A greener, bluer planet

For many years, our operations have been designed around a circular business model. This means seeking closed-loop solutions, maximising resource efficiency and minimising waste, including CO_2 emissions. It also means supplying packaging that protects our customers' products and avoids packaging waste and litter. Our ambition is to achieve at least net zero CO_2 emissions by 2050.

24%
reduction of relative waste sent to landfill (since 2013)

43.9%
reduction of relative CO_2 emissions (since 2005)

36.9%
reduction of relative COD in water discharge (since 2005)

Planet 34-67

Our Planet Key Principles

We operate a circular business model using mostly post-consumer recycled raw material. The virgin fibre raw material we use is renewable and from a sustainable origin. We reuse or recycle side streams and we use renewable energy and strive for energy efficiency where we can. This circular approach increases resource productivity, adding to our competitiveness.

Our circular business model starts with sustainable primary raw materials. Our integrated approach to producer responsibility and paper recycling means that 76% of our raw material is recycled fibre. We use organic by-products as biofuel, circulate our process waters as many times as we can before treating it and returning it to the water system. We collaborate with local organisations to find alternative uses for the rejects we receive with our recovered paper deliveries that we cannot use in our processes.

In our product development phase, we work towards synergies within the whole value chain. For example, by designing mono-material packaging solutions, we create efficiencies in our customers' packaging lines and we improve the recyclability of the packaging after use.

Forests themselves are a closed-loop system, fundamental for local climate and water systems. When managed sustainably, they also provide a renewable source of raw materials for industry, function as a carbon storage and provide employment.

Urgency in responding to climate change continued to be the most important environmental topic in 2022. In its Sixth Assessment Report and related working group reports published in February and April of 2022, the Inter Governmental Panel on Climate Change ('IPCC') confirmed a 'code red for humanity', demonstrating society is not doing enough to deliver on its commitments. The UN's 2030 Agenda for Sustainable Development calls for action via 17 Sustainable Development Goals, and both the Paris Agreement and the EU have set tough carbon targets. By 2030, the Paris Agreement aims to limit climate change to under 2°C, and the European Commission during 2020 set ambitious targets for reducing net EU emissions by at least 55% by 2030 compared to 1990 levels.

Achieving these requires a shift from linear to circular economic models, creating an era of opportunity and a need for innovation. At the same time, all parts of society need to set common targets. With its net zero ambition, Smurfit Kappa is well placed to make these targets a reality and the SBTi validation of our target evidences the robustness of our climate strategy.

We announced our support of the recommendations of the TCFD in May 2020 and we included our first disclosure in the

2020 Annual Report. In 2021 and 2022, we have significantly developed our disclosure as outlined below which is consistent with all the TCFD recommendations and recommended disclosures. In completing the TCFD disclosure, we have provided the recommended disclosures relating to:

- Governance
- Strategy
- Risk Management
- Metrics and Targets

Our TCFD disclosure in full is available in our 2022 Annual Report (pages 68 to 85) and should be read in conjunction with our CDP Climate Change Response made by the Group in 2022. Further information can be found on our website: smurfitkappa.com/sustainability.

Our progress and evolution of reporting consistent with the TCFD recommendations included but was not limited to: a comprehensive top-down identification and process review of climate-related risks and opportunities; in 2022, we commenced a process to complete additional scenario analysis in conjunction with an expert third party with an expectation to have the output data for review in 2023, our plans for beyond 2030 advanced with progress across a number of exciting collaborative projects such as the successful trial of hydrogen in France and the continued investigation of geo-thermal energy in the Netherlands. We expect that certain aspects of our disclosure will further develop and evolve over time.

Circularity has been a key part of our business model since our inception, so we are in the lead as the circular economy goes mainstream.

Our operations in 36 countries, and 357 production sites in Europe and the Americas, influence the entire packaged goods value-chain. We drive positive change from sustainable and responsible raw material sourcing to minimising operational impact and lowering our customers' environmental footprints.

Our environmental sustainability strategy is divided into four main areas: Climate Change, Forest, Water and Waste. These strategic priorities cover the most material environmental aspects in accordance with our business and stakeholders' expectations. They cover biodiversity, the circular economy, climate-change awareness, energy use and emissions, pollutants to air, litter on land and oceans, responsible forestry, water quality and scarcity, as well as waste to landfill.

Risks and Challenges: Limits of Resources

Our challenge is to create value within natural resource limits, maximising resource productivity while minimising our environmental footprint. In 2022, we continued to work on our climate-related risk register. Some of our key risks were published in our Annual Report 2022 on pages 79 to 81.

Climate Change

Climate change is one of the greatest challenges facing society. Our stakeholders are looking for low-carbon alternatives, and therefore we create packaging that is circular by nature and increasingly low-carbon.

Climate change has the potential to impact our business operations in a variety of ways. Extreme weather patterns may affect our operations and supply chain, potentially impacting forests, water, carbon regulation and taxation, and energy availability and affordability.

Forests play an important role in environmental resilience, especially in climate change. We therefore need to promote healthy forests and manage these resources sustainably. Drought, flooding and local restrictions on water usage may limit our access to water, so we continue to conduct water risk assessments at our paper mills.

"Forests play an important role in environmental resilience, especially in climate change. We therefore need to promote healthy forests and manage these resources sustainably."

Our Progress Against Targets (versus the baseline)

CO_2 Emissions Reduction (%) (2005)

Packaging Sold as CoC Certified (%)

COD Reductions (%) (2005)

Water Intake Reduction (%) (2021)

Waste to Landfill Reduction (%) (2013)

Furthermore, paper manufacturing is energy intensive, with a risk of carbon leakage if emission policies are not consistently applied. We recognise that climate change will only be slowed or stopped by a global low-carbon economy, and as we generate 77% of our revenues in Europe, we fully support the EU Green Deal. However, to retain global competitiveness, there must be safeguards against 'carbon leakage' – firms moving to areas with weaker carbon policies.

The Forest Fibre Industry 2050 Roadmap to a low-carbon bioeconomy shows a CO_2 reduction of 50%-60%, compared with 1990 levels, is possible for our sector, based on available and emerging technologies. To reach a reduction of 80% or more by 2050, breakthrough technologies must be available by 2030. We play our part as a leader in this area, for example by testing new technologies, such as the hydrogen project in our Saillat paper mill in France.

Scarce Resources

Our stakeholders expect Smurfit Kappa to use sustainable raw materials efficiently, especially forests and fibrous raw material. Halting deforestation is a particular concern for businesses supplying consumer goods and food who tackle this issue in their supply chains. Smurfit Kappa commits to only sourcing sustainable wood and fibre.

Packaging recycling and recyclability remain high interests for our stakeholders. Paper-based packaging holds a good position in recycling with its 90.7% collection rates and 81.5% recycling rates in Europe. Smurfit Kappa reaches a level of 100% collection rate and 88% recycling rate. However, the EU Green Deal emphasis on removing litter and plastic waste remains a risk to all packaging products. The European Commission published its Proposal for the updated Packaging and Packaging Waste Regulation in November 2022 with ambitions to reduce packaging waste through reuse targets for packaging. We believe that the reuse targets should not overshadow the need for fit-for-purpose packaging with science-based benefits to the environment. This is supported by the evidence collected by FEFCO in its three studies on reuse and recycling. The studies showcase multiple hot spots that impact the final environmental footprint of packaging solutions and demonstrate that the standardisation required in reuse systems may be contra-productive for the environment. The FEFCO Life Cycle Assessment ('LCA') study evidences that reuse requires a high return rate before reuse meets the climate impact benefits of the recyclable alternatives. The important role of sustainable and circular packaging as a vehicle to transport, protect and store goods and its role in preventing waste must remain the key focus of regulatory changes which should not create a situation where packaging waste overrules the benefits of packaging.

Water scarcity remains a concern. Freshwater resources are not evenly distributed globally, and human activity is still degrading its quality. Our water risk assessments and other measures confirmed that our mills' water use has no impact on water availability to neighbouring areas.

Opportunities: Embedding Circularity

A part of circularity is knowing the source of our raw materials and returning them to the production cycle. We depend on natural resources, so we aim to make our operations restorative by minimising waste and improving efficiency. We source natural materials responsibly, replacing and reusing resources and working with our partners to deliver better circular outcomes.

Using renewable wood fibres makes us a part of the biological and technical cycles of the circular economy. The biological cycle is called bioeconomy, and covers production and maximum value-capture of renewable biological resources, including their reuse, recycling and sustainable return through biodegradation. The technical cycle covers the circularity of mainly nonrenewable processed resources. Paper and paper-based packaging are involved in both cycles and move between them.

Part of the Bioeconomy

We also recover paper-based packaging from our customers, making our packaging production part of our product's end-of-life. For us, material efficiency means that we are recycling our fibres as long as possible, practically producing new packaging from old packaging. As a natural, organic raw material, wood fibres do however lose their quality after being recycled. Ensuring sustainably sourced wood fibres are used as part of our packaging solutions means our renewable, recyclable raw material can be sustained into the future.

We exist in both the bioeconomy and technical cycles of the circular economy, making us an efficient user of a sustainable, renewable raw material.

The virgin fibres used by the paper industry are mostly from the removal of young trees to support forest growth, or as by-products from sawmills, both of which are fully renewable, sustainable and reusable.

A total of 76% of our raw material is recycled fibre – the remaining 24% comes from

Case Study

Green City – Celebrating a Century in Belgrade

Serbia

To celebrate the 100 years anniversary the paper mill in Belgrade it was of great importance to our local team to involve the community in a special project. The idea to plant 100 trees in Ušće Park was agreed upon.

Aleksandar Lazarević, Sales Manager at Smurfit Kappa, said: "It was important to us that we marked this significant milestone with, and for the benefit of, our community. We chose the most beautiful park in Belgrade to plant the 100 trees and create an even more pleasant environment to relax and enjoy nature."

Ušće Park is located in the city centre with scenic views of Belgrade's fortress. Combined with the immediate benefit to the community of the enhanced natural space, the tree planting project that was supported by approximately 30 Smurfit Kappa employees, leaves longer-term benefits as the trees grow and we hope other companies join the initiative.

sustainably managed forests through CoC certified supply chains. Paper-based packaging has the highest recycling rate of any packaging. Trees capture atmospheric carbon, which remains sequestered in our fibres. Forests also contribute to the water cycle by regulating climate and purifying water. They also supply local industry and provide employment.

Smurfit Kappa participates in sustainable forest management through its own 100% FSC or PEFC certified forests and plantations, and by only sourcing fibres from sustainably managed forests.

Closing Loops

We continually work towards material efficiency, and aim to use all our production by-products ourselves, or by finding synergies with neighbours and local communities. Paper clippings from corrugating and converting operations are returned to our paper mills. Organic by-products – wood bark, dust and black liquor – are used as biofuel. We work with local organisations that can use other materials, for example some water treatment sludges become soil improvers in road construction, and waste ash can be used in the cement industry. We also seek alternative ways to treat our rejects from the fibre recovery processes, one of them being palletising the plastic waste for alternative fuels.

We recycle our process waters several times, and invest in best-practice water treatment. Biogases from this become fuel for our Combined Heat and Power ('CHP') plants. At some sites we work with local communities, sending our effluent to local municipal water treatment plants, where it can replace necessary nutrients.

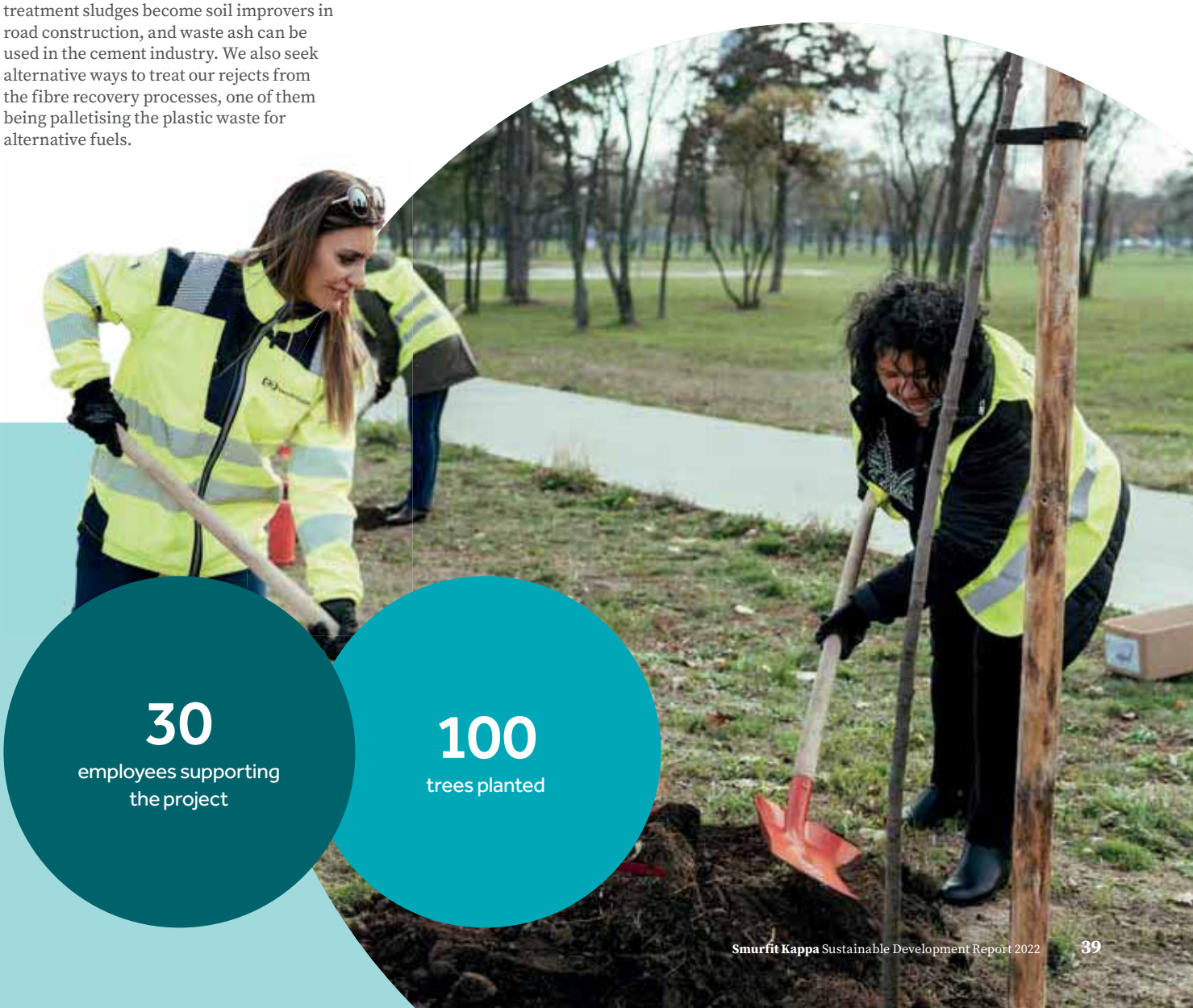
Reducing Leakage

In Europe, paper-based packaging collection rates were higher than for any other packaging material at 90.7% in 2020. Material leakage happens when used products are not being recycled but end up in landfill or as litter.

