (UN CPC 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.

Packaging Tomorrow

TOMORROW. It’s where challenges lie, but also opportunities. We believe that all aspects of packaging can be improved and contribute to a sustainable future. Every decision we make is guided by the promise to create a better tomorrow.

Thanks to our industry know-how and production expertise we’re able to develop sustainable packaging materials without compromising product performance. That’s why we can challenge and inspire our customers to make the best and most sustainable packaging choices with confidence.

We are here to lead the way, not just when it comes to challenging conventional packaging – but challenging conventional business.

It’s only when we have tomorrow in mind that you’ll do your very best today.

About Billerud

As a leading supplier of virgin fiber-based paper and packaging materials, and with sustainability in our essence, we are passionately committed to our customers and their businesses, every day. With our know-how and industry expertise, we are here to inspire and make them feel confident in making the best packaging choices that help reduce their climate impact.

Our roots and our proud history in the forestry and paper industry go back more than 150 years.

Our starting point is the firm belief that virgin fibers from slow growing Northern forests make for some of the best performing packaging materials. Materials that we, together with our customers, transform into packaging solutions that are not only renewable and sustainable, but that also create value in the form of outstanding product performance, consumer attraction and optimized total cost efficiency.

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.

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. Building a future where lighter, stronger, more durable and sustainable packaging is the natural choice takes dedication, expertise, teamwork and perseverance.

This is a journey that we are making together with our talented coworkers and our customers.

We are here to lead the way, not just when it comes to challenging conventional packaging – but challenging conventional business.

It's only when you have tomorrow in mind, that you'll do your very best today.

Billerud in short

Industries we serve

Food & Beverages
Consumer & Luxury
Industrial
Medical & Hygiene

Sustainable foundation

Sustainable wood supply
Responsible supply chain
Engaging workplaces
Resource-efficient production
Community engagement
Responsible business

8

Application areas

Fluting
Liner
3D Paper
Cartonboard
Kraft paper
Graphical paper
Sack Paper
Liquid Packaging Board

Production units

9

Escanaba
Frövi/Rockhammar
Gruvön
Gävle
Karlsborg
Pietarsaari
Skärblacka
Quinnesec
Wisconsin Rapids

Product information

GRUVÖN

Our production facility Gruvön is located in Grums, thirty kilometers west of Karlstad in Värmland, is a world-leading manufacturer of fluting Billerud Flute®, one of the world's strongest semi-chemical fluting, liners, kraft paper, sack paper, formable paper FibreForm®, cartonboard and liquid packaging board, intended for users with very high demands on efficient, creative and functional packaging solutions. In Gruvön, market pulp is also produced. The mill is certified according to ISO 14001, ISO 50001, ISO 9001, and FSSC 22000. In Gruvön there is also a development center Box Lab and Pack Lab, with expert knowledge in packaging optimization.

BILLERUD FLUTE

Billerud Flute is a superior semi-chemical fluting based on 100% virgin fibers with extremely high strength for boxes exposed to long demanding transport chains and humidity. It has high creep resistance which means high strength and durability over time with constant load in tough climates. Billerud Flute is mainly used for food applications including fruit and vegetables and for premium heavy-duty goods. I can also be used as center liner in double wall constructions.

SUSTAINABILITY

Sweden has a long history of sustainable forest management including active work to enhance biodiversity and have been working with forest certification systems since mid-1990. About 70 % of Sweden is covered by forests and about one fourth of the forest area is exempt from forestry, either protected or voluntary set asides areas. The company’s production units are certified according to FSC® Chain of Custody and PEFC™, which both demonstrate traceability. All of our paper and board are recyclable according to PTS.

PRODUCT SAFETY

Billerud Flute is produced in compliance with FDA and BfR food packaging norms. Based on information from our suppliers we state that no SVHC substances listed in the “Candidate List of Substances of Very High Concern” from the European Chemicals Agency are present in concentrations above 0.1% in our products. Nor do we intentionally add substances listed in Annex XIV or with relevant restrictions in Annex XVII during the manufacturing process.

