

unfold the future



The Age
of Fibre

The pulp and paper industry's
most innovative products

205 
cepi



Our sector leads the way

The European pulp and paper industry **supplies 23% of the global market**. It **employs 181,000 people** in **920 mills** and **505 companies**, and adds **€16 billion per year** to the European economy, generating an **annual turnover of €75 billion**. Over **20% of European pulp and paper production is exported**. The sector mainly uses local raw materials; **83% of fibres used are sourced in Europe**.

Pulp and paper producers are part of the much larger forest-based industry sector, which overall represents about 7% of EU manufacturing GDP.

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The proof is in the products

Innovation in a sector can best be monitored by the latest products delivered to new and existing markets. The pulp and paper industry is forging ahead, transforming itself as we speak. Many exciting new products are coming to the market. More are in the pipeline. This overview is CEPI's celebration of the industry's achievements and offers a flavour of some of the most innovative new products (but it's by no means all of them). The publication is the third in a series, following the CEPI 2050 Roadmap and the Two Team Project. Take a look and see for yourself an industry in transformation.

In November 2011 CEPI launched the first 2050 Forest Fibre Industry Roadmap that defined the way for the industry to decarbonise by 80% and at the same time create 50% more value. This widely-recognised document has steered discussions on the future of our industry throughout Europe and beyond.

To meet the challenge of breakthrough technologies, CEPI followed up with the Two Team Project, which delivered beyond expectations. The project came up with eight disruptive new concepts for pulp and papermaking in the world.

The breakthroughs presented in 2013, and the process that led to these concepts, put the pulp and paper industry on the map as a sector of innovation. Consortia of companies and research institutes are now developing these concepts further.

But the proof of change is in the products that we deliver and the markets that we serve. This publication shows the clear progress made so far. There are developments in all product segments – graphic papers, tissue and hygiene papers, packaging and new bio-based solutions from both virgin and recycled fibre.

The common driver is the quest to create new and higher-value products, to explore new markets, and to develop resource-efficient, low-carbon solutions.

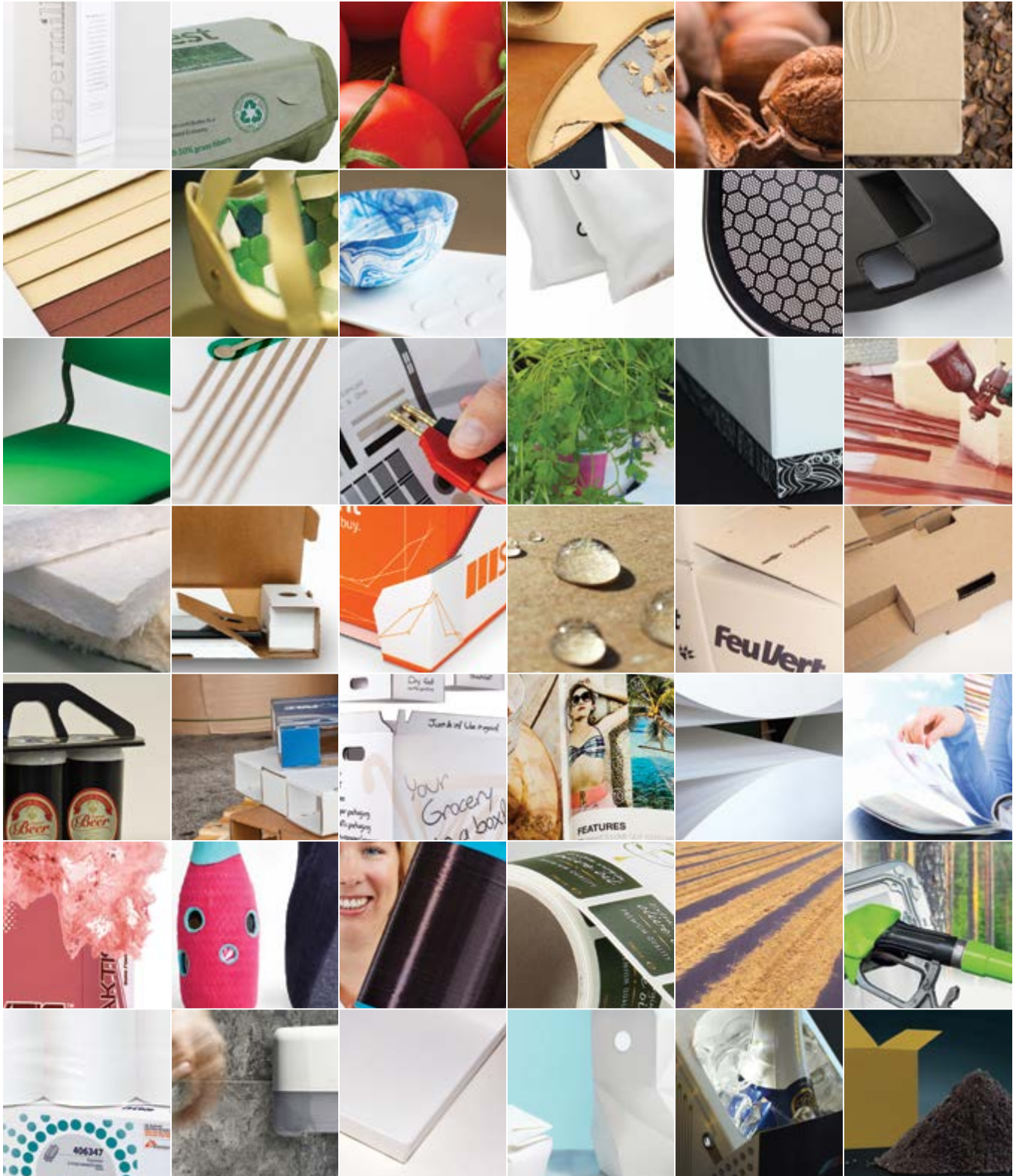
Paper-based products are made from renewable sources. They are recyclable and circular. We see renewability as the circularity of nature. Combined with the extensive system of paper recycling we produce one of the few really sustainable products for the needs of future consumers in Europe and around the world.