Paper benefits from being relatively easy for consumers to recycle. We work with municipalities and retailers to collect discarded paper packaging for recycling, and the demand for this is constantly increasing. Our fit-for-purpose packaging avoids over-packaging and waste, and we offer mono-material packaging solutions of corrugated board and paper, facilitating recycling. Eventually it returns to the biological cycle, and if it doesn't return to the recycling loop, it can either be combusted, releasing only the amount of CO_2 it captured while growing, or it degrades naturally, reducing the environmental footprint of the leakage.

Working with Life Cycle Assessments

The aim of the circular economy and waste hierarchy is to be a resource-efficient and environmentally sound choice hierarchy. To be able to assess packaging solutions, our stakeholders, especially customers and regulators, are interested in LCAs. Smurfit Kappa participates in various LCA projects: as members of Cepi, we take part in the EU Product Environmental Footprint development work, we are an active member in FEFCO projects both by supplying data for the industry LCA studies and by working in a study to understand the corrugated packaging LCA. We also participate in our customers' LCA studies and use our data and tools for our own LCA calculations. All these LCA projects deliver valuable information that is being further used for our product and service development throughout our supply chain.



30
employees supporting the project

100
trees planted

Planet continued
Responding to our Stakeholders

	What We Believe	What Our Stakeholders Expect of Us	Our Commitments
Climate Change	We are tackling our CO_2 emissions by improving our energy efficiency, as well as moving from fossil fuels to low-carbon, renewable and bio-based energy. In addition, we are improving resource efficiency when producing paper products and optimising the use of raw material residual streams, such as black liquor, in bioenergy production. The circular economy is an opportunity for our business as we seek to use resources efficiently, especially in energy production and the creation of innovative packaging solutions. We collect sustainability data on innovation and product design, develop supportive tools and services, and create packaging solutions for customers that lower their carbon footprint.	Paper manufacturing is energy intensive, and our stakeholders, notably customers and investors, expect us to approach climate change responsibly and provide detailed progress reports. However, we can make a significant impact in the value chain through smart packaging solutions that can significantly cut our customers' emissions.	**Commitment #1**: A 55% relative reduction in Scope 1 and 2 fossil-fuel based CO_2 emissions in our mill system compared with 2005 levels by 2030. Reach at least net zero by 2050 across all 3 scopes. **Commitment #2**: Collaboration with customers to determine carbon footprints of the packaging life-cycle.
Forest	Promoting sustainable forest management involves managing supplies of sustainable, renewable fibre, while protecting biodiversity and ecosystems as well as creating employment in rural areas. Wood fibres can be recycled at least 8 times and up to 25 times (as per a recent study) when producing paper-based packaging. Using both recycled and virgin fibres in production, we deliver fit-for-purpose packaging with the best overall environmental footprint. We communicate transparently about the sustainable origin of our fibres.	As growing consumption raises pressure on resources, our stakeholders increasingly place value on sustainable consumption, integrity of origin, recycling and avoiding packaging waste. Sustainable forest management and use of recycled fibres are at the core of the expectations for paper-based products.	**Commitment #1**: All fibre produced and purchased is CoC certified under FSC, PEFC or SFI. **Commitment #2**: At least 95% of our packaging is CoC certified under FSC, PEFC or SFI, by 2025. **Commitment #3**: All production sites have FSC, PEFC and/or SFI certified CoC management systems in place.
Water	Over 90% of the water we use is returned to nature in good condition, and the rest evaporates to the air during the process or is bound in the product. We focus our efforts on further improving the quality of water we discharge, decreasing our water intake and understanding the risks associated with water availability and use in the areas where we operate. This strategy positions us well to deliver a positive change to our processes and the environment.	Stakeholders are increasingly requesting information about our responsible water stewardship covering our paper and packaging production as well as our supply chains. Our key water footprint consists of paper manufacturing and forest and plantation management.	**Commitment #1**: Reduce the organic content of water returned to the environment from our mill plants COD by 60% compared with 2005 levels by 2025. **Commitment #2**: Perform environmental impact assessments of the water use of our paper mills (where relevant) and develop water usage measurements. **Commitment #3**: At least 1% relative reduction annually of water intake by our global paper and board mill system with 2020 as reference year.
Waste	We believe the circular economy is the business model for the future, and that we have an important role to play in it. Our products are designed to prevent loss and damage to the consumer goods they protect. Our packaging is produced efficiently and is 'right-weighted' to optimise resource use and minimise waste, and it is made from 100% renewable and recyclable fibres. Once fibres are depleted they are typically used for energy generation or in agriculture.	Reducing and eliminating our customers' product and packaging waste are material issues for our stakeholders, and many of our customers have stated objectives to reduce waste.	**Commitment #1:** Decrease the waste sent to landfill by 30% per tonne of product produced by our mill system compared with 2013 levels by 2025.

Status key: Significant improvement needed | Improvement needed | On track to achieve target

Progress Made in 2022	Status	Delivering for SDGs	Scope
Progress made: Since 2005, we have reached 43.9% reduction. In 2021, Smurfit Kappa had its CO_2 target approved by the SBTi.		As an energy-intensive manufacturing business that uses natural resources, Smurfit Kappa has a direct impact on affordable and renewable energy. Through our efforts to reduce the climate impact of our operations as well as our products that can help our customers reduce the climate impacts in their supply chain, we can contribute to global climate action. Smurfit Kappa contributes to the realisation of the following SDG and targets:  7.2, 7.3 and 7.A 12.6 13.1, 13.3	• This priority area covers energy use, climate change and greenhouse gas ('GHG') emissions. Our reporting covers our operations from gate-to-gate. • All CO_2 emissions from our paper and board mills relate to the production of paper and board. • Only paper and board production is taken into account, given its fossil CO_2 emissions are 80% compared with our converting operations and its subsequent contribution to fossil fuel CO_2 emissions. • The logistics emission reporting is validated annually by SmartFreight Center for assuring that our reporting complies with the Global Logistics Emissions Council ('GLEC') framework model and requirements. As part of the validation process, a gap analysis is performed in order to incrementally improve the data and reporting maturity. We work in line with the requirements from the GLEC framework and to anticipate the future requirements of the forthcoming ISO14083.
Progress made: Our suite of tools that help to determine the carbon footprint of our customers' packaging were used 160,000 times in 2022. Read more on **pages 42-49**			
Progress made: In 2022, we continued to produce and purchase 99.8% of our fibres under fibre-origin management systems that are CoC certified. This is within our margin of 1% variation.		As a paper-based packaging company that uses recycled and virgin fibres as its key raw material, Smurfit Kappa has a direct impact on ending deforestation and supporting forest biodiversity and ecosystems. Smurfit Kappa's forestry and sustainable fibre sourcing actions impact the following SDGs and targets:  12.2, 12.4, 12.5 and 12.6 13.1 15.1, 15.2, 15.3, 15.5 and 15.8	• This strategic priority covers forest management, biodiversity, fibre sourcing and the communication of how we use sustainable fibres through certified CoC. • Our reporting encompasses all of our own operations and products.
Progress made: 94.3% packaging solutions sold as CoC certified in 2022.			
Progress made: All our production sites are FSC certified and where relevant PEFC and/or SFI certified. Read more on **pages 50-55**			
Progress made: Since 2005, we reached a 36.9% reduction, a slight decline from 2021, further explained on page 60.		Water is a critical element in pulping wood and recovered paper fibres and formation of paper. With returning the water back to nature, Smurfit Kappa has a direct impact on clean water resources. Smurfit Kappa's water management practices impact the following SDGs and targets:  6.1, 6.2, 6.3, 6.4 and 6.6 12.2, 12.4 and 12.6	• This priority area covers the water intake and discharge to and from our processes. The data covers all Smurfit Kappa paper and board mills discharging water produced through the production process directly to water bodies. Mills that have their process water treated externally are not included. • Only paper and board production is taken into account because this contributes to 95% of all organic discharges and 98% of total water intake. • Our target is set against COD in water which is an indicator of the organic content in water. • As a processor and not a consumer of water, we focus our efforts on further improving the quality of water we discharge, and understanding the risks associated with water availability and use in the areas where we operate.
Progress made: We completed the water risk assessments at our paper mills in 2021, and in 2022 commenced the second phase of risk assessments covering all of our operations.			
Progress made: In 2022, we reached a 2.1% reduction of water intake at our paper and board mills compared with 2021. Read more on **pages 56-61**			
Progress made: Since 2013, we reached a 24% reduction, a disimprovement from 2021, further explained on page 64. Read more on **pages 62-67**		As a paper-based packaging company that uses recycled fibres as its key raw material, that produces packaging solutions that are recyclable and recycled, and help to reduce the waste of packaged goods, Smurfit Kappa has a direct impact on responsible consumption and production. Smurfit Kappa's circular business model and packaging design impact the following SDG and targets:  12.2, 12.3, 12.4, 12.5 and 12.6	• This priority area covers non-hazardous waste (recovered and landfilled) and hazardous waste generated from Smurfit Kappa's manufacturing processes. • Our target is set against waste sent to landfill from our paper and board mills per produced tonne of paper. • The amount of hazardous waste produced in our production processes is very low and depends on local activities such as construction or change of light bulbs on site. Therefore we have no set target for hazardous waste.

Climate change

Minimising energy use and moving from fossil fuels to low carbon, renewable sources are core elements of our climate change strategy. The strength of our approach is demonstrated through; delivering today (as evidenced in this report), setting independently validated interim targets for 2030 in line with the Paris Agreement, and our long-term ambition of at least net zero by 2050.

Climate change is a reality and one of the greatest challenges facing society. The challenge of achieving the Paris Agreement and the UN 2030 SDGs will require strong and concerted action to deliver on the increasing levels of commitments across all sections of society. We align our climate change strategy with the UN 2030 SDGs 7 (affordable and clean energy), 12 (responsible consumption and production) and 13 (climate action), which are related to climate change.

Our decarbonisation strategy is focused on minimising energy use and moving from fossil fuels to low carbon, renewable sources. We also focus on increasing our own energy efficient production systems, lowering our customers' carbon footprints and decreasing CO_2 emissions in our supply chain, through actions such as transport optimisation. These core elements are all aimed at reducing our fossil emissions in line with the Paris Agreement, reaching at least net zero by 2050. Through focusing on our contribution to these UN 2030 SDGs and our circular business model, we are an efficient user of natural resources such as wood and energy, and this leads to optimal use of residual product streams.

In line with our climate change strategy, we are committed to at least net zero by 2050, and have set interim targets on reducing our Scope 1 and 2 CO_2 emissions per produced tonne of paper by 55% by 2030 from our paper mills.

As part of our Better Planet 2050 initiative, we are committed to reporting consistent with all the TCFD recommendations and recommended disclosures, see the TCFD Index table on page 141 and the complete disclosure in our Annual Report 2022 on pages 68 to 85. Additionally in 2021, we had our CO_2 emissions target validated by the SBTi as being in line with the objectives of the Paris Agreement and well below 2°C. Our SBTi baseline is 2019 and has a respective intensity target reduction of 37.7% by 2030 for all our Scope 1 and 2 CO_2 emissions. The actions we are taking to deliver on our interim CO_2 emissions target of 55% specific reduction per tonne of paper produced by 2030 complements our validated SBTi target.

In line with the efficient resource use-hierarchy, we only use wood biomass for which no higher value-added purpose exists as fuel and we also use residual products of wood, such as black liquor, to generate energy.

The key focus of our energy efficiency investments is to deliver CO_2 emission reductions; however, we support the EU general energy efficiency target with our target to improve our energy efficiency at least by 1% annually in our global paper mill network.

We started to report on EU Taxonomy in 2021, our second disclosure can be found on pages 60 to 67 in our Annual Report 2022.

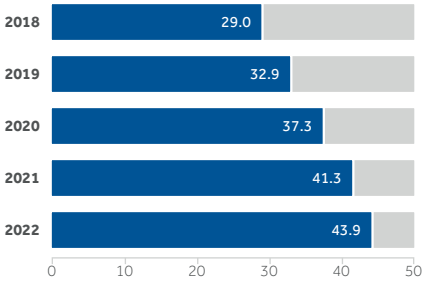
Progress in 2022

We focus on long-term ambition, coupled with action today and we are pleased to report continued delivery and reduction of relative CO_2 emissions from our mills in 2022 of 43.9% against our 2005 baseline.

Our global CO_2 emission reduction programme currently covers 100% of our operations with a focus on the paper and board operations that represent 10% of global operations but emit over 80% of our CO_2 emissions.

In 2020, we finalised an evaluation of a suitable CO_2 emission-target for our corrugated operations. Our conclusion is that the current approach to encourage energy reduction and positive climate-related activities are sufficient as the average share of a corrugated site to the Group CO_2 emissions is below 0.5%.

CO_2 Emission Reduction (%) (2005 baseline)



Packaging is estimated to represent only 3% of the carbon footprint in the food product value chain

Key:

- Packaging – **3.0%**
- Manufacturing – **6.0%**
- Transport – **5.0%**
- Retail & Hospitality – **9.0%**
- Consumer – **11.0%**
- Post-consumer – **0.5%**
- Imports Production – **32.0%**
- Domestic Ingredients – **34.0%**

Source: Data from analysis by WGAP 2020 UK

Energy Efficiency

Further progress in energy efficiency is key in achieving our CO_2 emission reduction targets. Since 2005 we have invested €994 million in more efficient energy-generation, technologies that reduce the use of energy and technologies that recover energy. Examples of this are investments in CHP generation and heat exchangers. These investments have improved overall energy efficiency in our paper mill system by 20.6%.

During 2022 Smurfit Kappa Group delivered a 43.9% reduction of relative CO_2 emissions compared with 2005, some of the key actions are listed below:

- Our Cali mill (Colombia) started to mix biomass in the coal boiler, reducing the CO_2 emissions from coal by 10% year-on-year.
- The energy efficiency improvements in our Coronel Suárez mill (Argentina) delivered an emissions reduction of 6.2% year-on-year.
- The energy recovery in the PM2 in our paper mill Parenco (The Netherlands) saved 13.6% on specific CO_2 emissions year-on-year.
- The rebuild of the multi-fuel boiler in our paper mill Zülpich (Germany) delivered a specific reduction of CO_2 emissions by 21.9%.
- Our Hoya mill (Germany) delivered 3.1% specific CO_2 reduction with a new high efficiency boiler.

These projects are an illustration of our focus on reducing energy, key from both financial and sustainability perspective for our paper and board mills.