The product is manufactured from virgin fibres with addition of chemicals that meet the relevant demands in FDA and BfR, and in accordance with good manufacturing practice. For further information please contact us at Billerud.

GRUVÖN – THE PRODUCTION SITE FOR BILLERUD FLUTE

Programme information

Declaration owner	Billerud AB
EPD Programme operator	EPD International AB Box 210 60, SE-100 31 Stockholm, Sweden www.environdec.com info@environdec.com
Geographical area	Europe
Reference year	2021
Product Category Rules (PCR)	PCR 2010:14 Processed Paper and Paperboard, Version 3.1
PCR review was conducted by	The Technical Committee of the International EPD® System. The review panel may be contacted via info@environdec.com
Third-party verification	Independent third-party verification of the declaration and data, according to ISO 14025:2006, via EPD verification by individual verifier
Third party verifier	Tom Gloria, Industrial Ecology Consultants
Approved by	The International EPD System
Procedure for follow-up of data during EPD validity involves third-party verfier	No

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but from different programmes may not be comparable.

Content declaration

PRODUCT COMPONENTS	Kg	%
Semi-chemical pulp	850	85
Kraft pulp	50	5
Moisture	100	10
TOTAL	1000	100

DISTRIBUTION PACKAGING	Kg	%
Wrapping	2.68	51
Containerboard	1.97	37
Core	0.66	12
TOTAL	5.37	100

LCA Information

Functional unit / declared unit: One tonne (1,000 kg) of Billerud Flute (10% moisture).

Time representativeness: Specific data were collected from 2021, and generic data are representative of the year 2021.

Database, LCA software and other technical information: The LCA model is created using the Sphera Solutions “Managed LCA Content” Software and LCI database (version 2022.2) as well as Ecoinvent 3.8 database. The impact models used are those indicated in EN 15804+A2 and EN 15804+A1. The characterization models and factors to use for the default impact categories are available on *www.environdec.com/impact-categories*.

Description of system boundaries: Cradle-to-gate with waste management of transport packaging waste.

More information: All relevant raw materials and energy carriers used in manufacturing have been covered in the LCA calculations.

STANDARDS

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
- ISO 14040, LCA – Principles and framework

Lifecycle stages

UPSTREAM

Production of plants, energy wares used in forestry, pigments, additives and other chemicals, materials and substances, forestry (production of plants, seeds or cuttings for cultivation, soil preparation, logging and internal transports etc.), packaging used for transport of the raw materials to the core processes, electricity and fuels and other raw materials used in the core processes.

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.