However, the core message is something else again: It is excitement, amazement and surprise. Our aim is to show you just how versatile paper can be, and in so many ways.

Gary McGann
CEPI Chairman

Marco Mensink
CEPI Director General

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The CEPI 2050 Roadmap

In November 2011 CEPI launched the Forest Fibre Industry 2050 Roadmap for a low-carbon economy. The Roadmap represents the vision for the sector over the next 35 years. It investigates how to achieve an 80% CO₂ emission reduction and at the same time create 50% more value.

The Roadmap looks ahead at ways in which the industry might transform in the context of the bioeconomy, outlining the technology needs, policy imperatives, and financial perspectives. The Roadmap is not a blueprint. It is an exploration of where developments might lead and an investigation into the policy framework and investments needed. It does not prescribe; it attempts to start a debate. It will be reviewed in 2016 to include an economic update and the results of further discussions on the future of the sector, such as those that have arisen in the course of the Two Team Project.

The Roadmap concluded that breakthrough technologies would be needed to achieve the vision. At the time, we did not know whether such technologies would be possible or cost-effective. The results from the Two Team Project indicate that fundamental breakthrough technologies which dramatically reduce greenhouse gas emissions by 2050 could indeed be possible. They will require considerable investment and research, but their potential to deliver cost savings is significant.

The sector warmly embraced the Roadmap. Over 6,000 copies were distributed and numerous industry events focused on its analysis, outcome, vision and roll-out. Far from remaining a Brussels-centred policy document, it has become the integral vision on the future of the sector. The economic crisis in Europe has made its aims even more compelling.

The future

The CEPI 2050 Roadmap starts from the assumption that consumers in the future will prefer sustainable bio-based goods to other materials. This is grounded in demographic evidence – the future consumer is known today; most EU citizens of 2050 have already been born. The Roadmap was built around the same modelling scenarios that the European Commission used for its policymaking. The challenge set out in the CEPI Roadmap was therefore not only how to decarbonise and how to create more value, but how to do so in a stagnating EU market with a stable but ageing population facing moderate to low economic growth.

The future sector

According to the Roadmap, the 2050 forest fibre industry will be built around a holistic vision of product lifecycle. Fibres will be used and recycled in an optimal way, with the highest possible value added at each stage. When no more products can be made, residues will be turned into energy. The future forest and fibre industry will be seen to operate as a single ecosystem, optimising raw material and energy flows in a complex of wood-based and recycled fibre-based bio-refinery units and non-integrated mills.

By 2050, new business models will have been set up through cooperation with other industrial sectors. A symbiosis of industrial activities will optimise raw material, energy and product flows. Some examples in this report already show that direction.

Value creation

The core strategy defined in the Roadmap is to get the highest possible value from resources – wood, virgin and recycled wood fibres, and non-fibrous raw materials. Creating 50% more value in a mature market is a challenging proposition but new products and markets are the answer. New bio-based products will add value, as will higher value-added successors of today's products. Although the relative share of EU exports in world markets will decline as other economies grow, our export role will remain strong. The forest fibre sector is already the largest bio-based industry sector in volume and value in the bio-economy. If it can hold this position, there is a solid future ahead.

Carbon reduction

The Roadmap technology assessment showed that with continued investment in current best available technologies, a significant carbon emission reduction is possible, provided the right framework is in place. However, today's technologies, even within the combination of resource efficiency, energy efficiency and conversion efficiency measures, do not achieve 80%. The 80% CO₂ emission reduction pathway to 2050 thus depends on breakthrough technologies. This is two investment cycles or a maximum of two paper machines away.

Four times ten years

Breakthrough technologies are not the only answer found in the Roadmap. Cooperation, interaction, resource efficiency, new products, business models and markets all play a role. But breakthroughs and related research, innovation, piloting and demonstration remain central. To implement the Roadmap and deploy new technologies, the sector has 10 years to think (research), 10 years to test, 10 years to build and 10 years to run and optimise the new technologies. Breakthrough technologies therefore have to become available by 2030 if they are to be implemented by 2050.

Breakthroughs

In all stakeholder meetings where the Roadmap was presented, the audience was asked to name the last breakthrough technology which the sector had implemented. Many people mentioned the bioeconomy, and the production of biofuels and biochemicals. Two breakthrough technologies for papermaking were identified, the shoe press being the last. Although basic and applied research already takes place, no company on its own can currently bring breakthrough technologies into reality today. Building on that observation, the Two Team Project was born.

The Two Team Project

The Two Team Project was an initiative by CEPI to identify the most promising breakthrough technologies to cut the carbon footprint of pulp and papermaking. It brought together two teams and set them to compete using a unique method of 'open innovation'.

The teams included researchers, scientists, manufacturers, suppliers and representatives from both the pulp and paper industry and other sectors. Stakeholders from around the world provided input via a dedicated website and social media campaign. The project challenged the teams to be as creative and imaginative as possible while focusing on technologies and solutions for all - old and new, large and small mills, for northern and southern Europe, for tissue, packaging or graphic papers, and for virgin or recycled-based products. Each team decided where to focus, keeping in mind the broad sector scope.

CEPI paid particular attention to the geographical base of participants, to secure the broadest European approach. Two former CEOs served as mentors to the teams, giving guidance, inspiration and direction. In addition, each team was led by a captain, supported by a CEPI Director and driven by a CEPI 'team engine', a colleague dedicated to the team.

The teams were set up to compete on creativity, and not lose due to lack of information. At the start they worked together to establish a common knowledge base. They also used crowdsourcing: Anybody could submit an idea(s) to the teams via the project's website - twoteam.unfoldthefuture.eu. These ideas were considered during the generic concept development. To achieve the best possible cooperation between team members, the final outcome was limited to 'generic pre-competitive concepts'. CEPI and all project partners set up a safe legal environment for team members and everyone who submitted an idea via the website. Partners signed a non-disclosure agreement and an assignment and licence of intellectual property rights.

