Reducing carbon footprint in pharma packaging

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Metsä Board – the leading producer of premium fresh fibre paperboards

Strong market position:

#1 Folding boxboards and white kraftliners in Europe
Coated white kraftliners globally

Our customers
are brand owners, retailers, converters, corrugated box manufacturers and merchants

We deliver to approximately
100 countries

2,250 employees

Sales of EUR
2.5 billion

Paperboard capacity
2.0 million tonnes

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Part of Metsä Group – with a unique value chain from pure Northern European wood fibre to high-quality end products

Metsäliitto Cooperative | The Group's parent company | Owned by over 90,000 Finnish forest owners

METSÄ FOREST

Wood supply and forest services

METSÄ WOOD

Wood products

METSÄ FIBRE

Pulp and sawn timber

METSÄ BOARD*

Paperboard

METSÄ TISSUE

Tissue and greaseproof papers

METSÄ SPRING | Innovation company

Metsä

*) Shares listed on the Nasdaq Helsinki

Metsä Board’s premium lightweight paperboards

FOLDING BOXBOARDS

FOOD SERVICE BOARDS

WHITE KRAFTLINERS

Our paperboards are made from pure and fully traceable fresh wood fibre.
They are recyclable and compostable according to DIN EN13432.

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World population and consumption keep growing boosting the demand for packaged goods.

Brand owners seek for more sustainable solutions

Climate change affects lives on Earth.

Consumers look for great experiences – but not at the cost of nature

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The European cartonboard and folding carton industry has succeeded in reducing its carbon footprint by

24%

since 2018.*

*Source:
The Carbon Footprint of Carton Packaging 2023,
carried out by RISE (Research Institutes of Sweden) for
Pro Carton (European Association of Carton and Cartonboard manufacturers)

Carton packaging not only meets the demands of a bio-based and circular economy but has a key role in the transition to a **low carbon economy**.

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We work to mitigate climate change

BY THE END OF

2030

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mills will not use any fossil energy.

products will be made entirely from fossil-free materials.

87% of our total energy consumption is already based on fossil-free energy (2022).

The Science Based Targets initiative has approved our emission reduction targets as consistent with actions required to meet the Paris Agreement goal to limit global warming to 1.5°C.

BUSINESS AMBITION FOR 1.5°C

Roadmap to fossil free mills by the end of 2030

Target:
100%

100%
90%
80%

Starting point:
82%

2018

RENEWAL OF THE HUSUM PULP MILL
Phase 1: New recovery boiler and turbine

KYRO
Peat is replaced by renewable energy

SIMPELE
Peat is replaced by renewable energy

2022

KYRO
The power plant's new turbine and generator

JOUTSENO
Natural gas is replaced by biogas or electricity

HUSUM, KEMI, KYRO, TAKO, SIMPELE
Liquefied petroleum gas (LPG) or natural gas in the coating drying will be replaced e.g. with biogas or electricity

HUSUM, KASKINEN, KYRO, SIMPELE
The power plant's backup fuels will be replaced with renewable fuels

KASKINEN
Process fuels in chemicals recovery will be replaced with renewable fuels

TAKO
In steam production, natural gas is replaced by, e.g. electricity

RENEWAL OF THE HUSUM PULP MILL
Phase 2: New fibre line

2030

Share of fossil free energy out of total energy. When the share is 100%, Metsä Board's Scope 1 and 2 emissions are zero.