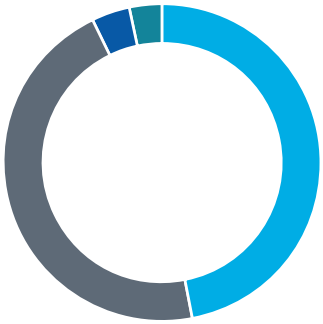
Renewable Energy

To reach our CO_2 emission reduction target, we are moving from fossil to low carbon, renewable fuels. During 2022, our paper mills used 50.74% biofuels, compared with 37.4% in 2005 and 47.01% for all operations in 2022.

Specific to bioenergy, our Nettingsdorf mill in Austria and Piteå mill in Sweden are examples of biofuel-based energy production.

As part of our sourcing strategy for grid electricity, we are shifting to CO_2 neutral energy. Our operations in the Netherlands and the UK moved to purchasing CO_2 neutral energy from the national grid in 2020. In addition our operations in Colombia, Austria, and Chile have also moved to purchasing CO_2 neutral energy.

Direct Fuel Consumption: All operations



Key:

- Biofuels – **47.0%**
- Natural gas – **45.9%**
- Coal – **4.0%**
- Other fossil fuels – **3.1%**

Working with our Customers

Using a suite of tools, including Innobook, Pack Expert, Paper to Box and SupplySmart we work with customers to determine their packaging's carbon footprint. These tools provide CO_2 emissions data and other information to optimise solutions.

In 2022, our tools were used 160,000 times. Our InnoTools suite of design software also shows customers the carbon footprint for each packaging unit and tracks its development over time. The impact of our Group CO_2 emission reductions are reflected in our InnoTools and also in the CO_2 footprints of our customers.

During 2022 we introduced BPProgress, a unique Smurfit Kappa tool to help our customers visualise the sustainability performance of their entire portfolio. Using BPProgress we can track year-on-year the carbon footprint of the total packaging portfolio delivered to a particular customer.

Our Strategy: Scope 1 and 2 Emissions**

In December 2021 our target to reduce our Scope 1 and 2 emissions was validated by the SBTi. In our approach to tackle climate change, we are using less fossil fuel and emitting less CO_2, promoting renewable sources and closing loops to create circularity in our production process.

There are four parts to our CO_2 reduction programme:

Investing in Fossil CO_2 Reductions

- Shifting to low or zero carbon fuels including CO_2 neutral energy sources:
  - Use of biofuels; and
  - Electrification.
- Research and development into new and emerging technologies with controlled trials:
  - Hydrogen, geo-thermal and heat pump technology.

Greening of Electricity Supply

Reducing Energy Use

- Investing in technologies that reduce energy consumption; and
- Re-engineering our processes and implementing smart energy-efficient solutions.

Investing in Efficient Energy-generation

- Investing in highly efficient CHP systems; and
- Improving the efficiency of our existing boilers.

Our Approach – Timelines

Short-term

Acting now with continued year-on-year reductions using best available technology and continuous improvement.

Medium-term

Strategic investment projects to replace high emitting assets, continuous improvement, availing of best available technology, collaboration across the value chain, all leading us to achieve our 55% reduction target.

Long-term

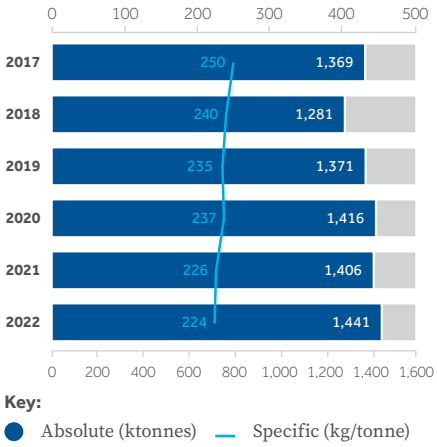
Through collaborative projects, executing controlled trials of new/emerging technology today to understand the feasibility and cost of large-scale implementation beyond 2030.

See our net zero transition plan on pages 44 and 45.

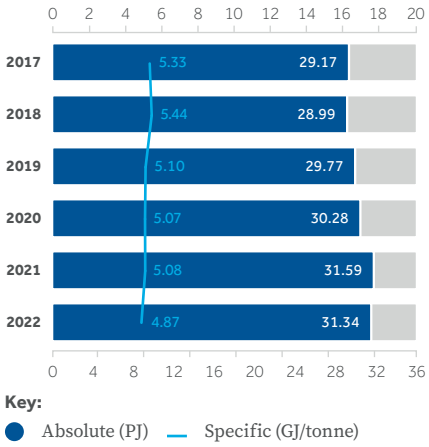
** For Scope 3 emissions reference page 48

Planet continued

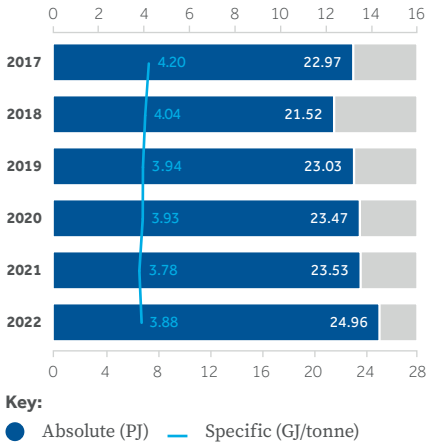
Direct Fossil (Scope 1) CO_2 Emissions: European Mills



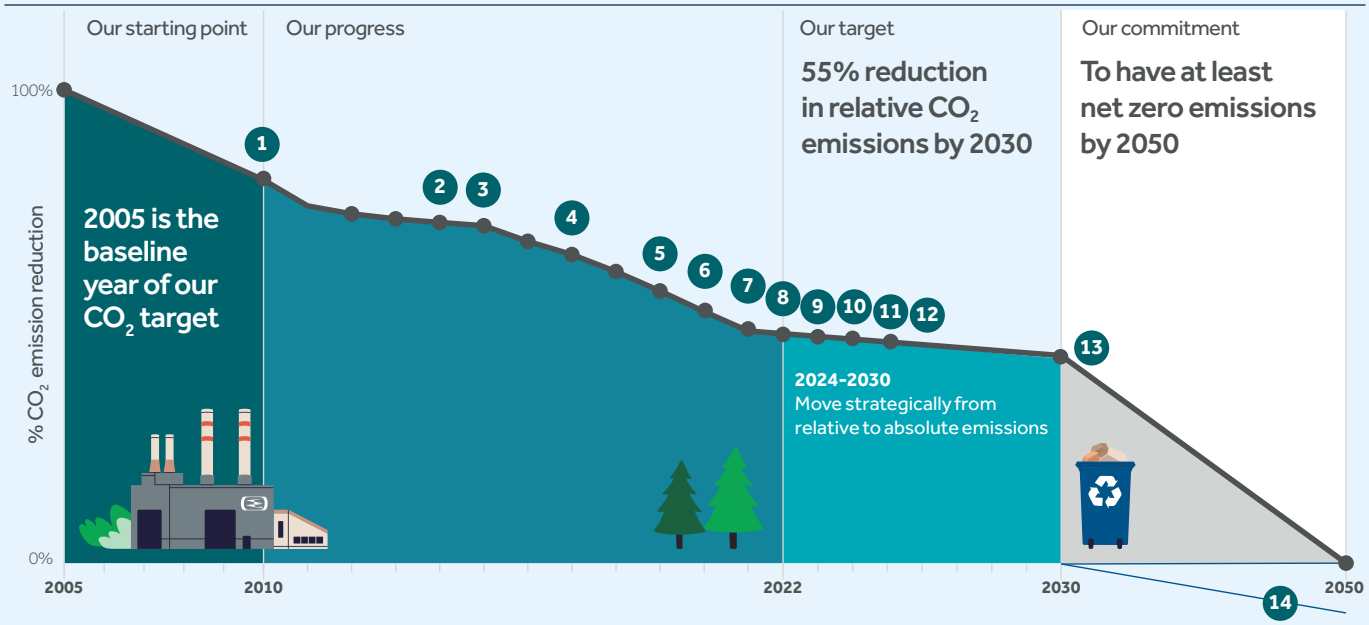
Biofuels: European Mills



Fossil Fuels: European Mills

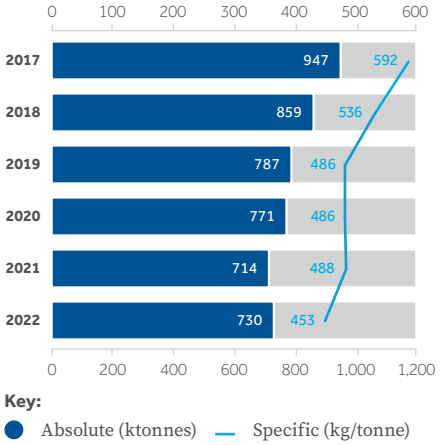


Our Net Zero Transition Plan

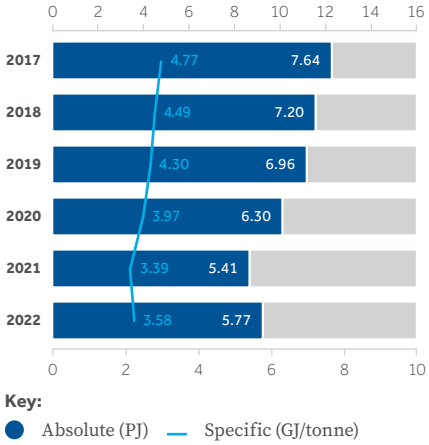


1. Set target of 20% reduction in relative CO_2 emissions by 2020 (2005 baseline).
2. 2020 target of 20% reduction achieved with a 21% reduction by the end of 2013.
3. New relative emissions reduction target of 25% reduction set for 2020.
4. 2020 target of 25% reduction achieved and more ambitious relative emissions reduction target of 40% by 2030 set.
5. Approval of €134 million new recovery boiler in Nettingsdorf (Austria).
6. Long-term target of at least net zero emissions by 2050 and increased the 2030 emissions reduction target to 55%.
7. 2021: SBTi approval received for our CO_2 emissions target as being in line with the Paris Agreement and a well below 2°C trajectory. Launched Better Planet 2050 commitments.
8. 2022: 43.9% reduction in CO_2 emissions. Successfully trialled hydrogen project at our Saillat paper mill (France). Announced a major investment in our Cali paper mill (Colombia) of almost US$100 million in a sustainable biomass boiler.
9. 2023: Significant investment in our Hoya paper mill and board manufacturing plant (Germany). A CO_2 emissions reduction of 5,500 tonnes per annum is expected.
10. 2024: Contribution from a state-of-the-art sustainable biomass boiler at our paper mill in Cali, Colombia which will reduce our global Scope 1 and Scope 2 CO_2 emissions by approximately 6%.
11. Reviews of our third party validation.
12. Approximately 60 projects identified to implement until 2030 in order to achieve our 55% CO_2 emissions reduction target.
13. Scaling new and emerging technologies, as they become available.
14. Consideration of residual carbon neutralising solutions to achieve 'at least' net zero by 2050.

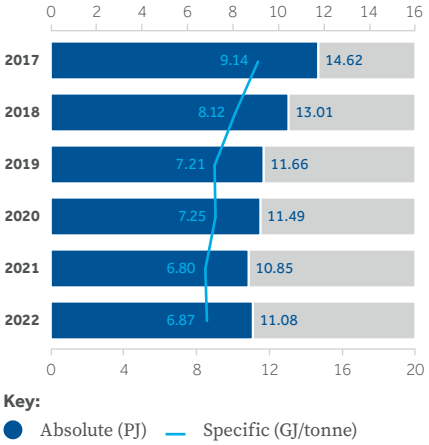
Direct Fossil (Scope 1) CO_2 Emissions: The Americas Mills



Biofuels: The Americas Mills



Fossil Fuels: The Americas Mills



Acting Today Across our Value Chain

Scope	Time Horizon*	Action Today
Scope 1 and 2	Short-term	• Year-on-year reductions towards our targets. In 2022, we achieved **43.9%** reduction in CO_2 emissions. • Continuous improvement of our operations through the implementation of best operational practices, insulation of pipes, LED lights, monitoring and improving processes, using data, reuse of residual steam to reduce the need for fresh steam, using biogas from water treatment plants, efficiency improvement in operations and energy efficiency. • Using Digital Twin technology in our Townsend Hook mill to reduce steam consumption by approximately **5%**. • Direct drive project in our Wrexen mill which has energy reduction as part of its projects benefits. • Nettingsdorf Biomass investment of **€134 million** completed in 2020 and now achieving its full run-rate of 40,000 tonnes of emissions reduction. • Investing **€11.5 million** in our Zülpich paper mill. A major redesign of the multi-fuel boiler provides a more sustainable fuel source for generating steam and electricity. The investment is set to deliver a reduction of 55,000 tonnes of CO_2 emissions. • Optimising starch use in our Hoya mill which requires less steam and energy to dry. • Water treatment plant investments in Colombia and Brazil which will help improve our COD (water) and capitalise on biogas from plants (CO_2). • Recent greening of energy supply in the Netherlands and UK.

Scope 1 and 2	Medium-term	• Around 60 projects planned between now and 2030 to deliver our interim target, reducing our emissions by 55% by 2030, including:
		  • Investing almost **US$100 million** in a sustainable biomass boiler in our paper mill in Cali, Colombia which will reduce our global Scope 1 and Scope 2 CO_2 emissions by approximately 6%, planned to be operational by the **end of 2024**.
		• Controlled trialling of new/emerging technology and feasibility of large-scale implementation:
		  • Build on learnings from Digital Twin pilot in Townsend Hook Mill (UK); and
		  • Collaborative heat pump project in Morava paper mill (Czech Republic).

Scope 1 and 2	Longer-term	• Controlled trialling of new/emerging technology today for the future:
		  • The **HYFLEXPOWER** consortium and SKG successfully completed the first stage of the **HYFLEXPOWER hydrogen** project, the first in the world for a paper mill and a truly collaborative project including suppliers, academia and government support; and
		  • **Geo-thermal** being explored in our Parenco paper mill in the Netherlands.

Scope 3	Short-term	• Customers: We have 100's of examples where a collaborative approach has delivered a lower carbon, circular solution, an example, by working together with a customer in Switzerland, we reduced the CO_2 emissions in transport by switching from road to rail delivery. This reduced the transport emissions by approximately **600 tonnes** of CO_2. • Customers: Developing products such as top-clip and click-to-lock which reduces the carbon footprint of our customers packaging by **over 30%**. A number of customer examples are outlined in the Annual Report on pages 10 to 13 and in this report on pages 8 to 11. • Engagement with Suppliers: In our Sustainable and Responsible Sourcing programme, we audit our suppliers on their energy reduction programmes and participation in commonly accepted best practice and certification schemes such as SBTi commitments and validation.
Scope 3	Medium-term	• Carrying out a more extensive Scope 3 inventory assessment, supported by GHG training. • Considering additional SBTi commitments. • Considering Scope 3 targets. • Internal: Trialled electric delivery vehicles in Germany and the Netherlands.