The teams had seven opportunities to meet, and these occasions were an important part of the process. They were tailored to provide input from outside, gain knowledge from national experts and engage with the sector in several European countries. Over the summer, the teams each finalised four generic concepts for breakthrough technologies. They completed the reports at their final meeting in September 2013. The judging process consisted of two rounds: a pre-jury and a final jury. The pre-jury advised the final jury, based on a scorecard that addressed carbon reduction, value-adding potential, innovativeness and feasibility. The jury convened in Brussels on 17 October 2013 to select the winning concept. Neither the teams nor the jury endorsed specific technologies or suppliers. The winning concept was Deep Eutectic Solvents, a radical new pulp technology, on which a consortium was started only weeks after the jury presented the outcome.

The real test of the concepts now lies in the hands of the industry and the future – only then will we discover which options survive to make it to the market. But progress is good and many in the sector are working to make these concepts become reality by 2030.



Introducing the products

The products shown celebrate the innovative power of the sector. Member companies were asked to submit what they thought were the most innovative developments they saw in their product portfolio. Clear trends are visible: new non-wood fibre sources, bio-composites, printed electronics, microfibrilated cellulose, exciting new packaging concepts, new forms of paper used every day and applications not seen before.

The large number of submissions shows that innovations can be found in many companies and in many regions in Europe. In a number of cases, several examples combined show a clear trend. We present products that are on the market or about to be launched. Examples from European innovation institutes underline these trends even further.

Products are made for consumers, not for policy makers. And the sample shows a clear demand from consumers for new products and new sustainable solutions. Based on this evidence, we feel the **Age of Fibre** has already started. As climate science and economists jointly state that most of the future's oil and gas reserves will have to stay underground, so fewer products will be made from these sources. The bioeconomy is about to become reality.

New markets will open up, to meet the demands of the ever-growing world population. What is great to see is that in any of the new products proposed, sustainable, resource- and carbon-efficient materials can be combined with adding value.

This brochure should be read as a catalogue. All entries in this document deserve to be shown to the widest possible audience. We are proud of all the products received and shown, and so are the people in the mills, plants, head offices and companies that make these products. You will find the companies that contributed at the end of this publication.

If you feel some products or trends are missing, please contact us so that we can issue a new version of this report, showing even more developments in the sector.

Fibre from everywhere

Cellulose is one of the most widespread compounds available in nature and can be found in a variety of renewable resources. Traditionally extracted from wood, the paper industry is now also using cellulose from a host of new sources. They can add something really special to a paper, such as an unusual or luxurious feel or a completely new and different property, while at the same time making sustainable use of what would otherwise be considered waste. Shells, one-way products, plants, milk and even leather residues are all being used as fibre and filler options and added value materials for paper and board of the future.

Papermilk

Paper is as essential as milk for humans. Now there's a way to combine them into a great product which reduces milk wastage. By including milk fibre in the paper process that would otherwise be wasted, the result is a very special paper with excellent tactile properties to suit all kinds of printing techniques and packaging solutions: A really attractive communication tool. Papermilk has some unique features, in particular a very soft and elegant velvety touch. In addition to its obvious environmental benefits, it is ideal for all kinds of creative projects.

Papermilk is made by Gruppo Cordenons Spa in Italy.

GreeNest: a very green eggbox

Nestling eggs safely while delivering a positive contribution to the environment is a challenge met by GreeNest. This innovative moulded box is based on 50% grass fibres sourced from natural reserves. It has a distinctive Smiley label carton design that allows for greater communication. This, combined with a new innovative locking system, creates a product with a premium "look and feel" suited to the high end organic egg market. It goes without saying that GreeNest's carbon and water footprint is lower than that of comparable products as it is recyclable, biodegradable and compostable.

GreeNest is made by Huhtamaki in the Netherlands.

Tomato paper

Growing fruits and vegetables to feed the world is vital. But what happens to their stems? Rather than composting or burning stems, the fibre they contain can be used to produce paper for printing books and magazines, as well as packaging and stationary. Fully bio-based and partly made of greenhouse tomato plant residues, this paper shows traces of the tomato fibre resulting in an eye-catching look and feel. In the future, this bio-based paper could be made of other fibre-rich plant stems. So far, books have already been printed in tomato-based paper and a prototype for a crate has been developed.

Tomato paper is made by Schut Papier in the Netherlands in cooperation with Smurfit Kappa.

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Papermilk



GreenNest



Tomato paper

Fibre from everywhere

REMAKE: Paper with leather

This new paper product uses a mix of wood pulp and leather fibre residues which are collected from industrial processes then purified and pulped. Finding a new life for residues has clear environmental benefits and this product is no exception. Indirectly, this way of adding value to leather residues is an incentive to eliminate the use of chromium, and indeed other metals, during the leather tanning process. It also saves on the costs of final disposal of leather residues. The end result is a fully recyclable and compostable paper with a very smooth surface and a natural look where the leather fibres are visible, depending on the product colour.

REMAKE is made by Favini in Italy.

COFFEE paper range

Where do all those paper coffee cups go once they've been used? Within the UK alone, 2.5 billion of them go to landfill every year. That's a lot of wasted fibre. Now the paper industry has come up with an easy way of separating the plastic coating from the paper, resulting in no waste whatsoever: Around 90% of the cup is paper and converted back into paper and the remaining 10 per cent (plastic) is sent off to become something else, creating a 'closed loop' process. Containing 50% reclaimed fibre and available in six themed colours, the new COFFEE paper range shows innovation in sustainable paper production.

COFFEE paper is made by James Cropper PLC in the United Kingdom.

Eco°Paper with hazelnuts

A leading brand of hazelnut spread has teamed up with a paper company to make smarter use of the hazelnut shells piling up in its factories. In a nutshell, the idea is to wrap the brand's chocolate products in a packaging that contains up to 10% hazelnut shells. Eco°Paper turns vegetal by-products previously treated as waste into a valuable raw material for food packaging. This example of using hazelnut shells to make paper isn't just good news for the environment: The result is very high quality, notably in terms of thickness and stiffness, which is good news for the product and the consumer too.

Eco°Paper is made by Stora Enso in Spain.