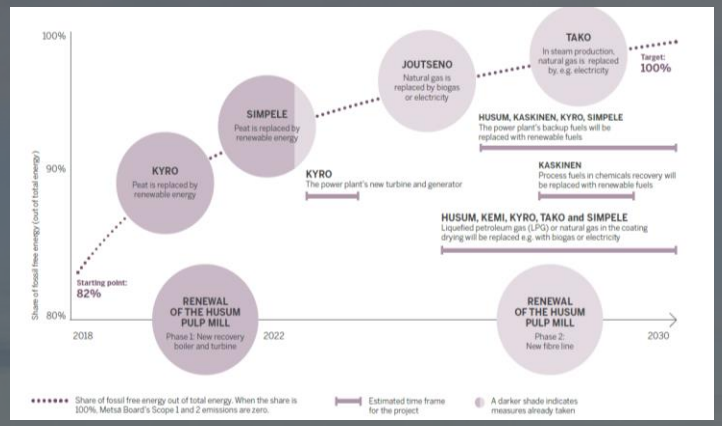
Estimated time frame for the project

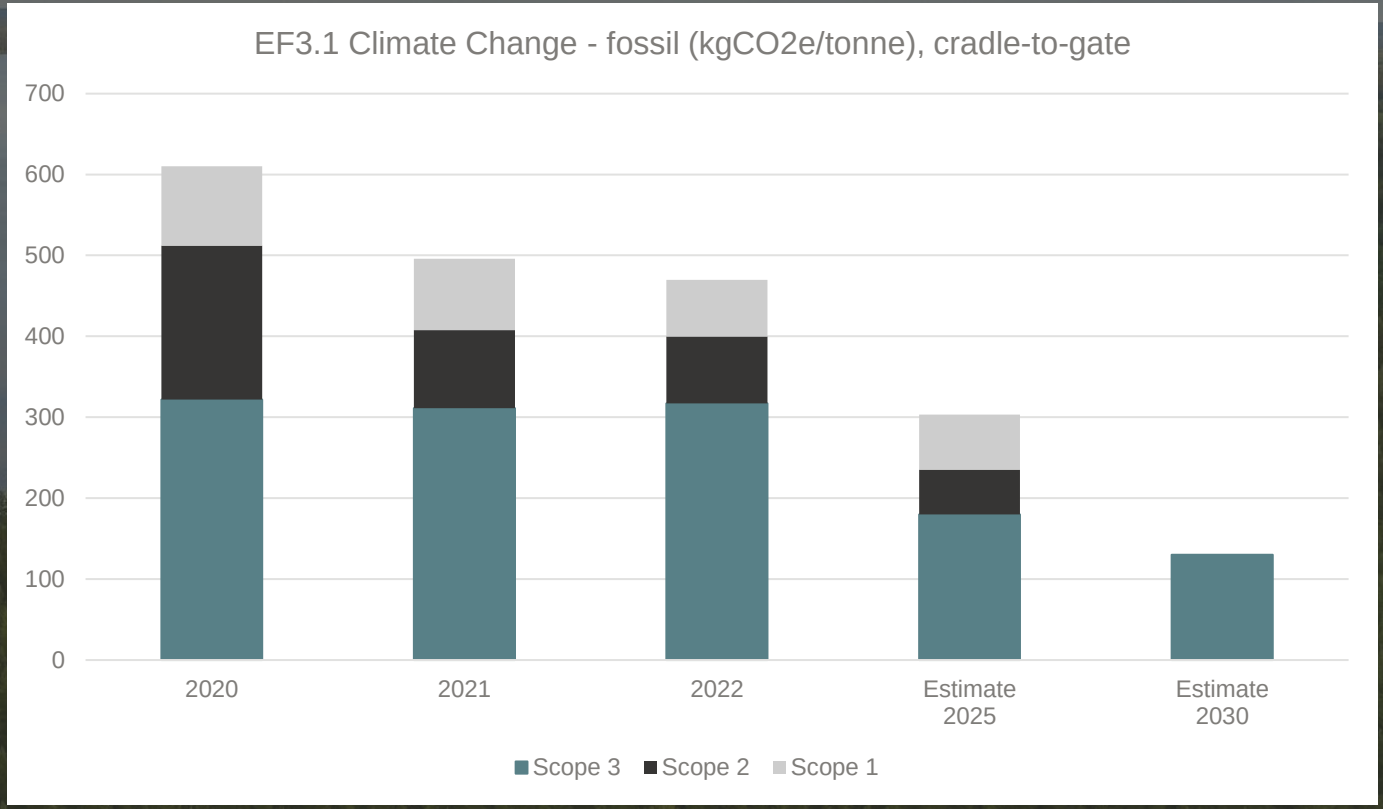
A darker shade indicates measures already taken