* Time-horizons are defined by when we believe they could be scaled, so we are actively exploring and trialling them now but their scalability could be now (short-term), 3-10 years (medium-term) or 10-30 years (long-term).

Residual Emissions: While the Group is focused on its impact on emissions reductions across its value chain, with significant scope well into the future, we acknowledge that as we approach 2050 we may have residual emissions which we cannot eliminate. In the event that this occurs the Group would consider neutralising these emissions through appropriate and credible solutions.

Case Study

Leading the energy transition through innovation

By taking fundamental action that addresses energy use at every level and to reach net zero.

At Smurfit Kappa, we work with dedicated experts who examine our processes with our climate change targets in mind. Our focus is on improving our energy use through efficient production systems, increasing our use of renewables, decreasing emissions in our supply chain, and ultimately lowering our own and our customers' carbon footprints.

Anne Slabbers, Senior Advisor, and Claire Schreurs, Energy & Sustainability Manager, work at our Roermond paper mill, which is an industry leader in circular paper manufacturing. Theo Peulen, Energy Systems Technologist, and Rafael Concepcion, Paper & Production Technology Paper Specialist, both work for our Business Excellence teams in Europe and the Americas respectively, and Jelmer van der Ende works as Environmental Investment Specialist for the Corrugated operations.

Together, they investigate climate-friendly actions at different stages of our value chain.

A Circular Approach to our Operations

"Our business naturally plays a valuable role in a circular economy. The main challenge for recycled mills is the energy transition: how to decarbonise paper production in an energy efficient and cost-effective way. We have developed a roadmap with projects to reach our target in 2030 and will follow up on new developments for the longer term," explains Anne.

So how can we be better, smarter, and more efficient with our energy to ensure our solutions have the biggest possible positive environmental impact?

We concentrate on four steps: reduce; reuse; efficiency; and renewable sources. "We focus on the first three aspects, and for the remaining energy requirement we want to switch from fossil to renewable sources," says Claire. Therefore, we are investigating and pioneering alternative energy sources and technologies. By first creating circularity in our energy system, we can be a more sustainable operation.

A Data-driven Approach

To describe their work, Theo and Rafael say, "data sits at the heart of this. We know the status of every machine so we can assess possibilities for improvement. We are constantly following and trialling new climate-friendly technologies to be implemented in our mills. Once an opportunity is identified, there is close collaboration between the plant and wider Smurfit Kappa team to develop a bespoke proposal, cognisant of the local site environment and resources."

1st

paper mill in the world to successfully trial hydrogen

Left: Construction of Saillat hydrogen power plant

Right: Nettingsdorf Mill, recovery boiler

5%
steam reduction delivered by Digital twin technology

40%
reduction in CO_2 emissions in Nuevo Laredo

40,000
tonnes of CO_2 reduction delivered by new bio-boiler in Nettingsdorf

Reimagining Plants of the Future

One key step in reducing energy demand is through optimisation. By integrating our operations, we can raise production capacity and cut transportation. Our Nuevo Laredo sheet plant in Mexico has become a fully integrated corrugated plant, reducing CO_2 emissions by up to 40% and doubling production capacity.

Additionally, we apply known technology and trial new and emerging technologies. Our Digital Twin project uses virtual reality models to simulate real world functionality, tracking and performing calculations while adjusting processes to design optimal solutions.

"Our former step was integrating three paper machines by reusing residual heat from the two large machines in the small one, which significantly reduced our gas consumption. The next step is a further reduction of our fresh steam need, and thus gas consumption, by implementing an innovative concept with thermo compressors, steam compressors, heat pumps and/or electric boilers." says Claire.

"Similarly, by redesigning our boilers, like at our Zülpich paper mill in Germany, we can reduce our CO_2 emissions through an integrated steam reuse system, which optimises energy usage," says Theo. Our new recovery boiler at Nettingsdorf paper mill in Austria optimises energy recovery from the black liquor from pulp production to boost energy optimisation and cut CO_2 emissions.

"In 2022, we announced on an investment in bioenergy at our Cali paper mill which will help us to reduce our CO_2 emissions by 6%."

Our Strategy: Scope 3 Emissions

There are three elements to our Scope 3 emissions strategy:

Supplier Engagement
- Reviewing SBTi commitment from strategic suppliers:
  - Expand beyond strategic suppliers in time.
- Sustainable and Responsible Sourcing programme.

Customers Engagement
Better Planet Packaging programme delivering lower CO_2 solutions for customers through:
- Material design;
- Packaging design; and
- Supply chain optimisation.

Transport
- Modal shift: CO_2 reduction by shifting transport from road to lower emission transport models.
- Operational efficiency: CO_2 reduction by optimising transport operations, sources and destinations.
- Fuel efficiency: CO_2 reduction by leveraging new technology, alternative fuels, engine efficiency.

These three elements are supported by our end-to-end approach to circularity.

Scope 3 Emissions
The initial Scope 3 estimates for the Group have been estimated at at 30-39% of our total emissions. This estimate was delivered as a result of our 2021 SBTi submission. Seven categories were considered as contributing to this initial assessment, of which items 1-3 are over 80% of the Scope 3 total.

1 Purchased goods and services
2 Upstream transportation and distribution
3 Fuel and energy-related activities
4 Downstream transportation and distribution
5 Waste
6 Business travel
7 Employee commuting

We have continued to keep Scope 3 under review as approaches and conversion factors have evolved. Following on from our SBTi submission and also through continued stakeholder engagement, we commenced a more detailed assessment in 2022 which has been supported by GHG training on best-practice GHG inventory capture. We expect the output of this work to conclude in 2023 and form part of our 2023 disclosure.

Within Scope 3, we actively collect detailed data and report on our emissions from transport applying emission default values, reference models and standards according to the GLEC by Smart Freight Centre. In 2022, we have expanded our transport emission reporting to all of our 36 countries.

Emissions from Transport
Smurfit Kappa is committed to continuously optimise and decarbonise its transportation operation. Therefore, a wide range of initiatives are followed with focus on:

1. **Modal shift**: CO_2 reduction by shifting transport from road to lower emission transport modes. Smurfit Kappa is making use of, and continuously develops, multi-modal transportation, leveraging rail, water and a wide range of multi-modal transport solutions. Access to rail or waterway transportation, is part of our logistics infrastructure investments.
2. **Operational efficiency**: CO_2 reduction by optimising transport operations, increasing load-fill and tonnage per unit, reducing empty mileage, back-loading of trucks to reduce truck movements, supply-chain network optimisation to reducing transport distances between sources and destinations.
3. **Fuel efficiency**: CO_2 reduction by leveraging new technology, alternative fuels, engine efficiency. As Smurfit Kappa mainly operates transportation with third party transport providers the strategy is to mutually set targets and monitoring progress with our external transport partners.

"In 2022, we expanded our transport emission reporting to cover all our operating countries."

In 2022, we expanded our transport emission reporting to cover all our operating countries. The total transported volume was estimated to be 31 million tonnes. This equates to 644,000 tonnes of CO_2 equivalent using the GLEC framework. Of this, the upstream value chain (see the scope description below) represents 476,000 tonnes of CO_2 equivalent and the downstream transport represents 168,000 tonnes of CO_2 equivalent.

While the transportation of corrugated packaging is mainly by road over shorter distances, for all remaining transport we operate a modal mix of 5% rail, 7% water and 88% road-based transportation. The modal mix is calculated based on shipped volume per mode. Including corrugated transport the total modal mix is at 4% rail, 5% water and 91% road-based transportation.

Scope Statement

The current scope is structured in the following main flows, and transport streams included are outlined in the diagram below.

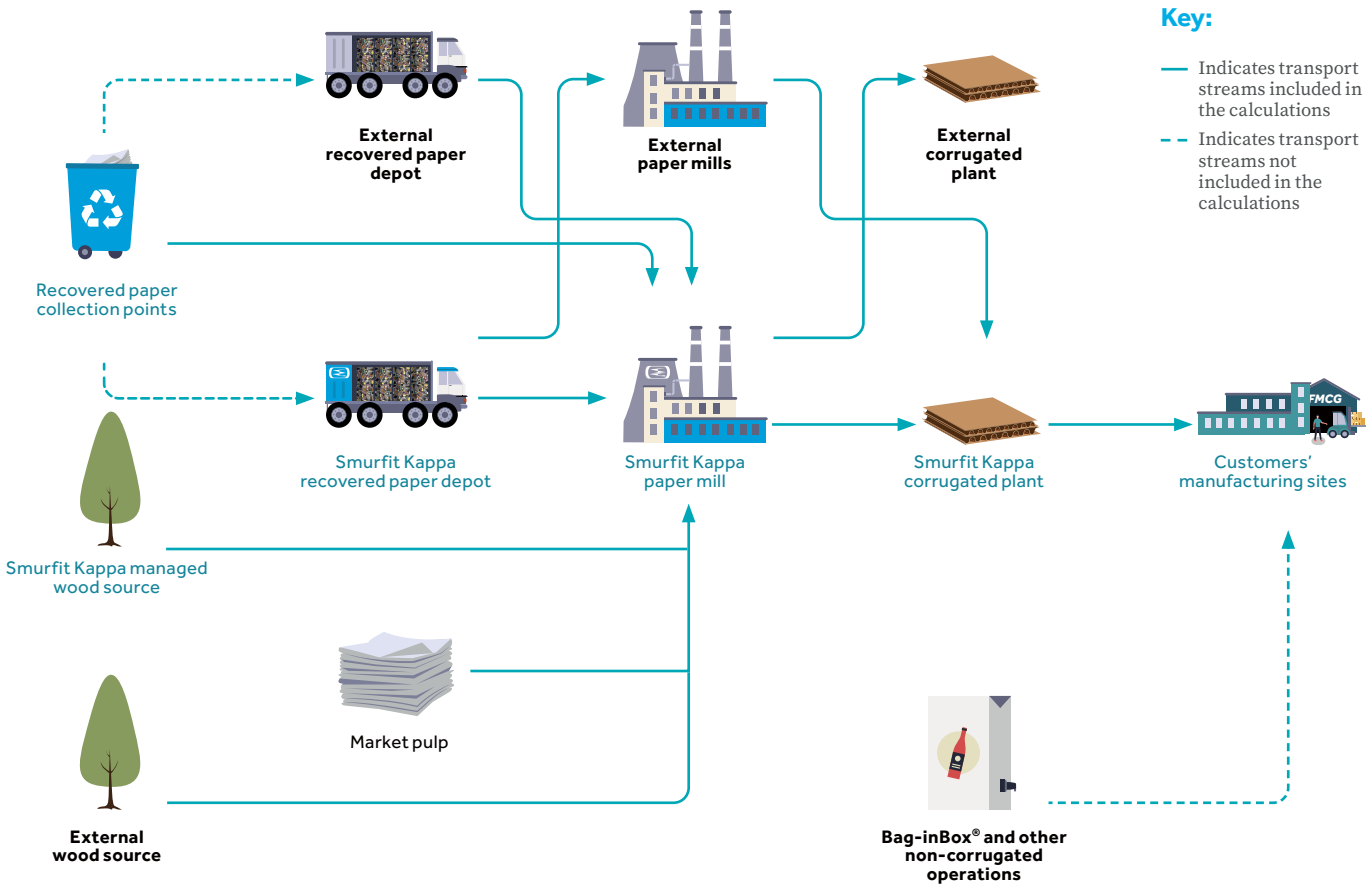
1 Transport of wood and wood chips to paper mills
2 Transport of recovered paper to paper mills
3 Transport of paper reels and solid board sheets from internal paper mills to internal or external Corrugated plants
4 Transport of paper reels from external paper mills to corrugated plants
5 Corrugated boxes from corrugated plants to Smurfit Kappa customers
6 Transport of market pulp and external wood to paper mills

Whilst our initial estimates of Scope 3 is 30-39% of our total emissions, our disclosure here on the total transported volume is more detailed and was estimated to be 31 million tonnes and does not include the following categories:

- **Goods flows:** All material and goods flows beyond the main flows expressed above are out of scope, like transport of raw chemicals, starch, or any other commodity supplies. The magnitude of these remaining raw materials will be estimated going forward.
- **Warehousing:** Any external warehousing operation is currently out of scope. The scope for external European warehouses is estimated at 1.6 million tonnes of paper transport from paper mills to corrugated plants where external warehouse activity applies. This amounts to 24% of flow 4 and 6% of the entire reported volume in scope.

We have included emissions in our transport-related supply chain decisions since 2017. Our strategy focuses on three opportunities to decrease transport emissions: maximising efficiency through payload optimisation and reducing empty mileage; developing a good modal mix of road, rail and water transport; and using less carbon-intensive fuel technologies.

Transport Streams



Forest

Natural fibres are our main raw material, of which 76% is primarily post-consumer recycled fibres. We produce our packaging solutions to meet our customers' performance requirements, which means using recycled, virgin or combination of both fibres in our packaging design. We source all our fibrous raw materials sustainably as CoC certified, including our recycled fibres.

Our raw material is renewable, recyclable, recycled and biodegradable. This makes us part of the circular and bioeconomy, which we have explained in more depth on pages 38-39. We need virgin fibres for food safety and other technical properties of our packaging solutions. As fibres can be recycled between 8 and 25 times (as per a recent study), we also need fresh virgin wood fibres to sustain a healthy fibre-recycling system.

The virgin fibres we use are primarily made of wood for pulp from certified sustainably-managed forests. Smurfit Kappa sustainably manages its own eucalyptus and pine plantations in Colombia which are FSC Certified since 2003, and our forestry operations in Spain and France support small forest owners to manage their forests, certified by FSC and/or PEFC. In Europe, Smurfit Kappa buys most of the virgin fibres it needs from suppliers in: Austria, the Baltic countries, France, Germany, Spain and Sweden.

Our Commitment to Sustainable Fibre

Products delivered to our customers must meet the commitments we make in our policy statements (Forestry Policy, Code of Conduct, Social Citizenship).

We source virgin fibres from certifiably well-managed forests, or at least of non-controversial origin, or certified recycled fibres. All materials must be delivered through a third-party-verified CoC certified supply chain. We accept FSC, PEFC and SFI certified wood, and the CoC systems at our mills and plants also cover recycled fibre consumption.

We regard these certification schemes as the best available means to conserve forests and their biodiversity.

Sustainable Forest Management certification schemes require regular monitoring of the protection of ecosystems and biodiversity. This is being monitored annually on our sites as part of the forest certification audits and auditing by independent third parties applies to our suppliers through the certified CoC.

100% of the wood we use to produce virgin paper or pulp comes, at least, from sustainable non-controversial origin. In 2022, 57% of this wood is from sustainably managed forests certified under the FSC, PEFC and/or SFI schemes and the remaining 43% is from FSC Controlled Wood sources, risk-assessed through our FSC and PEFC CoC system and verified by a third party. 15% of the wood we use originates from our own forests and plantations.