COCOA paper

Barry Callebaut, a famous Belgian chocolatier, has partnered with the paper industry to put its cocoa bean residues to good use. An innovative project has turned the residues, until now just a by-product of chocolate making, into a luxurious wrapping paper. Once the shells are processed into a powder, they can be added to any standard pulp used to make paper. The COCOA paper range is available in an extensive range of distinctive and natural earthy tones and fruit colours. They can be used for luxury goods and food packaging, printing, advertising, brochures and annual reports and are approved for direct food contact. Recyclable and biodegradable, these papers are an example of an intelligent solution for the reuse of otherwise lost organic materials.

COCOA paper is made by James Cropper PLC in the United Kingdom.



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REMAKE



Eco*Paper with hazelnuts



COCOA paper



COFFEE paper range

Fibre takes on plastic

The post-petroleum era has begun. There is probably no limit to the potential uses for wood fibre. Here are just a few illustrations to show that wood and paper can be a perfect complement, and even superior substitute to oil-based materials. Look out for more lightweight and hi-tech products in the future that will be moulded, extruded or assembled from wood components.

Bicycle helmet

Stand out from the crowd and stay safe with a fully bio-based bicycle helmet! The ultimate in sustainability, this helmet also delivers on protection by using a combination of hi-tech, renewable materials derived from the forest. With an outer shell made of 3D-veneer, the helmet has paper-based straps and an inner cushioning made from nano-cellulose foam. The latter can be used in a wide range of applications such as construction and packaging. It's an example of what happens when creative design meets the versatility of wood as a raw material: Proof that a bio-based economy is there already.

Bicycle helmet is made by Cellutech AB in Sweden.

3D bowl and dish

Forming 3D shapes purely from cellulose is now a reality. This all-cellulose pulp can be hot-pressed with water to create rigid and water-resistant 3D shapes which are 100% renewable and biodegradable. In the future, the material could have even better hydrophobic properties, opening a wide range of new applications such as tableware that no longer needs washing after use. These applications show the enormous potential of cellulose composite materials as an alternative to fossil-based materials.

3D bowl and dish are made by Innventia AB in Sweden.

PAPTIC: New wood-based bags

There is now a serious and sustainable alternative to the billions of short-life plastic bags that take hundreds of years to degrade. This is an innovative wood-based material that combines the functionality of plastics with the sustainability and recyclability of paper. At a time where more and more countries are limiting the use of plastic bags, there is a real business case for sustainable alternatives, and paper has the answer. An added bonus is that it can be produced in existing paper mills, minimising investment costs.

PAPTIC is made by Paptic Ltd in Finland.

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Bicycle helmet



3D bowl and dish



PAPTIC

Fibre takes on plastic

FIBROMER®: Cellulose-reinforced car parts

A fit-for-purpose mixture of kraft pulp and virgin polymer delivers a strong, light-weight composite and a-la-carte colours. Used in injection-moulding applications, it is a low-carbon and high performance solution for the automotive industry and other markets. Converted into car parts, this composite offers light-weight options to the automotive industry and reduces its overall carbon footprint.

FIBROMER® is made by Mondi in Austria.

Symbio: Forest plastics

Cellulose-reinforced polypropylene is a step towards more bio-based materials in the future. The material can be processed using common plastic processing techniques and has applications ranging from consumer electronics to rigid packaging, to automotive parts and furniture. This material boasts features such as better rigidity than standard plastic while keeping a low density enabling less material usage. This product is being developed within a new business model: It has a dedicated start-up team for development and commercialisation, responding to the need for a fast-paced and market driven product development. Ultimately, the vision is to provide 100% bio-based materials that performance and cost wise are competitive with oil-based plastics.

Symbio is developed by the Symbio team within Sappi Europe in the Netherlands.

Renewable formability

This new cellulose fibre-reinforced plastic composite has a high renewable material content. It is designed for injection moulding, extrusion and thermoforming applications. Up to 50% of its raw material is renewable. The granulates offer smooth and reliable processability. A specially selected mixture of virgin plastic completes the mouldability of granulates for a wide range of end products with precise details. In addition, it has unlimited dyeing possibilities and great paintability. The composite can be used to replace plastic in many applications, from furniture to consumer electronics.

UPM Formi is made in Finland and in Germany.

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FIBROMER®



Symbio



Renewable formability

Fibre on a mission

Today's markets and consumers want more than just products: They need solutions. In the fields of both printed electronics and nanotechnologies, the European paper industry is well placed to provide solutions that will differentiate from mass production and commodities. Be prepared to see paper performing in unexpected areas!

PowerCoat®ALIVE for printed electronics

Paper just got a lot more intelligent. Although it's been a challenge, this product is the proof that electronics can be printed directly onto a paper substrate. This ultra-smooth and highly stable, innovative paper can be used to print RFID tags as well as more complex circuitry. And the fact that it is made entirely from cellulose fibre makes it an environmentally-friendly alternative to plastic substrates. The product range opens up new Near Field Communication (NFC) possibilities for graphic design and creative packaging. It has huge potential, from uses in the medical, pharmaceutical and educational sectors to science, electronics, food and many others. Printed electronics are the bridge between paper and the digital world.

PowerCoat®ALIVE is made by Arjowiggins in France.

A3Ple electronic circuits

This exciting example is a paper-based product with autonomous functionalities, functional materials, functional components, electrical stimulation tools, printed circuit layout, on-line quality control and specific manufacturing techniques. It can be turned into a device for detecting and warning of dangerous gases or posters delivering gas level information. But the real result of the project is a toolbox for printed electronics technology that includes all the key components to build an autonomous electronic circuit on a paper substrate. Upfront investments in printed electronics are now affordable for existing printing SMEs.