By the end of 2030

Reduction of fossil CO_2 emissions of **MetsäBoard Pro FBB Bright** from Äänekoski Mill

- Metsä Board's fossil free roadmap 2030 enables reduction of **Scope 1 & Scope 2** emissions to zero
- **Scope 3** emissions' reduction depends on our suppliers' emission reduction activities (e.g. raw materials, logistics) and we work actively together with them towards 2030 and beyond





Two major factors influencing CO_2 footprint of paperboard packaging

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Two major factors influencing CO_2 footprint of paperboard packaging

1

Fossil or non-fossil-based energy

Nordic fresh fibre paperboard production uses mainly renewable and fossil free energy

In many other regions of the world, the main energy sources are still fossil-based

2

Efficient material use, lightweighting

Using less material to produce a required type of packaging

Less weight to be transported throughout the supply chain, with lower transportation emissions

Less waste after the product use

Reduce climate impact without compromising the protective properties of the package

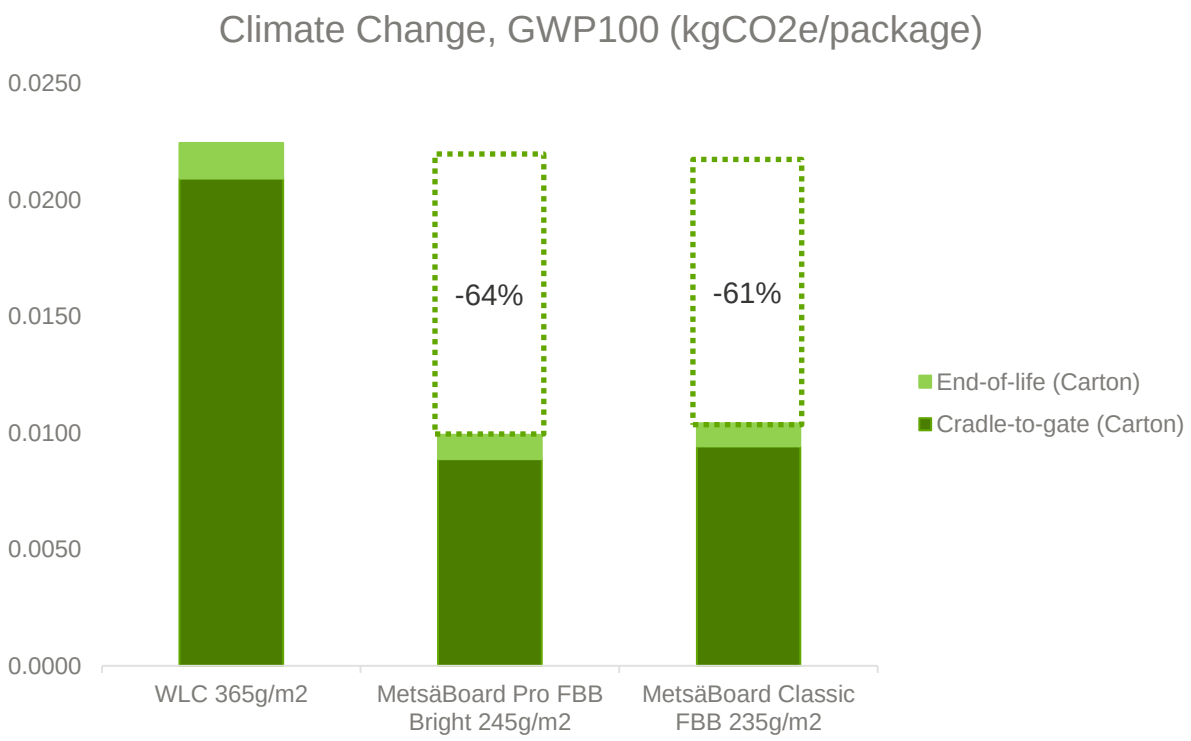
- Metsä Board’s **lightweight folding boxboards** are made from wood fibres sourced from sustainably managed Northern forests
- Production of Metsä Board’s folding boxboards is highly **resource efficient** and uses **high share of fossil free energy**, which enable a lower carbon footprint of the paperboards
- This helps brands to design packaging that is considerably lighter than those made with other types of paperboards while retaining the strength and functional properties of heavier grades.