Our objective is to increase certified wood supplies. Low availability of certified wood at competitive prices in the regions where we can economically source our wood supplies is limiting the possibility of increasing certified wood supplies.

The administrative effort to achieve certified CoC status means that it is often not economically feasible for small forest holders to certify their forest holdings, further limiting the availability of certified wood supplies. However, efforts to increase FSC certified supplies have started to have positive impacts on the certified wood volumes in Spain, where we support forest owners, all smallholders, in achieving the FSC certification of their forests. Also, in Sweden volumes could be increased through finding better agreements with forest owners in the region.

Annually, Smurfit Kappa's recycling operations handle some 6.1 million tonnes of recovered paper in Europe, and 2 million tonnes in the Americas. We have a network of 19 recycled paper depots in Europe, and 25 in the Americas, using recovered paper from municipalities, retailers, industries, and our own corrugating and converting operations. All recycled fibre we use is certified CoC.

Chain of Custody

Smurfit Kappa does not source fibre from high deforestation-risk areas, including High Conservation Value areas. Through supply-chain transparency we ensure our sustainability commitments and fibre origins. We use robust monitoring and third-party auditing of our wood and fibre supply chain.

The best practice to deliver our commitments is through CoC certification.

Our complete paper mill system has been CoC certified under FSC and PEFC schemes in Europe since 2010, and under FSC, PEFC and/or SFI schemes in the Americas since 2015. At the end of 2022, 93.0% of our paper was produced as CoC certified, according to FSC, PEFC or SFI standards. The remaining 7.0% are from non-controversial fibres in accordance with FSC Controlled Wood standard, and managed through the mills' CoC certified risk assessment systems.

We have a target to deliver over 95% of our packaging solutions as CoC certified to our customers by 2025 at the latest.

Share of Packaging Products Sold as CoC Certified 2018-2022

Key:
- Smurfit Kappa Group

Our Certified Raw Materials

Key:
- Recycled
- Virgin
- Certified
- FSC Controlled wood

CoC: Proven Trail for Sustainable Fibres

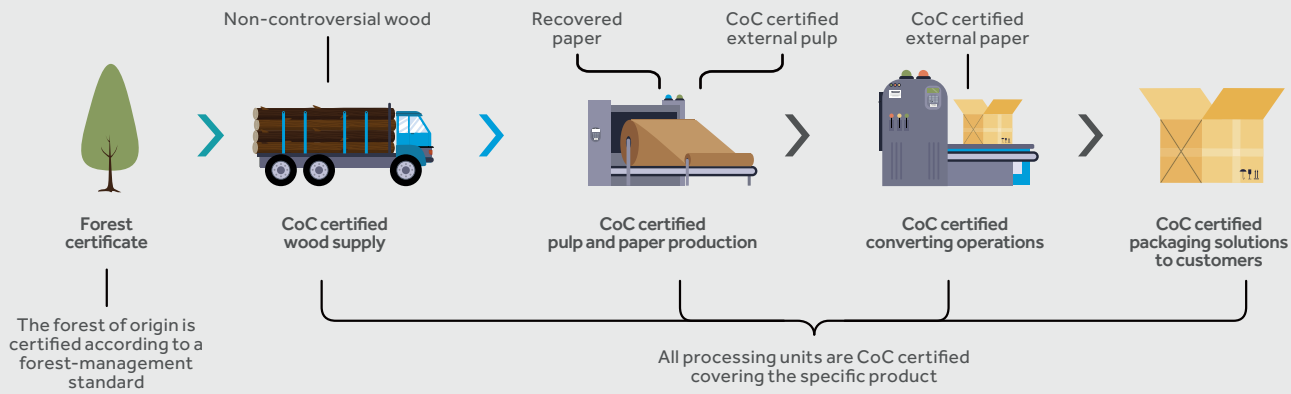
Transparency throughout the supply chain is vital to delivering our sustainability commitments. Robust monitoring and third-party auditing of our supply chain is ensuring sourced fibre complies with our sustainability principles.

Our manufacturing sites are CoC certified, and over 99% of our paper and pulp are sourced through CoC certified supply chains. Our commitment is to deliver over 95% of our sold packaging products as CoC certified.

Our definition of sustainable forest management is focused on optimising the forest's benefits: supplying wood fibre for our business, providing jobs and income for communities and maintaining healthy forest ecosystems that support biodiversity, protect water bodies and supply non-wood forest products. Production of sustainable paper-based packaging starts in the forest. The forest owners commit to manage their forests and plantations according to sustainable forest-management criteria. They obtain a certification after an independent, third-party audit and follow a regular audit scheme where their forest management practices are being evaluated.

The forest certification related CoC management systems start from the harvest of the trees. Each operation and entity processing the material has its own CoC system, which covers storage and use of the material, production and shipping of products, documentation of material and product flows and communication to customers through invoices and delivery notes. In the Smurfit Kappa system, the paper production and converting operations have their own CoC certificates.
Each product carrying a forest certification scheme on-product label carries a licence number that can be further traced back to the supplier, producer and the country of origin of the raw material.

A small amount of fibres used in CoC certified products may come from non-certified forests. Evidence of these 'non-controversial' sources is required to comply with the minimum standard of sustainable forest management. Smurfit Kappa requires this portion to comply with the FSC Controlled Wood standard.



> **"Identifying species in our forests sets a baseline for a collaboration with local organisations on nature protection and improving the ways how we work individually and together."**

over 30%
of our forests in Colombia are protected, natural forests supporting biodiversity

Case Study

Sharing Biodiversity Knowledge

Colombia

"Long before sustainability was even a topic for discussion, we decided to contribute to the environment through a focus on conservation and sharing our in-depth-knowledge," says Adriana Marin, Planning Process Engineer who is in charge of Forestry FSC certification. Since 2005 Smurfit Kappa Colombia Forestry Operations has worked to protect and understand biodiversity and ecosystems. It makes sense, because sustainable forest management ensures continuity of the business and to manage forests sustainably, we need to conserve their diversity. Adriana is responsible for the young tree generation in our commercial plantations, but she has a specific interest in our research on Podocarpus family of pines, the only national pines species in Colombia. This helps the nurseries to produce healthy trees for our plantations and the research would not be possible without our forest conservation programme.

One third of the land Smurfit Kappa owns and manages in Colombia is dedicated to conservation. We work together with local universities to understand the diversity of our flora and fauna and so far, some 3,000 species have been found in our natural and rehabilitated forests. 52 of them are threatened. One of the endangered species thriving in the Smurfit Kappa forests is the Andean Bear that was already believed to have disappeared completely from the region. "In 2022, we started the second round of inventories," says Nicolas Pombo, Director of the Forest Division, "the first inventory set the baseline and next we will be able to measure growth in diversity and see if our forest conservation efforts have paid off."

The Forest Health Programme at Smurfit Kappa is led by entomology specialist, Divanery Bolaños, and forestry pathology specialist, Ginna Zabala. Their team studies and publishes scientific research and applies integrated pest management with emphasis on biological control in our forest plantations. The company has committed to integrated pest management and to keep the plantations and forests healthy, understanding the equilibrium in the nature is the best way. The Programme uses natural enemies of the pests, such as friendly insects that eat harmful insects, in our forests to protect them – in other words, it harnesses biodiversity for commercial use. "We want to ensure that we are not polluting our environment, our waters when managing forests," Carlos says and continues "therefore it is our responsibility to work with the nature and share our knowledge."

We reached 94.3% for the full year compared to 93.45% in 2021, and reached our target level in the last quarter of 2022 which is a Group first. This result is without Russian operations which are no longer included in the Group target. Including Russian operations, the outcome would be 92.7%. In the beginning of March 2022, FSC suspended all FSC Certified trade of wood-based products in Russia and Belarus as a consequence of the illegal invasion by Russia of Ukraine. The decision made by FSC impacted Smurfit Kappa's ability to sell any products as CoC certified from its Russian plants from the beginning of April 2022. On 1 April, Smurfit Kappa announced that it would exit the Russian market in an orderly manner and suspended any support to its Russian operations. Due to these two decisions, Russian packaging sales has been excluded from the scope of the CoC certified delivery from 1 April 2022 onwards.

Smurfit Kappa has implemented a Due Diligence System ('DDS') that further ensures that all of the related Group sustainability and sustainable fibre sourcing policies are implemented at local and central purchasing level. The new wood fibre risk assessment procedure, together with the Wood Fibre Risk Assessment platform, facilitates greater teamwork and standardises local purchasing processes. The implementation of the DDS has been third party verified by 'Preferred by Nature' and the verification process consisted of both overall group and on-site gap assessments. The audit report will be used to further strengthen our related policies/ procedures and the implementation of our sustainable fibre sourcing policy requirements.

Although we source most of our wood from Europe, in 2022, we sourced wood fibres from 39 different countries of origin among which 10 are classified as potential high-risk countries: Argentina, Bosnia, Brazil, Chile, Mozambique, Paraguay, Romania, Russia, Ukraine. Our mills and third party paper and pulp suppliers stopped using any wood with country of origin Russia after the beginning of April 2022. In Colombia, we only source from our own FSC-certified plantations. Fibres sourced from the other nine countries require additional due diligence before purchasing to ensure our sourcing policy requirements are followed.

Forest and Plantation Management

All of Smurfit Kappa's own forest plantations are based in Colombia, France and Spain, of which Colombia represents over 99%. All our plantations are certified, either to FSC or PEFC standards.

France and Spain

In Europe, we offer forest management services through our wood supply companies in Spain and France, where we own and manage some 500 ha of forest. In both, we follow local best practice for forest management, as certified by PEFC. Our wood-handling operations are CoC certified to FSC and PEFC standards.

Colombia

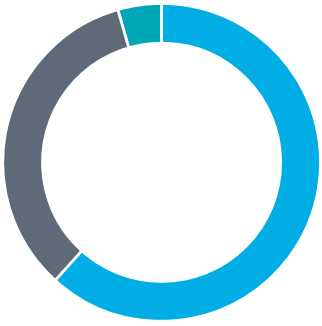
Almost all the virgin wood fibre our Colombian plants need is supplied by 67,600 ha of certified forests and plantations, which we own and manage. We use nature conservation programmes with the best sustainable development principles, promoting responsible use of natural resources along with economic development and social inclusiveness in collaboration with NGOs and other third-party organisations.

We also conform to comprehensive legal, technical and environmental regulations, subject to annual review.

Our 67,600 ha of forests and plantations in Colombia include:

- 41,900 ha of commercial plantations, of which 5,300 ha are partnerships with private landowners;
- 22,700 ha of protected natural forest; and
- 3,100 ha for infrastructure.

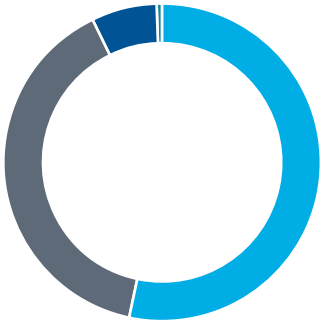
Colombian Plantations Usage



Key:

- Commercial plantations – **42k ha**
- Protected natural forest – **23k ha**
- Infrastructure – **3k ha**

Biodiversity in our Colombian Forests



Key:

- Trees – **1,563**
- Birds – **1,147**
- Mammals – **199**
- Amphibians – **1**

In our commercial plantations, 57.4% of the land is pine, 36.4% eucalyptus, 4.5% is being replanted and 1.8% is dedicated to research. Our Colombian forest management programmes have been certified by the FSC since 2003.

Biodiversity and Ecosystem Conservation

A third of our Colombian forest land is dedicated to protecting forest sustainability, helping maintain the area's rich biodiversity and preserving watersheds, habitats and ecosystems.

To maintain forest biodiversity and sustainability, our principles for our commercial plantations that represent two thirds of our land use are to:

- Conserve them, by protecting and promoting species, diversity, sustaining ecosystems, and protecting water sources and habitats;
- Identify appropriate species and practices that increase plantation yields whilst protecting the environment; and
- Develop research programmes to preserve and enhance soil productivity.

Fibres for paper are efficiently produced on our commercial plantations. We use carefully selected areas for plantations, avoiding valuable ecosystems and protected forest areas. Protecting and promoting natural habitats is important to our approach, so in Colombia we use our own research centre as well as third-party institutions. Since 2009, we have worked with four local universities – Cauca, Nacional, Valle and Quindío – studying the flora and fauna populations in and around our forests.

Examples include:

- A partnership, since 2013, with the Biology Programme of the Natural Science School of Universidad del Valle studying the diversity of birds, mammals and plants in the natural forests of the forestry nucleus in Sevilla.
- In 2014, a literature review aimed to inform conservation planning by identifying areas of special biodiversity close to the Company's plantations and natural forests in the Santa Rosa-Pereira core areas.
- During the past five years, studies developed by Smurfit Kappa identified 2,910 species in our forests. This includes 1,563 trees, 1,147 birds, 199 mammals, and one amphibian, of which 52 species are threatened. Our plantations and neighbouring protected forests form important wildlife corridors, contributing to species, conservation in the Andean ecosystem, and need careful management.
- Since 1994, we have collaborated with coffee farmers in the regions where we have forest plantations to introduce ecological synergies from coproduction of forest plantations and coffee farming.

Working with Local Indigenous Communities in Colombia

Smurfit Kappa is a proud member of the communities it operates in, abiding by local laws and striving for best practice in everything we do. The Company began lawfully acquiring farms in Cajibio over 50 years ago from legitimate property titleholders and now owns 2,700 hectares in the region. Since then the Company has supported the development of sustainable local communities through education, income generation, job creation, environmental management and being a good corporate citizen.

Our forest management activities in Colombia are independently audited each year and must demonstrate compliance with the 10 FSC principles which set out the essential elements of environmentally appropriate, socially beneficial and economically viable forest management. The FSC Principle 3 covers respect of indigenous peoples' rights, among them the free, prior and informed consent. The last FSC forest management certification audit was conducted by an independent third party auditor in October 2022 with no major observations arising. These forests have been FSC certified since 2003.

Engaging in the Communities

The Company has been involved in many voluntary community-oriented programmes which have specifically benefitted indigenous communities, some examples of which are outlined below:

- Collaboration with Yanaconas indigenous community in the Cauca municipality with the purpose of establishing and maintaining a high-density commercial plantation for the production of sawn timber. The support included hosting members of the Yanaconas community in our forestry nursery in Restrepo, Valle, and provided them with technical guidance from our employees.
- In the Suarez municipality we have supported the local Nasa ethnic community, sponsoring musical training for young members of the Nasa ethnic Cerro Tijeras Reservation.
- A collaboration on a business development and cultural identity project with the indigenous reserve of Kurak Chak, Cauca, which is predominately comprised of members of the Misak indigenous community. The project involved the construction and operation of a small sugar refinery in addition to supporting workshops on health promotion and disease prevention.
- We have worked with Nuestra Señora Candelaria de la Montaña indigenous reserve, part of the Emberá Chami ethnic community, located in the Riosucio municipality, in the Caldas department on strengthening the economic productivity of their strawberry and dairy projects and helping them achieve the quality levels to comply with the standards of good agricultural practice certification.