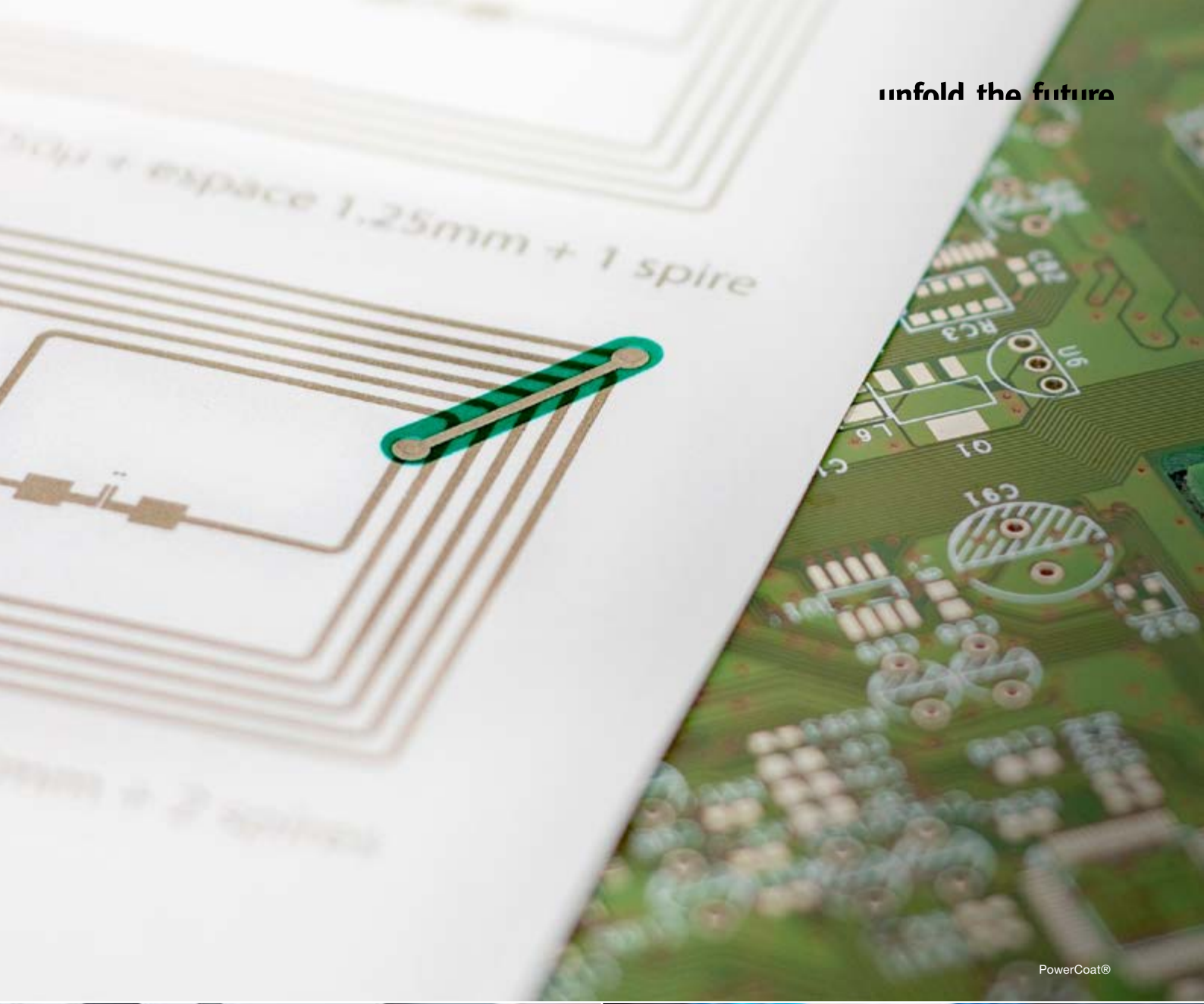
A3Ple is made by Centre Technique du Papier in France.

Active flower plot

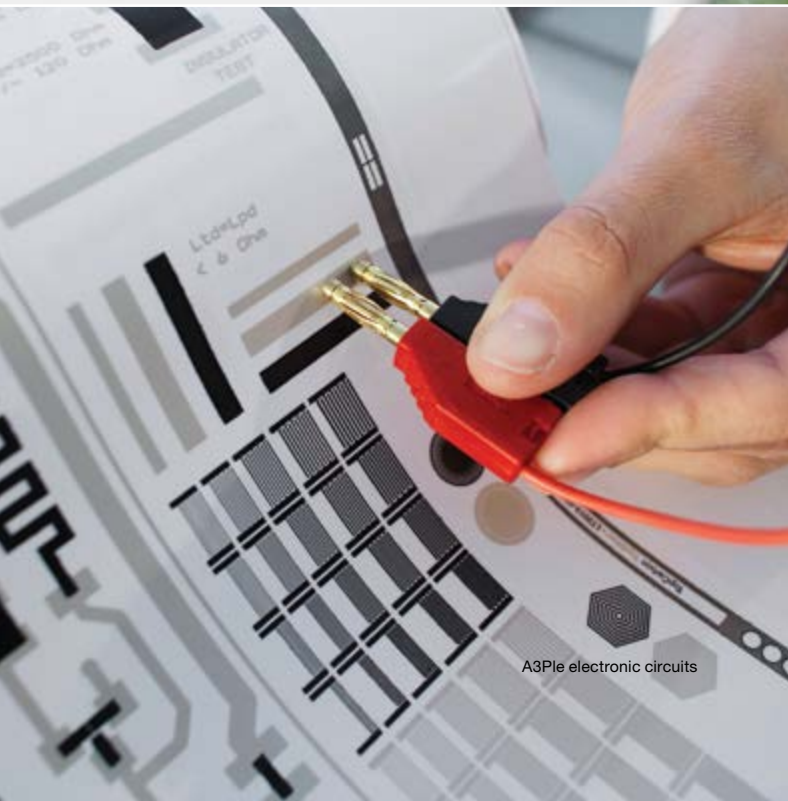
Biodegradable sensing tools, such as built-in moisture sensors, are paving the way for a whole new range of connected products to make life easier. How about an "I'm thirsty" tweet popping up on the screen of your mobile phone, for example, so you know it will be time to water your plants? The biodegradable flower pot with biodegradable sensors embedded in the soil is feasible thanks to the combination of cellulose and printed electronics. Roll-to-roll printed electronics is the latest development that makes printing sensors cost effective. The concept fits perfectly into an increasingly connected way of living.

Active flower pot is made by VTT in Finland.