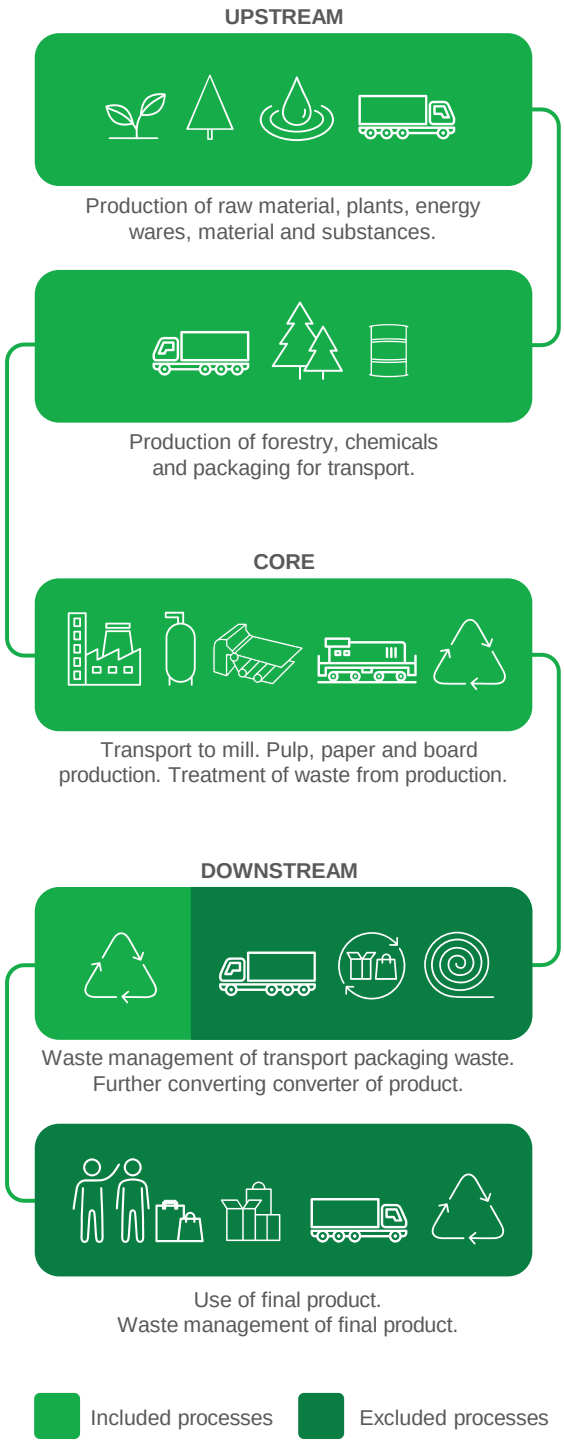
DOWNSTREAM

Waste management of transport packaging.

EXCLUDED STAGES

The following activities have excluded in the system boundaries:

- Business travel of personnel, as well as travel to and from work by personnel
- The manufacturing of production equipment, buildings and other capital goods. For upstream processes, such as electricity production, these activities are however included
- Transportation of the product from final manufacturing to an average converter or customer, processing at the average converter, transportation to the customers and use of final product, as well as waste management of the final product

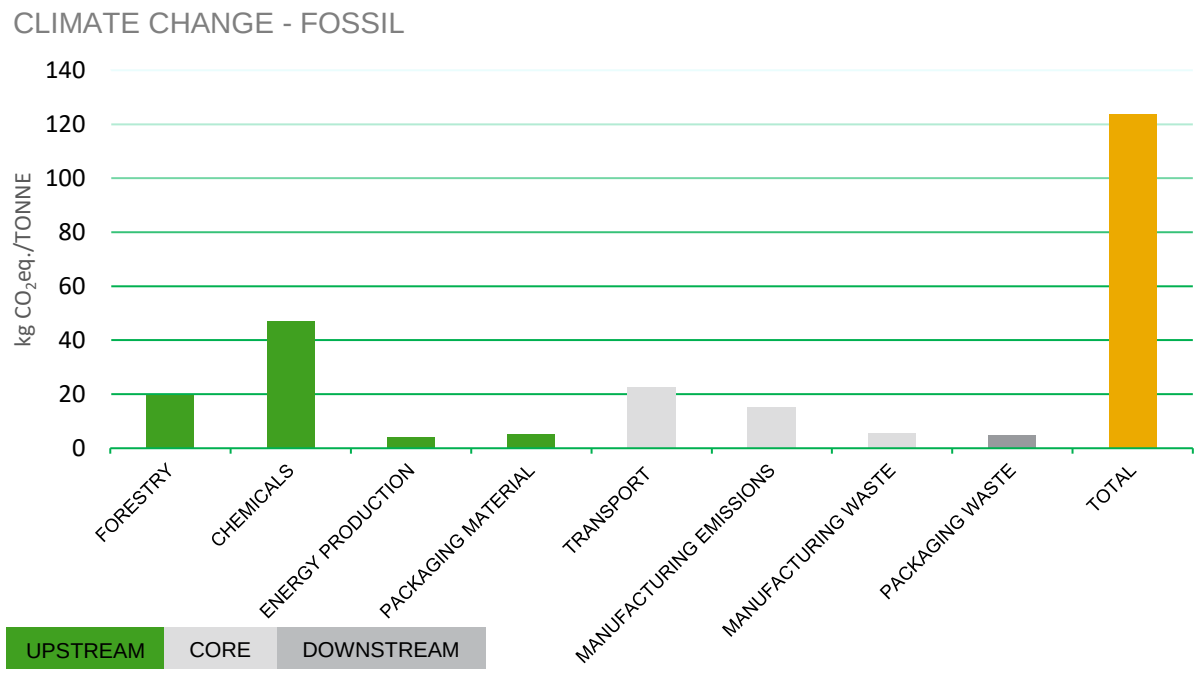


Environmental performance

The environmental impact is presented in the following graph and tables.