In addition to these initiatives with indigenous communities we have invested more than US$7 million locally in the last three years in sustainable agricultural and forestry production, maintenance of public roads, infrastructure development, economic reactivation, and other social initiatives which benefit local communities in Colombia. In the last five years, we have also invested over €50 million in the upkeep of our forests across all our forestry.

Land Invasions

Given our positive relations with indigenous communities and the peaceful co-existence that had been in place, the events of July 2021 and subsequent unlawful incidents on our forestry land were entirely unexpected.

In July 2021, without any communication of concerns or issues, there were unlawful invasions and significant damage to our forestry (including natural protected forests) by individuals or groups allegedly representing the Misak indigenous community. Since that time, there has been ongoing unlawful activity and damage to the local ecosystem in our forests in the Cajibio region in Colombia. The Company reported, and continues to report, any such actions to local authorities in order to protect the personal safety of our employees, the local community and the diverse ecosystem in the area.

In addition, for a period during October and November 2022 our forestry farm in the municipality of Sotará in Colombia was subject to illegal invasion by individuals or groups allegedly representing the Coconucos indigenous community. In early November 2022 a serious incident occurred on this farm during which a number of our forestry workers were injured and significant damage was caused to our machinery. This incident

Forest Growth and Carbon Sequestration

Colombia

Every year the trees in our plantations sequester carbon from the atmosphere and store it in the growing stock.

Our plantations in Colombia have been established on land that has been in low-productivity use. Since the start of our forestry operations in Colombia, we have established sustainably managed tree stock which has increased the CO_2 sequestration capacity and carbon stock to a total current storage of over 9 million tonnes of CO_2 equivalent ('eq'). In 2022, the biomass on our plantations sequestered in total a little over one million tonnes of CO_2 eq from the atmosphere, a figure similar to the CO_2 eq in the wood we harvested. In total we have stored 9.34 million tonnes of CO_2 eq from the atmosphere in our growing trees inventory which remains at this level year on year.

To calculate this, we use a methodology, developed in collaboration with the Ministry of Agriculture and Rural Development ('MADR'), National Centre of Coffee Research ('CENICAFE'), and several forestry companies to quantify the growth and carbon sequestration capabilities of commercial pines and eucalyptus species grown under tropical conditions.

Europe

The forested land area in Europe has been in a steady growth since 1950's. The land area has grown during this time by some 30% and between 2005-2015 by 44,000km^2 (FAO), an equivalent of over 1,500 football fields. Smurfit Kappa owns some 500ha of forest in Europe, and we source a large proportion of our timber used at our virgin paper mills from forest owners whose forest holdings are located in boreal or hemiboreal forests.

Sustainable forest management benefits carbon sequestration and carbon storage in boreal forests. According to a recent study*, the carbon storage in intensively managed boreal forests grows faster than in those that are less managed. The study shows that the carbon sinks in the sustainably managed forests in Nordic Countries grew by 35% during 1990-2017, where as in other, less managed boreal forests it remained about the same. This means that supporting sustainable forest management is a means to mitigate climate change.

9.34 million tonnes

of CO_2 eq from the atmosphere in our growing trees inventory

* Höberg P. et al. Sustainable boreal forest management – challenges and opportunities for climate change mitigation.

and the circumstances surrounding the fatality of an individual which occurred during this incident are currently being investigated by the relevant authorities. The Group will continue to support the ongoing investigations.

The life, health, safety and integrity of all our employees and neighbouring communities are fundamental values of our Group, and therefore we continue to seek an end to such unlawful invasions, and a return to peaceful co-existence with all local communities.

Peaceful Co-existence

Since the unlawful invasion of our land in July 2021 Smurfit Kappa has openly sought dialogue with the Misak indigenous community. In late 2022, members of that community agreed to take part in an independently mediated dialogue process. This process, which to date has been constructive, commenced in December 2022 with Smurfit Kappa Colombia, members of the Misak indigenous community and other key stakeholders taking part. The dialogue remains ongoing with further meetings held in January and March of 2023, and more planned for 2023.

We continue to believe that peaceful co-existence can be restored in the region within the framework of the law and respect for the constitution. We maintain our commitment to contribute positively to the communities we operate in, supporting the development of all these communities, including the indigenous communities, through our forestry activity and social initiatives.

Case Study

Environmental and Social Sustainability Recognition

Colombia

As we place significant importance on being a socially responsible company, it is particularly rewarding to be recognised for this by our customers and partners.

In 2022, Smurfit Kappa Colombia was once again presented with an award for Exemplary Supplier in the category of Environmental and Social Sustainability for a Large Company by Nutresa Group. This award is an excellent example of our leadership and commitment to social sustainability, biodiversity and ecosystems, innovation, the implementation of sustainable practices and the creation of value for our customers.

The Nutresa Group is a leading multi-national food manufacturing company with similar values to Smurfit Kappa with their commitment to inclusive business practices and the preservation of the planet through circular solutions and sustainable sourcing.

For eight consecutive years, Nutresa Group has rewarded the work of partner companies that contributed to their sustainability objectives through social, environmental and economic initiatives. We were delighted to be recognised as one of their leading suppliers in this award celebration from more than 1,900 companies based in Colombia and abroad.

The nominated companies were evaluated by multi-disciplinary committees and experts, who assessed them on several performance criteria including innovation, productivity, level of logistics service, and environmental and social sustainability.

Commenting on the recognition, Smurfit Kappa Colombia CEO, Alvaro José Henao, said: "At Smurfit Kappa, we deliver through our purpose to create, protect and care, so this award not only makes us feel very proud and grateful, but it also motivates us to continue evolving our work in sustainability and for the communities where we have the privilege to operate. Alongside this is our commitment to contribute to the growth of our customers and the delivery of their strategic objectives."

Water

We are a processor of water and not a significant net-consumer of water, therefore our main focus is on the quality of the water we emit back into the water system. Yet, using water is critical in the paper-making process. Without water, we cannot produce the paper we need for our packaging solutions.

Smurfit Kappa is mainly a processor of water, as illustrated in the diagram on page 57. Our global operations used 141 million m^3 of water in 2022. Almost all of that – 138 million m^3 – was used by our 35 paper and board mills and the remainder is used by our 243 other (packaging) operations.

Of the 138 million m^3 used by the paper and board mills, 126 million m^3 was discharged in good condition and almost 12 million m^3 is evaporated into the air and will return as rainfall or is bound in the product. We also reuse water several times, after which it is processed in our water treatment facilities and returned to public water bodies. Of the water discharged, 81 million m^3 was used for processing and 45 million m^3 for cooling.

Water treatment is part of the bioeconomy. We use bacteria to clean the water, and the resultant biogas fuels our on-site CHP plants. The water-cleaning sludges can be used for other water treatment processes, or in agriculture. We also support forests in maintaining nature's water-cycles through promoting certified sustainable forest management. For example, preserving water bodies linked to commercial forests is an indicator of sustainable forest management, while allocating protected forest land, as we do in Colombia, further supports natural water ecosystems (see Forest section on page 53).

"We also reuse water several times, after which it is processed in our water treatment facilities and returned to public water bodies."

Case Study

Supporting the Health of our Rivers Through Automation

Germany

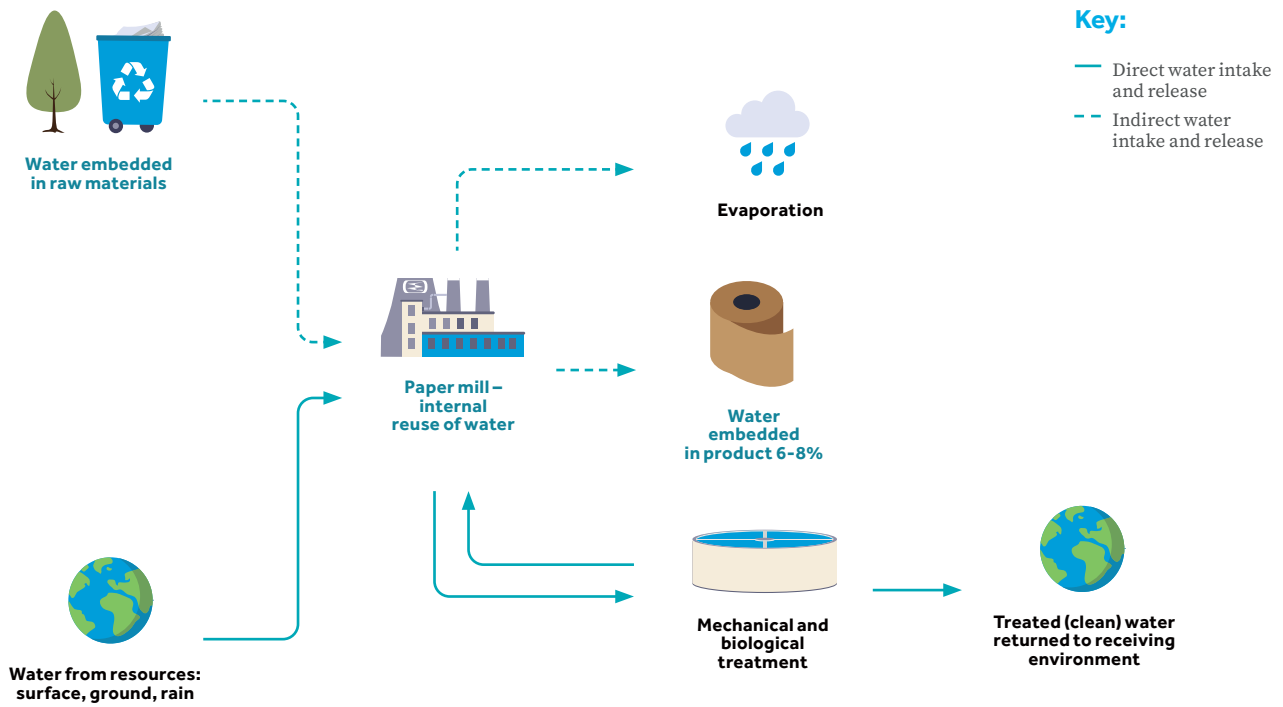
Many paper mills use river water and release treated process water back. To minimise the process water discharge's organic content (COD), the water is being treated in a water treatment plant and part of the water purifying process is done by bacteria. The bacteria need nutrition, which is managed through taking water samples and adding nutrients such as phosphorous and urea that activate the bacteria.

At Wrexen mill in Germany, this is more complex because it produces both brown and white paper, which require different doses of nutrients. Wrexen's water treatment laboratory could only take one sample per day, so it could not accurately synchronise nutrient doses with production. There are strict regulations on effluent and Smurfit Kappa has a 2025 target to reduce COD by 60% compared with 2005 levels, so Kay Berndt, Manager of Technology, Innovation & Development at Wrexen identified an opportunity to automate the water analysis and treatment process.

Kay's team installed automatic water sensing devices in a shelter outside the mill to take readings every 20 minutes. Despite the faster flow of data, calculations to define nutrient dosages still had to be done manually. Kay's team spent six months researching a solution – and found a correlation with levels of oxygen, pH, and temperature, which enabled them to predict what dosages the water discharge would need, depending on the production schedule.

"We wanted Wrexen to have the best water consumption and lowest environmental footprint of any comparable mill," says Kay. "The better the water discharge quality,

Water in the Paper Mill



20%
COD reduction

the more we support the health and wellbeing of our rivers. This new part of the mill is integral of our production process and enables us to reuse most of our water."

With this new automated process, Wrexen has reached a 20% COD reduction, uses 10% less fresh water, has reduced chemical use by 5% and manual handling by 70%. The process has wider ramifications for the industry too, as it could be replicated at many other mills – and a Smurfit Kappa mill in the UK is already exploring how to adopt it.

Committed to Sustainable Water Stewardship

Assessing Risks Related to Water

Since 2014, we have investigated the environmental impact of our paper and board mills and undertook water risk assessments across all our mills. We first conducted a global risk assessment based on the geo-locations of our mills using the Aqueduct and the Weather Research and Forecasting Model ('WRF') tools and created a water scarcity risk mapping for our sites followed by individual risk assessments at sites. In 2021, we completed the first water risk assessments at our paper mills. At the end of 2022, we merged the water risk assessments to our climate risk processes. The project updates all geo-location based, water scarcity based risk assessments using tools such as Aquaduct and WRF, and expands the assessment coverage from paper mills to all operations.

The water risk assessments process focuses on three main risks – physical risk, including local water scarcity and mill equipment, regulatory risk, and reputational risk.

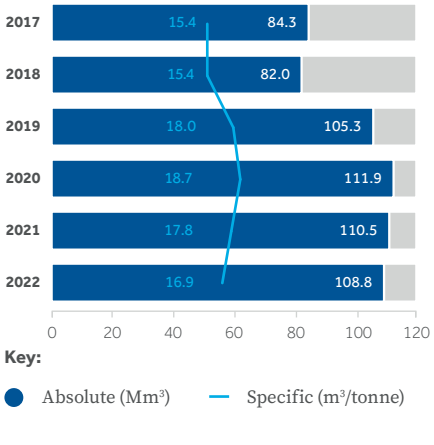
Each assessment comprises a supporting desk study and an on-site audit of each category, including interviews with key stakeholders. Since 2018, the mills have included these assessments in their ISO 14001:2015 certification risk assessments.

All assessments to date confirmed that our mills' water use has no impact on water availability to neighbouring areas. Only 12% of our paper and board production, and just 4% of our water intake, takes place in areas of water scarcity. Nevertheless, we always use water sustainably – many of our stakeholders are focused on local quality and expect good water-management practices.

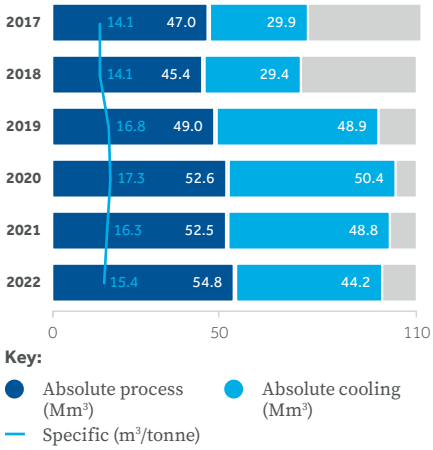
Our products need to meet hygiene standards, and our paper-making technologies require good-quality water. Together with our neighbours and stakeholders, we have a common interest in good water stewardship and we will use these findings to build individual site water stewardship strategies. To manage possible changes in our mill environments, the assessments will be repeated every five years.

"Smurfit Kappa strives to continuously improve its water management, with current focus on improved water use and water quality."