Carbon-footprint reduction potential up to 40-60%

- Scope 3 plays a big role in pharma companies' emission reduction target setting, including raw materials used in brand packaging
- Metsä Board's 2030 fossil free targes help customers reduce their carbon footprint. However, we can do more already today:
  - **We can offer solutions reducing carbon footprint of packaging and contribute to brand owner's emission reduction targets**
- Carbon footprint assessments conducted demonstrate carbon-footprint reduction potential up to 40-60%, and even more

Switching from white lined chipboard to MetsäBoard folding boxboard can reduce carbon footprint over 60%

- Cradle-to-gate + EoL impacts of a carton made of MetsäBoard Pro FBB Bright and MetsäBoard Classic FBB are between 61 to 64% lower when compared to a white lined chipboard representative of European market
  - 33-35% lighter paperboard and packaging
  - High share of fossil free energy in paperboard production

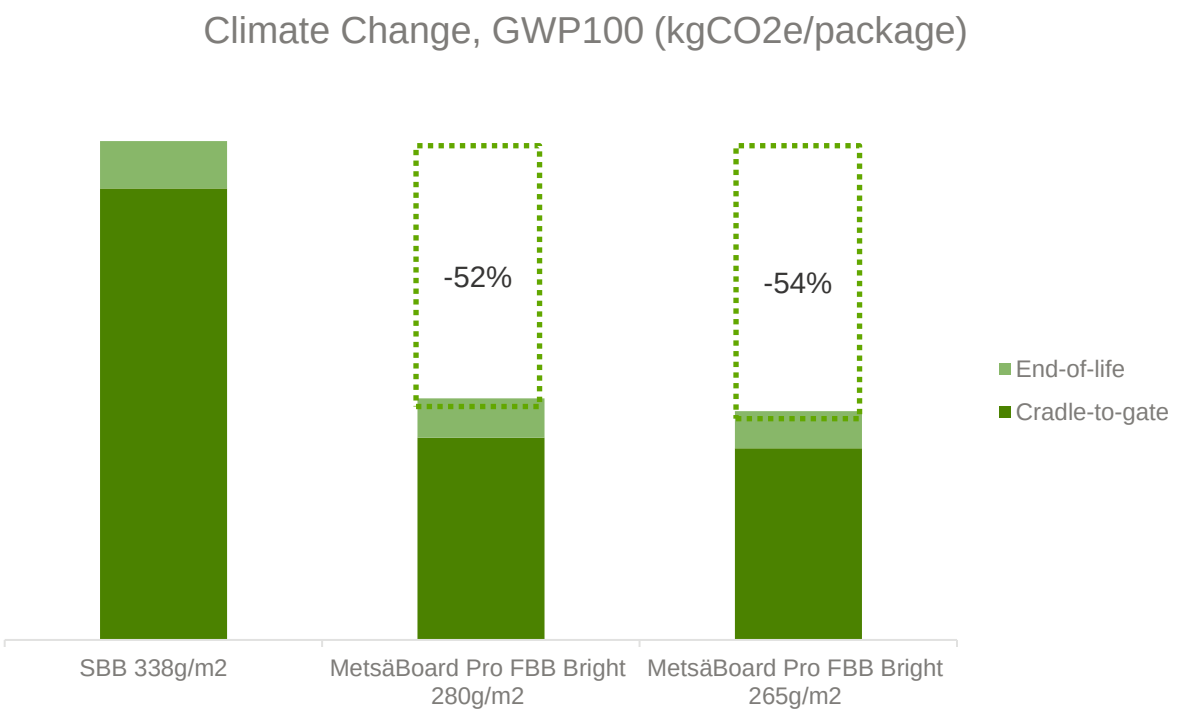


Climate Change impact methodology: EF3.0 Climate Change [kg CO2 eq.] The process of converting of paperboard to carton and downstream transportation is excluded.