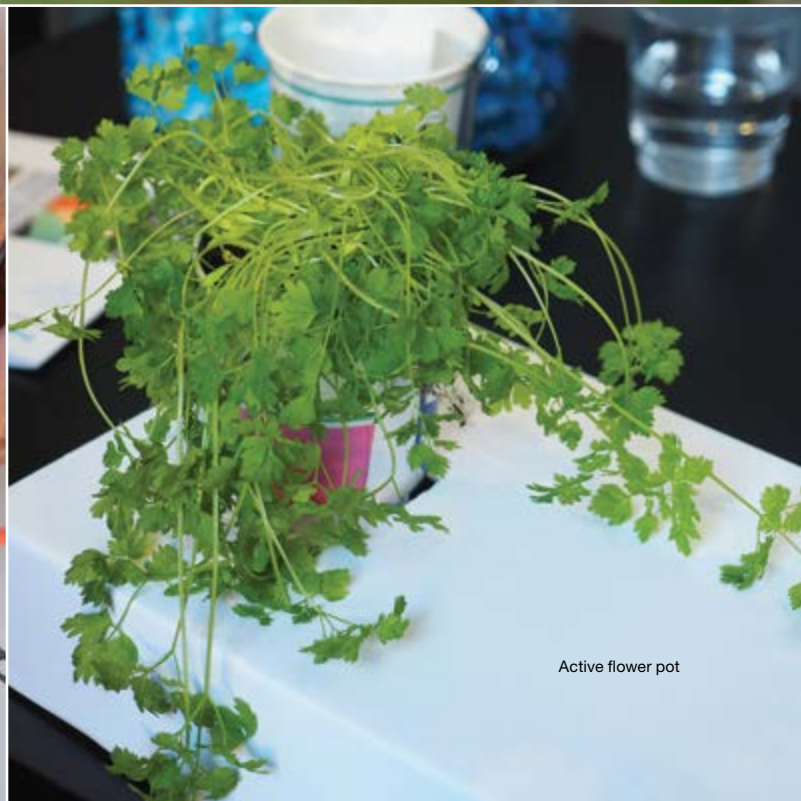
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PowerCoat®



A3Pie electronic circuits



Active flower pot

Fibre on a mission

A cookie box with RFID

A growing number of consumers are allergic to one or another food ingredient. But what's the simple way to find out if they can tolerate a product? This cookie box has been developed to communicate that its content is genuine and safe, but it will also check and warn of potential intolerances for the consumer. It includes RFID (radio frequency identification device) antenna and NFC (Near Field Communication) technology that interact with smartphone applications to alert the consumer to potentially allergenic substances (based on information the consumer has supplied to the application). A window made of micro-fibrillated cellulose can be integrated into the packaging too.

Cookie box is made by Stora Enso in Finland.

Micro Fibrillated Cellulose

When Micro Fibrillated Cellulose (MFC) can perform as well as products from the petrochemical industry, the dream of a bioeconomy becomes reality. This product is 100% bio-based and delivers remarkable results as a functional additive in terms of plasticity, texture modification, water retention, temperature stability and pH variations, etc. Another advantage is that it can facilitate thicker coating layers in spray paint applications without sagging. These properties mean it has great potential in paints, coatings, cosmetics, sun-creams, detergents, adhesives, the list goes on.

Exilva is made by Borregaard in Norway.

Nano Crystalline Cellulose

Nano Crystalline Cellulose (NCC) is a bit of a mouthful but the inspiration behind it was simplicity itself - nature and plants. Occurring in the waste sludge from the papermaking process, NCC can form highly complex structures which make it very good for applications such as foams. Companies are capitalising on this characteristic to develop environmentally-friendly foams which are light, strong, water and fire resistant. There are all sorts of possibilities, from insulation to lightweight composites. Expect to see a lot more any time soon - in houses, planes, cars, ships, windmills and many other applications.

Nano Crystalline Cellulose is made by Melodea, backed by Holmen AB in Sweden.

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Cookie box with RFID



Micro Fibrilated Cellulose



Nano Crystalline Cellulose

Designer Fibre

Packaging plays a clear role in consumer purchasing decisions. It fulfils increasingly-sophisticated functions of communication and protection. Add innovative design and connectivity, and paper packaging is in pole position to win markets, from the wholesaler to the final consumer, by delivering a sustainable answer to many needs.

Protective Wings

Transporting electronic goods safely requires dedicated packaging. But when plastics or styrofoam are used, they often present a recycling challenge for the end-customer. The certified Protective Wings Packaging Family is different, using a “winged” buffer zone made from cardboard to protect the free-floating contents during transport. After opening, the customer can concentrate on the contents of the package, not on how to recycle it. This packaging has already proved that a clever paper folding technique can produce a simple, strong and sustainable packaging design, suitable for even the most sophisticated markets.

Protective Wings Packaging Family is made by Smurfit Kappa in Germany.

SalesFront® in the shelves

There is nothing more inconvenient than having to stretch to reach a product hiding at the very back end of a box. The solution needs no on-shelf device, no engine, and no expensive energy source. Just a specially-engineered band embedded in the corrugated box. This simple solution provides a number of benefits: It is food safe, it lasts for ages and its length adapts to different type of products. For the brand owner, the packaging’s features include product visibility as well as easy access. For the shopper, their shopping experience is enhanced. For the retailer, it improves in-store execution and for the supplier, it improves in-store visibility, brand experience and sales performance.

SalesFront® is made by DS Smith in Germany.

Coverliner repelling water

This packaging material repels water, oil and grease and is made from waste paper and vegetable oil. It can be used to package fruits, vegetables, frozen food, baked goods, you name it. Exceeding the specifications when it comes to water absorptiveness, it also ensures good protection from dirt and other similar substances.

Coverliner is made by Klingele Papierwerke GmbH & Co. KG in Germany.

e-Nature’EL for e-commerce

Easy to assemble, easy to open, La gamme e-Nature’EL boxes have a reinforced bottom, secure flaps and include anti-tampering features. They are 100% recycled-based and do not require any adhesive tape. They’re a great example of how packaging for the growing e-commerce society is becoming increasingly sophisticated.

La gamme e-Nature’EL is made by Emin Leydier in France.