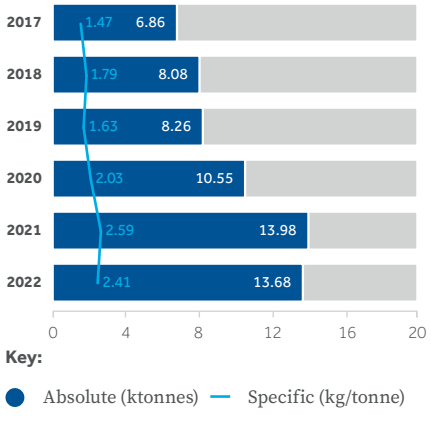
Water Intake: European Mills



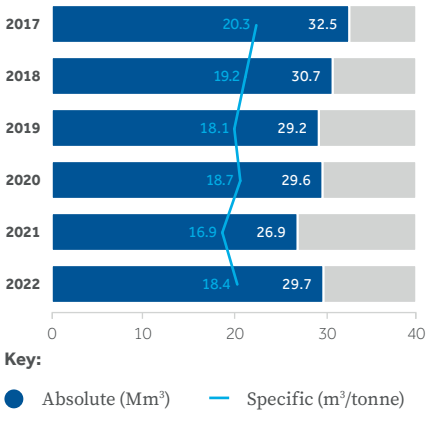
Water Released: European Mills



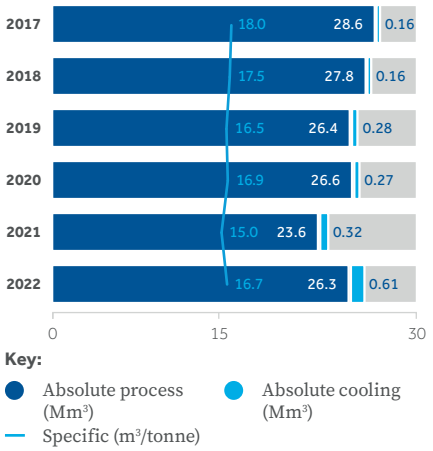
Process Water Discharges* COD: European Mills



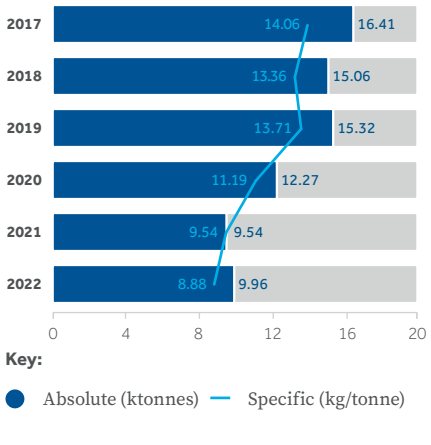
Water Intake: The Americas Mills



Water Released: The Americas Mills



Process Water Discharges* COD: The Americas Mills



* Figures of mills releasing to the environment (mills that released water to external water treatment plants) are not reported.

Since 2018, we are a signatory to the CEO Water Mandate and we are also a member of the Cepi Water Issue Group that is looking into water specific industry issues.

Our paper mills engage with their stakeholders in multiple ways. Six of our paper mills – Forney (USA), Los Reyes and Monterrey (Mexico), Nervión (Spain), Nettingsdorf (Austria) and SSK (UK) – discharge their water to the municipality water treatment system and our Morava mill (Czech Republic) shares its water treatment plant with the local municipality. This collaboration benefits all participants as the water discharge from paper mills helps to balance the nutrition needs for municipality water treatment and thus reduce the need for additional water treatment nutrients needed by the municipality. Depending on location, we participate in water-body management and cross-industry collaboration, for example, our Roermond paper mill (Netherlands) receives the phosphorus it needs for water treatment from a neighbouring baby food plant where it is a by-product of their processes.

Focus on Better Water Use and Water Quality

For the vast majority of our operations, availability of 'fresh' water is not a concern for the foreseeable future. Nevertheless, we believe that a responsible approach to water is crucial.

As a processor and not a consumer of water, we focus our efforts on further improving the quality of water we discharge, and understanding the risks associated with water availability and use in the areas where we operate. We therefore continually implement best practice in our mills' water treatment. In 2022, over 98.48% of paper and board was produced at mills with best-practice water treatment systems. This involves decreasing the organic content of process water through anaerobic and aerobic treatments before returning it to public water bodies.

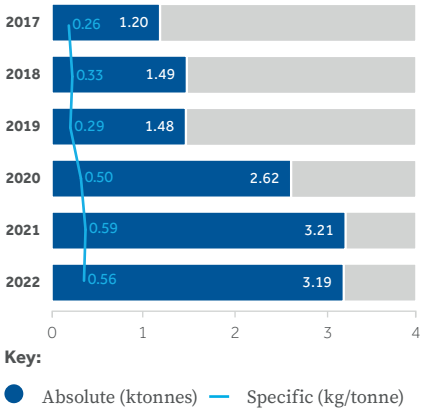
Since 2005 we have invested €129 million in best-practice water treatment systems. Future investment plans include building best practice water treatment for the remaining operations.

Smurfit Kappa strives to continuously improve its water management, with a current focus on improved water use and water quality. Improved water efficiency in our paper mills means improved production efficiency. Therefore, we monitor closely the opportunities arising from best practices to improve our efficiency.

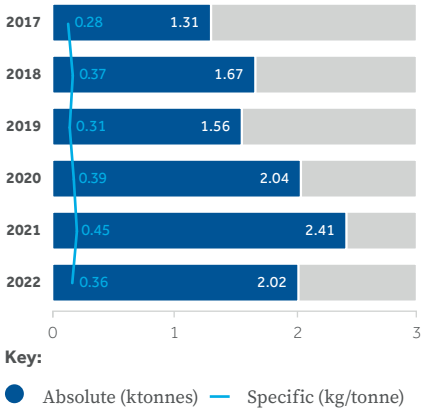
We set a new target to reduce water intake at our paper and board mills by 1% annually per produced tonne of paper. For us, the water quality, and especially water discharge quality is important. The best measurement is the COD for which we have a 60% reduction target by 2025 against the 2005 baseline.

Our COD target is a good measurement also in terms, of understanding how our water-efficiency strategy works, as the COD impacts both paper production as well as effluent.

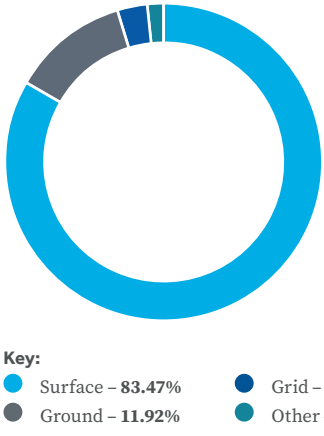
Process Water Discharges* Biochemical Oxygen Demand ('BOD'): European Mills



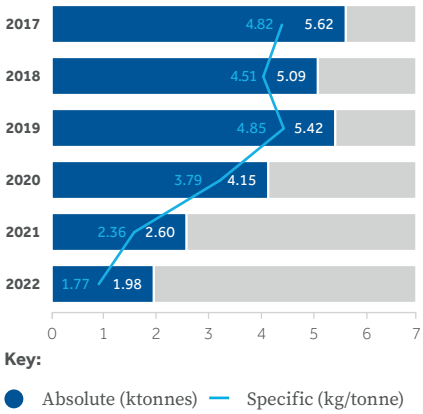
Process Water Discharges* Total Suspended Solids ('TSS'): European Mills



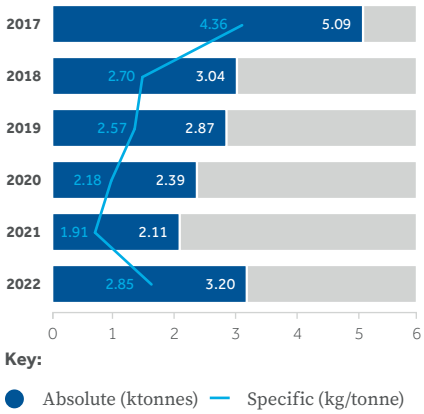
Water Sources – All Operations



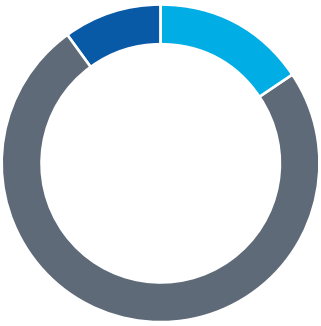
Process Water Discharges* BOD: The Americas Mills



Process Water Discharges* TSS: The Americas Mills



Water Discharge – All Operations



* Figures of mills releasing to the environment (mills that released water to external water treatment plants) are not reported.

Progress in 2022

Water Quality

In 2022, we saw a disimprovement in our COD emissions year on year, which was due to some operating issues at our water treatment plants. We expect the ongoing ramp-up of recent investments as well as the implementation of new waste water treatment plants to support the Group's delivery into the future.

Between 2005 and 2022, the COD content of processed water returned to the environment has decreased by 36.9% relative to production, compared with 38.5% in 2021. We saw a slight backtracking against our target in 2022, mainly due to the following:

- The production increases at our Cali mill, Colombia.
- The insufficiency of the water treatment plant at our Belgrade mill in Serbia to the production volumes. The building of a new water treatment plant has begun in 2022.
- Issues with the start-up of the water treatment plant at our Barbosa mill, Colombia and Alfa D'Avignon mill, France.

The addition of our Verzuolo mill in Italy, delivered improvements to the Group's global COD reduction result.

Water Use

In 2020, we introduced a new target to reduce our water by 1% annually in our paper and board mill network. In 2022, the water intake of all our operations was 141 million m^3, in comparison with 140 million m^3 in 2021. For 2022, compared with 2021, the average water intake by our paper and board mills decreased to 17.2 m^3 per tonne of paper produced, from 17.6 m^3.

2022 is our second year reporting against the target, and we achieved a 2.1% reduction in comparison with 2021. Whilst the specific water intake trend has been decreasing, the key contributors to the target in 2022 were our Bento and Uberaba mills in Brazil, and Piteå mill in Sweden.

Our paper mills recycle water at a high rate. At the headbox of a paper machine, the pulp consistency is around 1% in the water mix. Initially, 75-125 m^3 water is used per tonne of paper. We discharge 3-7 m^3 of water – about the same amount as the intake per tonne of paper. Depending on the specific local location, we recycle 10-40 times the amount of water needed in the paper-making process, and reuse this in the paper machine before returning part of it to our process, after treating it in our water treatment plants. Our Smurfit Kappa Zülpich (Germany) and Bento (Brazil) mills operate closed water loop systems.

"2022 is our second year reporting against the target, and we achieved a 2.1% reduction in comparison with 2021."

Approximately
90%
efficiency in COD reduction at all four water treatment plants

Case Study

Investing in Cleaner Water in the Americas

As part of the Group's ambitious target to reduce COD in our water discharge, we have made significant investments in best-practice water treatment in the Americas region. Water is a medium that helps us to form paper from pulp – a mass of fibres. We return some 90% of the water back to nature after water treatment. The rest of the water evaporates from the process and some is bound in the product.

Most of the time, we return the water we use back to the same water body we take it from. Therefore it is important for us that we manage the water quality of our discharge. We do this by treating the water in the water treatment plants and we work to constantly improve the discharge parameter with COD being the most important.

Since 2018, we have invested in building water treatment plants at our Barbosa, Barranquilla (Colombia), Cerro Gordo (Mexico) and Uberaba (Brazil) mills. All new water treatment plants are now running, delivering towards the Group target of 60% reduction of COD by 2025 in comparison with the baseline year 2005.

The COD reduction efficiency at the water treatment plants is currently at 95% in Barbosa, 87% in Barranquilla, 92% In Cerro Gordo and 97% in Uberaba.

Waste

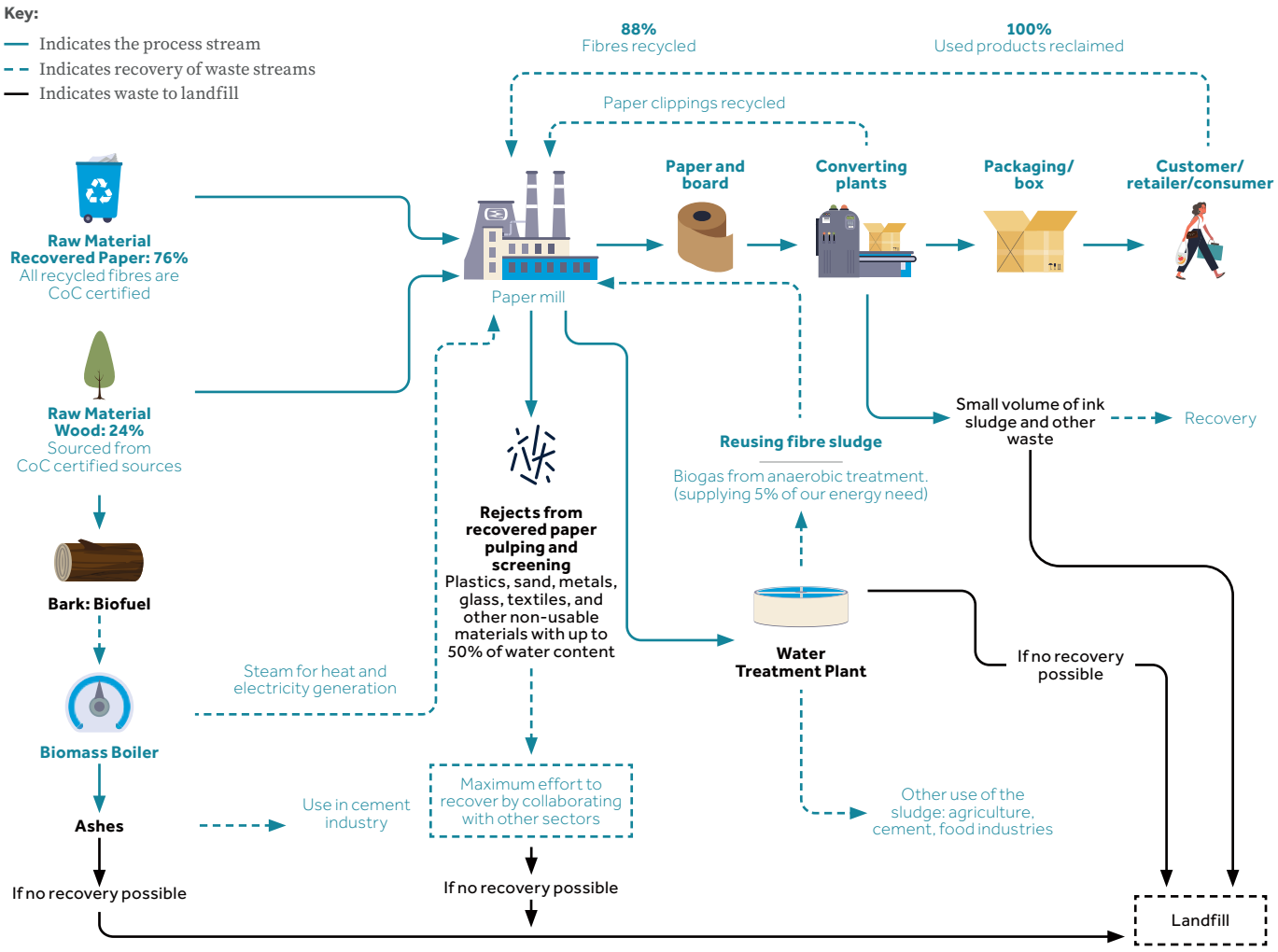
Efficiency of material usage is vital for the bioeconomy and circular economy. We continually find alternative ways to reuse, recycle and recover, to end the linear economy where products end their life-cycle at landfill.