MetsäBoard Pro FBB Bright and MetsäBoard Classic FBB primary data from 2022, secondary data from LCA for Experts and ecoinvent 3.8. Based on EPD PCR for Processed Paper and Paperboard.
WLC (RER: White-lined chipboard (WLC), integrated mill, cut-off, Sphera LCA for Packaging)
EoL scenarios for carton 75% recycled, 10% incinerated, 8% composted, 7% landfilled. Recycling rates are based on PEFCR Guidance Annex C (CFF_Default_Parameters_March2018)

Switching from solid bleached board to MetsäBoard folding boxboard can reduce carbon footprint over 50%

- Cradle-to-gate + EoL impacts of a carton made of MetsäBoard Pro FBB Bright are between 51 to 53% lower when compared to a solid bleached board representative of European market
  - 17 - 22% lighter weight of paperboard and packaging
  - High share fossil free energy in paperboard production



Climate Change impact methodology: EF3.1 Climate Change [kg CO2 eq.] . The process of converting of paperboard to carton and downstream transportation is excluded.

MetsäBoard Pro FBB Bright primary data from 2022, secondary data from LCA for Experts and ecoinvent 3.8. Based on EPD PCR for Processed Paper and Paperboard
SBB (Sphera LCA for Packaging, RER: Solid Bleached Board (SBB), production mix)
EoL scenarios for carton 75% recycled, 10% incinerated, 8% composted, 7% landfilled. Recycling rates are based on PEFCR Guidance Annex C (CFF_Default_Parameters_March2018)

Customer collaboration

Packaging design collaboration

Co-creation of new resource saving and circular packaging solutions

Virtual simulation

Simulation of packaging performance to optimize materials and design

Sustainability Services

For **carbon footprint calculations** and other tools to support data-based material selection

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Together we make
the perfect package

WLC vs. FBB

	Current solution		New solutions			
Materials and grammage	White lined chipboard packaging	365 g/m2	MetsäBoard Pro FBB Bright packaging	245 g/m2	MetsäBoard Classic FBB packaging	235 g/m2
Caliper	518 µm		415 µm		425 µm	
Stiffness Taber 15º CD	7.2 mNm		8.1 mNm		8.4 mNm	
Stiffness Taber 15º MD	-		16.5 mNm		17.0 mNm	
Weight of packaging solution (g)	16.9 g		11.4 g (32.9% lighter)		10.9 g (35.6% lighter)	
Process information / Applied dataset(s)	RER: White-lined chipboard (WLC), integrated mill, cut-off Sphera LCA for Packaging		Primary data from own processes (2022), secondary data from GaBi and ecoinvent databases.		Primary data from own processes (2022), secondary data from GaBi and ecoinvent databases.	
EF 3.1 Climate change (kgCO2eq) of a packaging solution						
Cradle-to-gate	**0.0163**		**0.0053**		**0.0059**	
End-of-life scenario	Packaging: 75% recycled, 10% incinerated, 8% composted, 7% landfilled. Recycling rate based on EU PEFCR Annex C and other disposal rates are based on Eurostat 2021.					
End-of-life	**0.0015**		**0.0010**		**0.0010**	
Total climate impact	**0.0178**		**0.0063 (-64%)**		**0.0069 (-61%)**	

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SBB vs.FBB

	Current solution		New solutions			
Materials and grammage	solid bleached board packaging	338 g/m2	MetsäBoard Pro FBB Bright	280 g/m2	MetsäBoard Pro FBB Bright	265 g/m2
Caliper	408 µm		485 µm		455 µm	
Stiffness Taber 15º CD	11.3 mNm		11.6 mNm		10.0 mNm	
Stiffness Taber 15º MD	-		23.3 mNm		20.2 mNm	
Weight of packaging solution (g)	11.3 g		9.4 g (17.2% lighter)		8.9 g (21.6% lighter)	
Process information / Applied dataset(s)	RER: Solid Bleached Board (SBB), production mix Sphera LCA for Packaging		Primary data from own processes (2021), secondary data from GaBi and ecoinvent databases.		Primary data from own processes (2022), secondary data from GaBi and ecoinvent databases.	
EF 3.1 Climate change (kgCO2eq) of a packaging solution						
Cradle-to-gate	**0.0098**		**0.0044**		**0.0041**	
End-of-life scenario	Carton: 75% recycled, 10% incinerated, 8% composted, 7% landfilled. Recycling rate based on EU PEFCR Annex C and other disposal rates are based on Eurostat 2021.					
End-of-life	**0.0010**		**0.0009**		**0.0008**	
Total climate impact	**0.00108**		**0.0052 (-52%)**		**0.0049 (-54%)**	