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Protective Wings



SalesFront®



Coverliner



La gamme e-Nature'EL

Feu Vert



Designer Fibre

e-wine

The biggest challenge when shipping or transporting wine bottles is to prevent shocks and glass breakage. This paper packaging is the best packaging solution to prevent horizontal, vertical and side impacts on bottles. It combines shocks absorbers and air chambers to deliver protection. Stringent tests like the one by the International Safe Transit Association (ISTA) that included dropping the boxes, shaking them and piling them up have been carried out successfully. And the beauty of this entirely bio-based shield is that it only takes 10 seconds to assemble.

e-wine is made by SAICA Pack in Spain.

Take it: your beer

More than one can to carry but dislike the plastic multipacks? This packaging solution could be the answer; a practical, resource-efficient and eye-catching innovation. It is attractive, practical, made from renewable resources and has been designed by experts. Customised printing also means marketing opportunities. Could this be the future for multipack can sales?

Take it is made by Mondi in Poland.

Logipac: A paper pallet

It takes just over a minute to assemble this carton-based pallet. Quick but strong! Easy to handle from all four sides with a forklift, the carton-based pallet contains nothing more than recyclable fibre: No nails, no splinters, no glue, no stitches. Transported flat and assembled at the customer's own site, it weighs only two kilos but can support up to 250 times its weight, and it's also printable for point-of-sale applications. In the future, dedicated assembly stations could speed up the pallet folding even more and deliver large quantities to local customers.

Logipac is made by Europac in Spain.

A grocery box for online shopping

Increasingly, busy consumers are turning to online shopping to save time, including groceries. Goods chosen and delivery slot booked, the consumer expects to receive those products as they could in the shop – separated out, with the most fragile well protected from damage – although in some cases that can mean a lot of plastic bags. The grocery box contains a number of sorting boxes or trays, offering optimum protection for the groceries, ensuring an easier pick and pack at the supermarket, and making transport safer and much more efficient. Once delivered, the inner boxes can be used at home to help store products.

Grocery box is made by Stora Enso in Sweden.

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e-wine



Take it



Logipac



Grocery Box

Fibre for creativity

Holding a pencil and drawing on a piece of paper is often one of the first ways a child expresses creativity. When it comes to being creative, paper is still hard to beat. That's why Europe's pulp and paper industry is continually innovating to come up with high-performing and sustainable papers for printing, writing, art and more. Producers are always looking at ways to make their papers lighter and even more sustainable, to improve recycling, and to make papers which look and feel attractive: Papers which will keep on boosting the imagination of the young and the young at heart.

Weight matters

First and foremost, people want their paper to do the job it's been made for. Then they look at features such as opacity, printability and smoothness, before how much it weighs. Now, however, they can have the best of both worlds: This paper is meant for printing magazines, catalogues and direct mail, and at the same time saves customers money by delivering a lighter weight paper with no compromise on performance.

Holmen UNIQ is made in Sweden.

Tactile print in high volumes

Can you picture your life without print? Seriously, give it a try. Take away your books, your framed print, your children's drawings, your photo album... cards, books. Oh, and the magazines go too. You're left with a world that's pretty bleak. Print enriches our lives. Paper calls on your senses. With the rise of digital media, paper qualities will stand out even more. Keeping print competitive in the media mix, while still providing an extensive range of paper surfaces with visual and tactile qualities to match is a challenge. The paper you have in your hands right now answers both these challenges by having a superior look and format flexibility while responding to the demands of the high volume printing market.

The Magno paper range is made by Sappi Europe.

Lightweight performance

Now, lighter weight paper doesn't have to mean compromised quality. This paper solves the problem of achieving an optimal look and feel while reducing the amount of resources consumed. It contains fewer raw materials and requires less water and energy but delivers the strength and printability of heavier papers. As a result, delivery and mailing costs are reduced but the overall environmental performance of the printed product is improved. It was designed to meet market demand: An innovation that adds value for customers.

UPM Valor is made in Finland and in Germany.

unfold the future



Weight matters



Tactile print in high volumes



Lightweight performance

Sci-fibre

Full of science, but no longer fiction. Between the disappearing cement sack and the lignin (wood-based) carbon fibre, the unthinkable is becoming real: Taking full advantage of the versatile assets of wood, the European paper industry is inventing more convenient, more sustainable, more enticing products every day. To infinity and beyond!

D-Sack®: A dissolving cement bag

The construction sector uses billions of cement sacks that go through many handling steps during the mixing process and must then be disposed of. This cement sack dissolves in the cement mixer with no impact on the properties of the concrete or mortar. Made from coated and uncoated papers and with a special venting system, the sack keeps the contents dry and offers the same performance as traditional sacks. Welcome to the world of disappearing packaging...

D-Sack® is made by BillerudKorsnäs in Sweden.

Textile-like paper

A material that is rigid like paper and soft like a textile can be achieved by combining wood pulp with polylactic acid (PLA). Opacity and ease of handling are just two of the assets of paper, while flexibility and adaptability to the content are some of the advantages of textiles. Now a team of scientists and designers has identified additional features that can be added to packaging using this textile-like paperboard. It could be adapted to the product to form a bottle shape, for example, or collapsed with a gentle press of the hand to save space and give an intuitive estimate of how much content is left.

Textile-like paper is made by Innventia AB in Sweden.

Carbon fibre from lignin

Carbon fibre is a high-performance lightweight material which is costly to produce and mostly based on petroleum pitch. In contrast, lignin is an abundantly available by-product of the pulpmaking process. When lignin is produced with a high-level of purity, it is possible to produce 100% lignin-based carbon fibre. This has already proved to be feasible on a lab-scale. Lignin-based carbon fibre would be much more cost-competitive than its fossil alternative. The market demand for strong and light materials is huge, extending far beyond the automotive industry.

Carbon fibre from lignin is made by Innventia AB in Sweden.

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D-Sack®



Textile-like paper



Carbon fibre from lignin

Sci-fibre

Acti-V®: Sustainability sticks

Much of what you see has been put on a product with a so-called release liner. For specialists of pressure-sensitive adhesives (labels, tapes, medical patches) the release paper is a key component that will be coated with silicone so that it can release an adhesive. Now the use of Munksjö Acti-V® paper can reduce the amount of catalyst needed in the silicone coating process by almost two thirds and cut energy consumption significantly. The aim is more efficient and sustainable labelling!