The declared unit is one tonne (1,000 kg) of the product at the production gate with added waste management of packaging waste downstream.

The carbon footprint (greenhouse gas emissions over the life cycle) is presented in the following graph as global warming potential 100 years fossil emissions (GWP100) in kg CO_2 equivalents per tonne product.



ENVIROMENTAL IMPACT POTENTIALS

The table presents the potential environmental impact per declared unit as defined by the product category rules for processed paper and paperboard (CPC 3214). The impact models used are those indicated in EN 15804+A2. Data for the calculation is taken from the actual production during 2021.

BILLERUD FLUTE	ACRONYMS	UPSTREAM	CORE	DOWNSTREAM	TOTAL	UNIT
Climate Change - fossil	GWP-fossil	7,04E+01	4,31E+01	1,01E+01	1,24E+02	kg/tonne
Climate Change - biogenic	GWP-biogenic	-2,30E+03	9,46E-02	1,68E+03	-6,15E+02	kg/tonne
Climate Change - land use and land use change	GWP-luluc	7,59E-01	8,34E-02	2,53E-02	8,68E-01	kg/tonne
Climate Change - total	GWP-total	-2,23E+03	2,06E+01	1,71E+03	-5,00E+02	kg/tonne
Ozone depletion	ODP	8,15E-06	1,34E-12	8,86E-12	8,15E-06	kg/tonne
Acidification	AP	7,50E-01	2,50E-01	7,59E-01	1,76E+00	kg/tonne
Eutrophication aquatic freshwater	EP-freshwater	7,24E-03	6,02E-05	2,74E-02	3,47E-02	kg/tonne
Eutrophication aquatic marine	EP-marine	7,96E-02	1,25E-01	5,63E-01	7,68E-01	kg/tonne
Eutrophication terrestrial	EP-terrestrial	8,08E-01	1,38E+00	4,18E+00	6,37E+00	kg/tonne
Photochemical ozone formation	POCP	3,56E-01	3,35E-01	1,09E+00	1,78E+00	kg/tonne
Depletion of abiotic resources - minerals and metals	ADP-elements	4,06E-04	8,92E-07	3,27E-07	4,08E-04	kg/tonne
Depletion of abiotic resources - fossil fuels	ADP-fossil	6,71E+03	2,75E+02	1,02E+02	7,09E+03	kg/tonne
Water scarcity	Water scarcity	2,88E+02	1,50E-01	-2,55E+02	3,38E+01	m^3/tonne

CONVERSION FACTOR

To convert the result from kg/tonne product to kg/1000 m^2, the following formula shall be used:

$$Y = \frac{X \cdot B}{1000}$$

$Y = \text{kg/tonne product}$
$X = \text{kg } CO_2\text{/tonne product}$
$B = \text{g/m}^2 \text{ (product grammage)}$

USE OF RESOURCES

The following tables present the total resources used in the upstream, core and downstream stages. The impact models used are those indicated in EN 15804+A1. Data for the calculation is taken from the actual production during 2021.