Our packaging solutions help prevent waste, especially in food products' supply chains by protecting products from damage or spoilage. After use – at the end of its life, any paper-based packaging becomes a valuable raw material – it has the highest recycling rate of all packaging materials, supported by advanced recycling systems.

As the graph on page 67 shows, 90.7% of old, corrugated packaging is being collected for recycling and the industry is currently able to recycle 81.5% of its weight as recycled fibres. At Smurfit Kappa globally, we collect 100% of our products back after their use to the production system and in total 88% returns back to our own paper mills.

Smurfit Kappa also participates in its product end-of-life management. Our 44 recycling depots collect recovered paper and paper-based packaging, returning it back to our paper mills, in a sustainable way, where the fibres will be recycled. It is in our interest that the products will be recycled back to the paper-making process. In addition, our

Production Waste Streams



760
tonnes waste to landfill reduction

Case Study

Continuous Improvement in Recycling Waste

Argentina

Coronel Suárez Mill in Argentina has a culture of continuous improvement, and in the past year it has focused on two highly successful waste reduction and recycling programmes.

The bales of recovered paper that the mill processes contain many unwanted materials, mostly plastics, which are sent to landfill three times a week – 200km away. The repulping process also means that all rejected materials come with a high water content. When Superintendent of Maintenance, Javier Guarnieri and Mill Manager, Sergio Torres learned that at another nearby mill an out of order pneumatic screw press was being consigned to plastic waste, they saw an opportunity to bring this back into operation and joined Environmental Manager, Marina Povolo and Environmental Coordinator, Pamela Rey to the team.

Using this press, water is squeezed out of the plastic waste, vastly reducing the weight of the waste sent to landfill. In the next five years, Coronel Suárez plans to repurpose plastic for energy recovery, but for now, this intervention has reduced waste to landfill by 20% or 760 tonnes in just one year, saving an estimated 44 tonnes of CO_2 in avoided transportation.

"We have to be resourceful about sending waste to landfill because it's so far away and expensive, and not sustainable for us," says Pamela. "We're always looking for alternative ways to reduce it."

In another initiative, the team researched how they could divert metal and plastic ink and chemical drums from landfill. Having found a market for the drums, their target was 5% – but within months they recycled 20%, around 10 tonnes. This has saved the site €15.7k in charges and avoided around 9 tonnes of oil being needed to make new drums.

The mill is now aiming for a 25% recycling target, and towards this is in the process or reviewing its waste permit from the local authority.

packaging reduces its own impact by being 'right-weighted', using the minimum necessary material, and we are committed to offering sustainable packaging concepts to all our customers. Read more about the circular aspects of our products on page 101.

Our product end-of-life is part of our material sourcing strategy and we collect used boxes to make new boxes from them. Therefore, we can say that we have fully committed to the product end-of-life management; we are a key actor in the circular economy and one of the largest recyclers of paper in Europe, as well as many of our regions in the Americas.

Our key raw material is recycled fibre and, globally, we use 76% of recycled fibres and only 24% virgin. Our other raw materials have been explained in the tables on pages 118-119.

However, whilst our products are recyclable, we generate under 109 kilogrammes of non-hazardous waste per tonne of paper and board, 50% of which is recovered. A large part of the non-hazardous waste we generate is due to the fact that we are a significant player in the paper-recycling business. The recovered paper bales sent to us by recycling companies often contain unwanted plastic, metals, glass, textiles, sand and other non-usable materials; 49% has to be sent to landfill. On average, it takes 1,078 kilogrammes of recovered paper to produce one tonne of paper and board. To reuse as much as possible, we separate unwanted elements using water, some of which is retained by the non-usable materials and can contribute as much as 53% to the weight of subsequent waste.

To minimise landfill, we reuse our own waste as far as possible. Currently, approximately 50% is recovered, and we aim to reduce the amount of waste sent to landfill by 30% per tonne of paper by 2025, compared with 2013.

Our converting operations send paper clippings back to our mills, delivering high-quality recycled fibre. Recovered paper from our corrugating and converting operations comes with minimal auxiliary materials, decreasing waste from the recycled fibre pulping process, further evidencing our circular approach to production.

Our production waste streams and collaboration with other industries to use our side streams are described in the diagram on page 62.

Work Against Litter

Litter and the reduction of packaging waste are a global megatrend.

Our products are the world's most recycled packaging materials. While the paper industry in Europe generally achieves 71.4% recycling rates (lower than paper-based packaging's 81.5% recycling rate in the graph on page 67), in the US and in Latin America recycling rates of 68% and 48.3% have clear upward potential. This, along with our raw material's biodegradability, positions us to work with stakeholders towards litter-free solutions.

Eventually, our packaging returns to the biological cycle – if not to the recycling loop, then it will either be combusted, emitting only the CO_2 that the wood captured while growing, or will degrade naturally with an even smaller environmental footprint than effectively all other packaging solutions.

Work Towards Optimised Use of Raw Materials

We continually collaborate with other industries to use our side streams, including agriculture, cement and pharmaceutical. In 2019, we joined the 4evergreen initiative that aims to support product design for recyclability and calls for the development of optimised collection systems and appropriate recycling infrastructures. The 4evergreen initiative brings together the whole paper-based packaging value chain, from suppliers to packaging customers such as fast moving consumer goods businesses, to find solutions to current and future challenges in collaboration.

Progress in 2022

Our starting point is paper mill waste sent to landfill. After a Group-wide assessment in 2015, we set a target to reduce this by 30% per tonne of paper by 2025. Most waste is reject material from the recovered paper pulping and screening process.

Other sources include sludge from our water treatment facilities, calcium carbonate residue from lime kilns and ash from biomass boilers.

In 2022, we reported a disimprovement year-on-year, reaching a reduction of 24% of waste sent to landfill (29.2% in 2021) from our paper mills per tonne of paper since 2013.

Case Study

Transforming Waste into Reusable Material

Italy

Verzuolo paper mill in Piedmont, Italy, can process 1,000 tonnes of waste paper every day, but with the recovered paper come other materials that we can't use. Some 4-5% of it is 'reject' – things like the plastic windows in envelopes and metal bindings on folders. In most European countries, some plastic material can be burned for energy, but not in Italy. Instead, rejects go to landfill – at an environmental cost of €190 per tonne for Verzuolo.

Raffaele Marinucci, Engineering Director at Verzuolo, is leading a research project to change this. He saw a new flotation tank technology that could efficiently separate plastics from rubber waste such as used tyres and made a business case to invest in it. With this new technology at Verzuolo, rejects are shredded and then pulped and flushed in a giant water tank. Water makes up 50% of the total volume, and low-density plastics 20%, with 3% being ferrous metals. These materials are now separated out and sold on for reuse via brokers – the plastics can be melted and moulded into many different products, such as pallets.

What was the motivation for this project? For Raffaele it was simple: "The waste reject comes with an extremely high cost and a large environmental footprint. When we buy waste paper we also buy rubbish,

The main reason for the decline in 2022 was the increased production at our Cali mill (Colombia) which has a higher intensity than the Group average and also the fire at our SSK mill (UK) recovered paper yard, which resulted in an exceptional increase of waste sent to landfill. These were partially mitigated by the positive impact of the improved performance out of our Forney mill (US) and Zülpich mill (Germany).

Around 1% of our waste is classified as hazardous, with it mostly coming from maintenance, ink sludge from printing and converting operations and per operation, the amount is small. Our hazardous waste assessment showed the key issue is correct waste classification. Due to local and national lack of clarity in hazardous waste definition, we believe it is conservatively reported in this report.

Our hazardous waste figure increased from 8,774 tonnes in 2021 to 12,815 tonnes in 2022. The annual amount varies due to maintenance, product additives and hazardous waste tanks taking over a year to fill.

19,000
tonnes potential land fill reduction annually

so we must consider the full cost, including disposal of the waste. We also anticipate there will soon be legislation to ban sending waste to landfill. We had to think out of the box to find a sustainable solution."

So far, the project has reached a recovery rate of 25% of the potential reusable waste. With some fine tuning, the new technology should soon be able to remove 19,000 tonnes of reusable materials from the waste stream each year and reduce the mill's waste sent to landfill by 75%. All for an investment of €4.5m – plus the time, effort and passion of Raffaele and his team.

"This modification has helped us... to deliver to our sustainability targets of which the whole team is very proud of!"

Alejandro Perez

41%

reduction of rejects per tonne of paper

Case Study

More Fibres from the Same Amount of Recovered Paper

Recycled fibre is an important raw material for paper. Recent study shows that fibres in corrugated packaging can be recycled up to 25 times. However, recycled paper mills receive their recovered papers with a lot of additives on them. These additives include tapes, glues, and stickers. They are tightly attached to the recyclable fibres and reduce the yield of fibres from recovered paper and fibre ends up as rejects, which sometimes becomes waste to landfill.

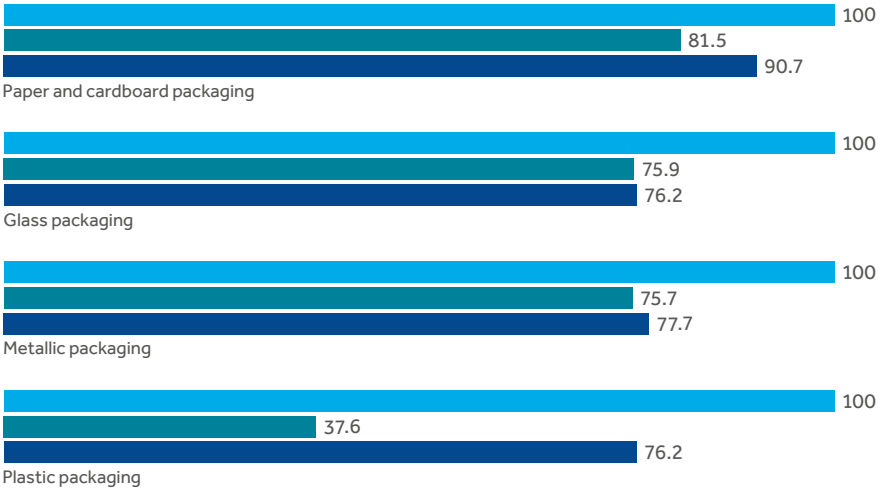
At our Forney mill in the US, the Stock Prep Operations team has been working on reducing the amount of waste sent to landfill and improve the fibre reclamation process. In 2021, the mill was working on a strategic plan to increase capacity. As part of this plan, a review of the stock preparation stage was done.

Stock preparation is the stage in paper production where pulp is being prepared. When repulping recycled fibres, sorters to separate rejects from fibres are used. In the new system arrangement, the sorting flows were re-directed leading to a simpler system and improving the yield of fibres captured into pulp and not leaving the system attached to rejects.

"The introduction of the new system has helped our mill to reduce the reject volume from 183 kg/tonne of paper to 108kg/tonne of paper, equalling to 59%, which is a great achievement in many ways," says Alejandro Perez, Manager of Stock Preparation and Utilities.

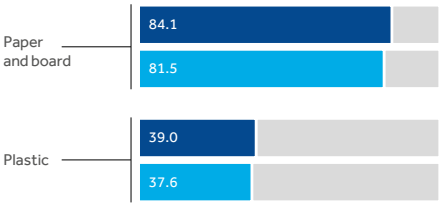
"This modification has helped us not only to use our raw material more efficiently, but also to deliver to our sustainability targets of which the whole team is very proud of!"

Circularity of Packaging in 27 EU Countries (%)
Source: Eurostat



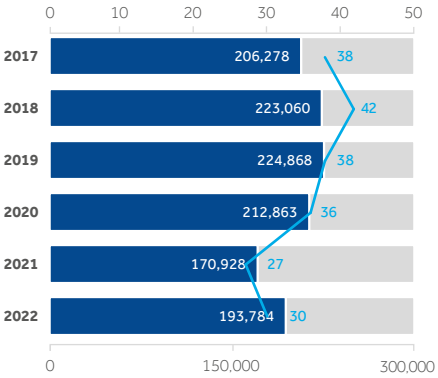
Key: Year 2020
Used Recycling Recovery

Packaging Recycling Rate in 27 EU Countries (%)



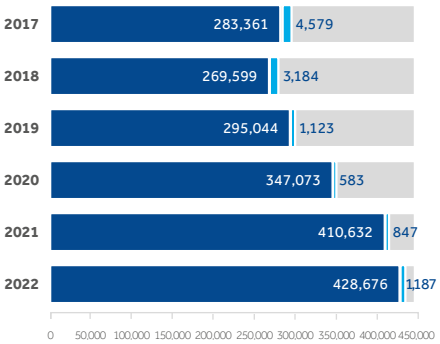
Key:
2014
2020

Non-hazardous Waste European Mills



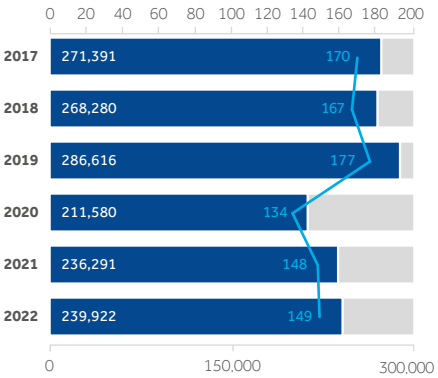
Key:
Waste sent to landfill (tonnes)
Specific (kg/tonne)

Non-hazardous Waste European Mills



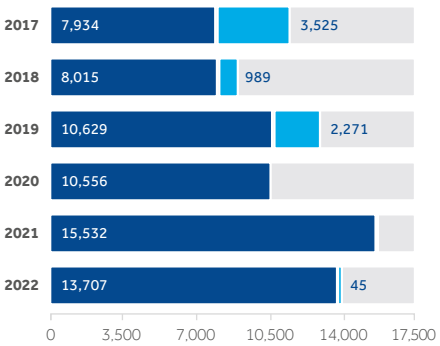
Key:
Waste sent to recovery (tonnes)
Waste sent to other (tonnes)

Non-hazardous Waste The Americas Mills



Key:
Waste sent to landfill (tonnes)
Specific (kg/tonne)

Non-hazardous Waste The Americas Mills



Key:
Waste sent to recovery (tonnes)
Waste sent to other (tonnes)