Acti-V® is made by Munksjö in Italy and France.

AgriPap: Rethink mulching

Today, most of the material used as mulch is plastic-based. However, AgriPap will change that. A 100% biodegradable mulch that lasts one plant season, this material reduces pesticide usage, increases yield and boosts plant quality. It also degrades completely without leaving any residue in the soil – and that has the added advantage of saving on labour costs since it doesn't need to be collected at the end of the season. Field tests in several European countries have confirmed a stable performance in different environmental conditions.

AgriPap is made by Stora Enso in Germany.

Next-generation fuel & Biofore concept car

Simple ideas like “more with less” are often big ideas. Wood-based diesel is one of those. Processed in a biorefinery, residue of the pulpmaking process can be transformed into a high quality renewable diesel, which is fully compatible with today's car engines and an ideal fuel for all diesel-powered vehicles. By using a residue of a long established process, it does not compete with the food sector, nor does it create additional pressure on land. The Biofore concept car fuelled with the wood-based diesel gives a new meaning to sustainable transport. It is lighter and contains a significant fraction of thermoformable wood, paper-based self-adhesive labels and bio-composites instead of traditional oil-based ones.

UPM BioVerno diesel and Biofore concept car are made in Finland.

Eucalyptus cosmetics

Eucalyptus biomass and bark constitute an industrial source of high-value triterpenic compounds. Using a special purification technique for crude Eucalyptus globulus extracts, triterpenic compounds content can now reach 98%. Depending on the degree of purity, this pulp industry by-product is a promising source of bioactive chemicals with interesting applications in human health, cosmetics and animal nutrition.

Triterpenic acids are made by PortucelSoporcel in Portugal.

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Acti-V®: Sustainability sticks



AgriPap



Next generation fuel



Eucalyptus cosmetics

Fibre for everyday

Nothing is irreplaceable! That's why we need more sustainable solutions for the future – and renewable fibre products have the answers. More alternatives to non-renewable products are being invented every day by the forest products industry, supplanting other materials to make everyday life that little bit easier, more comfortable, more stylish... and more sustainable. The paper industry is able to offer products of choice, not only because they are renewable, recyclable and biodegradable, but because they have unique innovative features that will make them hard to live without in the future.

Bio Tech & Dissolve Tech: Active hygiene

Some everyday products have super-powers. Take Bio Tech, a dermatologically-tested toilet paper that cleans the pipes using micro-organisms that are harmless for human beings and the environment. This biologically active toilet paper also reduces bad odours and reduces the risks of clogging. Then there's Dissolve Tech, a new generation of hand towels that, besides working very well as a towel, dissolves within only a couple of minutes in water, if flushed.

Bio Tech and Dissolve Tech are made by Sofidel Group in Italy.

Tork EasyCube™

Managers of public toilets dream of the perfect 'connected lavatories' that tell you when there is no more toilet paper, hand towels, soap, etc. A perfect example of the 'internet of things', this invention provides real-time information about the washroom's status. Managers can then use the information to plan more efficiently and coordinate cleaning and refill routes. And users are more likely to experience well maintained and consistently-supplied lavatories. Good news all round.

Tork EasyCube™ is made by SCA in Sweden.

Bio-based kitchenware

It is now possible to serve food in a wide range of plastic-free, fully biodegradable, yet oven-compatible boards, trays and containers. Made of material which is fully recyclable and approved for contact with food, these innovative grades of board can be used in packaging as well. They have been carefully designed to make life that little bit easier, both for the individual and the mass catering sector. The new food-service papers and boards boast a long list of assets, including biodegradability, recyclability, ease of use and food contact compliance.

Food service board is made by Metsä Board in Finland.

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Bio Tech & Dissolve Tech



Tork EasyCube™



Bio-based kitchenware

Fibre for everyday

Self-opening packaging & Self-expanding bowl

Opening boxes can be difficult for elderly or disabled people, especially when they contain hot food, for example. The solution is the box that opens itself when warmed up. These boxes, made entirely from bio-based resources, react to external stimuli, such as temperature or water. In fact, mechano-active paper and board materials offer a vast range of possibilities for packaging design. A second example is a self-expanding bowl, a box made of mechano-active cellulose material that opens automatically when water is added. Third is a minimised packaging containing dry ingredients that grows once hot water is added. Needless to say that this next generation cardboard is food compatible and will make lunchtime a new experience!

Self-opening packaging and Self-expanding bowl are made by Innventia AB in Sweden.

Champagne cooler

The integration of several functionalities to packaging, including conductive patterns that would enable connectivity and interaction, into an attractive design, is paving the way for a new generation of packaging that not only fulfils marketing objectives but delivers valuable services to the consumer. In the future, a champagne bottle will stand out, illuminated and chilled by the packaging. This is now a reality. Cheers!

Champagne cooler is made by Stora Enso in Finland.

Catcher Board: a very smart board

Catcher Board is a unique board. This smart natural solution contains a powdered activated carbon layer which absorbs odours and protects against the migration of unwanted substances. A mono material, it is 100% certified and fully recyclable. Its innovative design uses active coal to 'catch' and block impurities such as ink or glue particles in recycled fibre. This makes the board safe to use for a wealth of applications.

Catcher Board is made by Smurfit Kappa in Germany.

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Self-opening packaging



Champagne cooler



Catcher Board

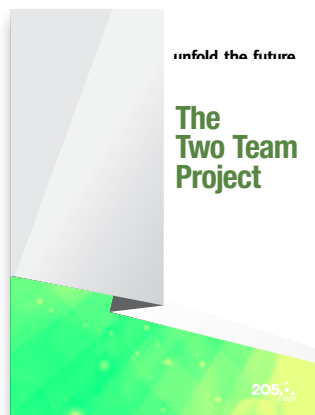
A big thank you

CEPI would like to thank all those who have contributed and submitted ideas. Most of these contributions have made it into the final report, some have not. All have been valuable.

2011



2013



2015



2016



Join us for the revision of the 2050 Roadmap.

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