BILLERUD FLUTE	ACRONYMS	UPSTREAM	CORE	DOWNSTREAM	TOTAL	UNIT
Use of resources						
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	PERE	2,52E+04	1,34E+01	9,69E+00	2,52E+04	MJ/tonne
Use of renewable primary energy resources used as raw materials	PERM	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MJ/tonne
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	PERT	2,52E+04	1,34E+01	9,69E+00	2,52E+04	MJ/tonne
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	PENRE	6,71E+03	2,76E+02	1,02E+02	7,09E+03	MJ/tonne
Use of non-renewable primary energy resources used as raw materials	PENRM	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MJ/tonne
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	PENRT	6,71E+03	2,76E+02	1,02E+02	7,09E+03	MJ/tonne
Use of secondary material	SM	0,00E+00	0,00E+00	0,00E+00	0,00E+00	kg/tonne
Use of renewable secondary fuels	RSF	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MJ/tonne
Use of non-renewable secondary fuels	NRSF	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MJ/tonne
Net use of fresh water	FW	6,26E+01	1,75E-02	-5,78E+01	4,90E+00	m^3/tonne
Waste						
Hazardous waste disposed	HWD	3,31E-04	5,17E-09	7,71E-09	3,31E-04	kg/tonne
Non-hazardous waste disposed	NHWD	7,69E-01	4,15E-02	6,21E+01	6,30E+01	kg/tonne
Radioactive waste disposed	RWD	2,01E+00	1,15E-03	9,63E-04	2,01E+00	kg/tonne
Output flows						
Components for re-use	CRU	0,00E+00	0,00E+00	0,00E+00	0,00E+00	kg/tonne
Materials for recycling	MFR	0,00E+00	0,00E+00	0,00E+00	0,00E+00	kg/tonne
Material for energy recovery	MER	0,00E+00	0,00E+00	0,00E+00	0,00E+00	kg/tonne
Exported electrical energy	EEE	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MJ/tonne
Exported thermal energy	EET	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MJ/tonne

IMPACT CATEGORIES

Acidification potential

Acidification potential is measure of emissions that cause acidifying effects to the environment. It is a measure of the decrease of the pH value in terrestrial and water systems. Decreasing PH values may cause forest decline, fish mortality, and the deterioration of building material.

Depletion of resources

Abiotic depletion potential is a measure of the consumption of non-renewable resources that leads to a decrease in the future availability.

Eutrophication potential

Eutrophication is the disturbance of the nutritional balance in the soil and waters due to an added amount of nutrition, the most important being nitrogen (N) and phosphorus (P). In aquatic systems, this leads to increased production of biomass, which may lead to oxygen deficiency, undesirable shift in species composition and it may also render surface waters unacceptable as a source of drinking.

Global warming potential

The global warming potential (GWP) is declared as CO_2 equivalents and is caused by increases in the atmospheric concentration of carbon dioxide (CO_2) and other greenhouse gases, such as methane and nitrous oxide, that absorb and reflect heat.

The amount of biogenic carbon 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 in the downstream module. The sum of the sequestered and emitted biogenic carbon during the product life cycle is thus zero in a cradle-to-grave LCA. This study is cradle-to-gate with waste management of transport packaging waste, i.e., carbon is still stored in the product when it reaches the customer. While forest management activities might result in changed carbon storage (above and below ground) in the forest, the potential climate impact of this change is not included in the EPD.

Ozone depletion potential

Ozone depletion potential quantifies how emissions contribute to the degradation (i.e., thinning) of the ozone layer in the stratosphere (increasing the "ozone hole"). An intact ozone layer in the stratosphere hinders harmful UV radiation.

Photochemical ozone creation potential

Photochemical ozone creation potential is a measure of an individual VOC, relative to that of other VOCs, to form ozone by reaction with oxides of nitrogen in the presence of sunlight. Ground level ozone may cause injury or damage to ecosystems, crops and human health.

Water scarcity

Water scarcity is based on a method called AWARE (available water remaining) and is based on the inverse of the difference between water availability per area and demand per area. It quantifies the potential of water deprivation, to either humans or ecosystems.

References & Contact

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BILLERUD

Packaging Tomorrow

Billerud provides paper and packaging materials that challenge conventional packaging for a sustainable future. We are a global leader in superior paper and packaging materials made from virgin fibers, and we're passionately committed to sustainability, quality and customer value. We serve customers in more than 100 countries with nine production units in Sweden, USA and Finland and around 6,100 employees in over 13 countries. Billerud is listed on the Nasdaq Stockholm.

www.billerud.com

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