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Background information on the assessment

Standards, tools and methodologies used

We at Metsä Board assess the life cycle impacts of our paperboards according to Environdec product category rules for processed paper and paperboard which are in conformity with ISO 14040(2006) and ISO 14044 (2006).

For comparative assertions we use a third party verified Sphera's LCA for Packaging software which methodological requirements are equally in conformity with the ISO standards. The purpose of this calculator is to create life cycle assessments of packaging solutions and compare them with alternative designs.

Although the results are comparative in nature and both Metsä Board's LCA model as well as Sphera's LCA for Packaging model has undergone external assurance, individual case studies have not been critically reviewed in accordance with ISO 14044 in order to support claims of environmental superiority of one product over another that are communicated to the public. Thus, this report is intended for internal use only. Nothing contained in this report constitutes a warranty, a guarantee of the performance of any packaging for any particular use, the provision of any service, or a waiver of any rights or remedies.

System boundaries used in comparison are either cradle-to-gate or cradle-to-gate + end-of-life. Cradle-to-gate assessment excludes the converting phase of packaging and focuses solely on the impacts of different materials used in packaging solutions. Jurisdictional waste statistics are used when assessing end-of-life impacts.

Background information on the assessment

EF 3.1 Climate change [kg CO2 equiv.]

A measure of greenhouse gas emissions, such as CO2 and methane. These emissions are causing an increase in the absorption of radiation emitted by the earth, magnifying the natural greenhouse effect. The indicator is calculated for a 100-year time horizon. This impact category only includes biogenic origin carbon when re-released in the form of other greenhouse gases such as methane, but uptake of CO2 during the plant's growth and release of the same at the End of Life are not considered.

Packaging products are typically a fast-moving consumer goods; therefore, any biogenic carbon sequestered during biomass growth in plant-based products such as paperboard, will be eventually re-released at end-of-life. For this reason, CO2 from biogenic sources was excluded from the results in this report. Biogenic carbon that converts into methane as well as land use and land use change is included into the climate change methodology.

Description adapted from LCA for Packaging (Sphera)

EF 3.1 – Environmental Footprint and the method is maintained by the European Commission. The use of this impact method is required to align the results from Sphera's LCA for Packaging with Metsä Board's own LCA results and allow comparison.

Glossary on the terminology used in the comparisons

EF 3.1 – Environmental Footprint and the method is maintained by the European Commission. The use of this impact method is required to align the results from Sphera's LCA for Packaging with Metsä Board's own LCA results and allow comparison

EPD – Environmental Product Declaration

PCR – Product Category Rules

Cradle-to-gate – An assessment of a partial product life cycle from resource extraction (cradle) to the factory gate (i.e., before it is transported to the consumer)

RER – Europe

Primary data – Data gathered from the actual manufacturing plant where product-specific processes are carried out

Secondary data - Data from commonly available data sources (e.g. databases)

Sphera LCA for packaging – Packaging calculator is a tool to to evaluate and understand the environmental impact of different packaging solutions

Sphera Managed LCA Content –LCA database with annually updated datasets managed by Sphera

Ecoinvent Database – LCA database with information on the environmental impacts of products and services managed by ecoinvent

End-of-life/EOL –scenario – Assumed disposal of packaging material under study

EU PEFCR Guidance (Annex C) – Default parameters (recycling rate) used in EU Product Environmental Footprint Category Rules (PEFCR) Circular Footprint Formula

Eurostat – Statistical office of the European Union