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confederation of
european paper industries

SUSTAINABILITY REPORT

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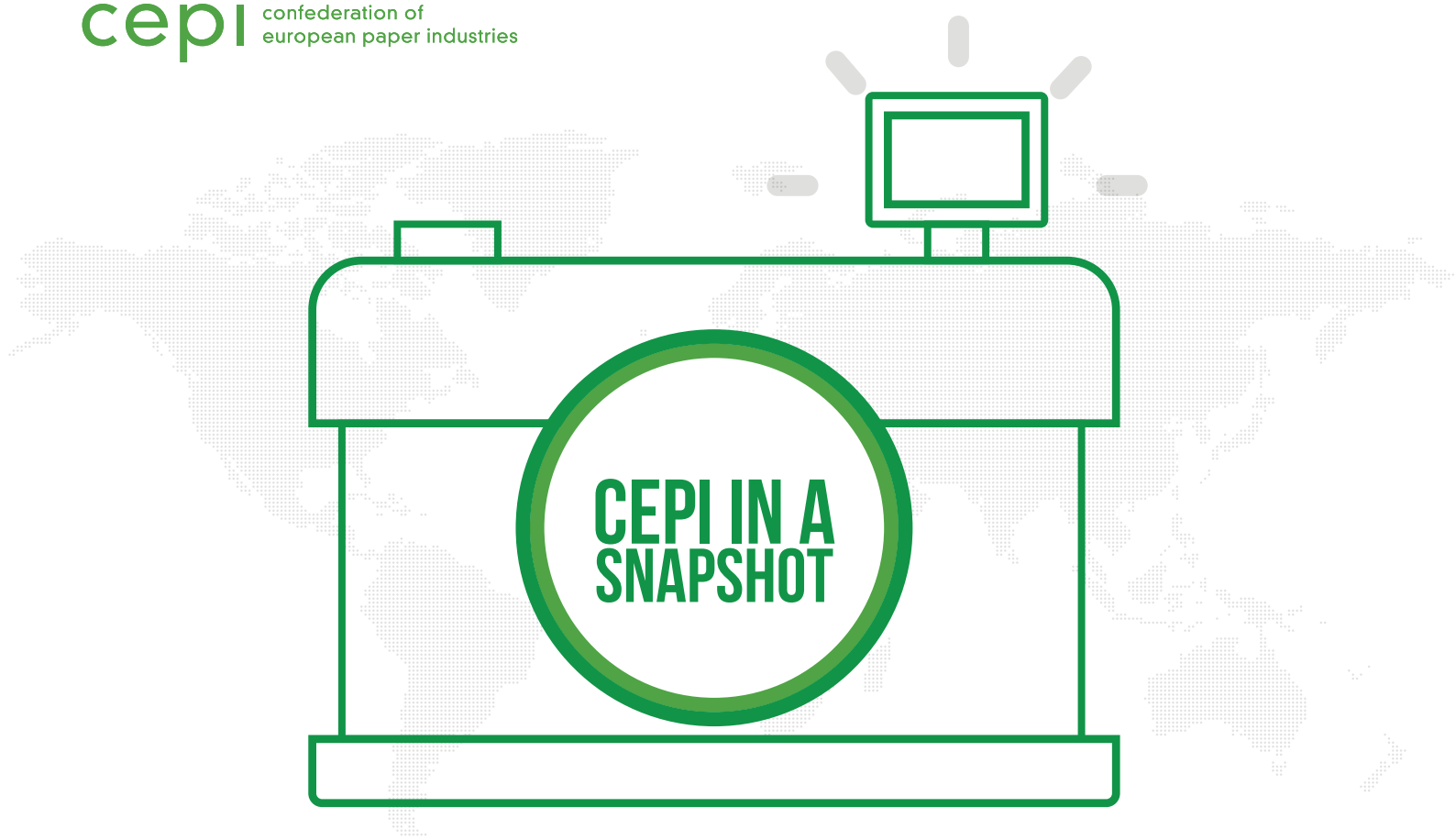

Sustainability and competitiveness have to go hand in hand in order for industry to excel; we are a leading example of this. Reducing our raw material consumption makes sense from an economic and a sustainability point of view.

For instance, we use residues, e.g. bark and wood cuttings, from the pulpmaking process to produce renewable energy. We also turn residues from recycling into useful products that foster Europe's Circular Economy. At the same time we are pioneering research that will provide low-carbon alternatives to the way we produce our products, reducing not only the amount of raw materials we use, but the amount of energy we consume.

Sustainability is precisely that, a vision of business development based on sustainable practices that address society's key challenges, on a long-lasting basis. The European forest fibre and paper industry is the only mainstream industry that is both renewable and recyclable. We are therefore uniquely placed to create new sustainable opportunities for the European circular bioeconomy; a key pathway to safeguarding the European manufacturing industrial base.

CEPI is proud to represent the European forest fibre and paper industry and to champion the sustainability of its products and achievements. As a Brussels-based, non-profit, research and advocacy association, our mission is to represent the interests of our members and the industry towards the EU institutions in the areas of the bioeconomy, Circular Economy, environment, energy, forestry, research and trade. We also seek to enhance the knowledge of our members and the value chain in specific technical areas, as well as facilitating the flow of information between our member associations and their companies.

OUR PRODUCTS ARE AT THE CORE OF EVERYDAY LIFE

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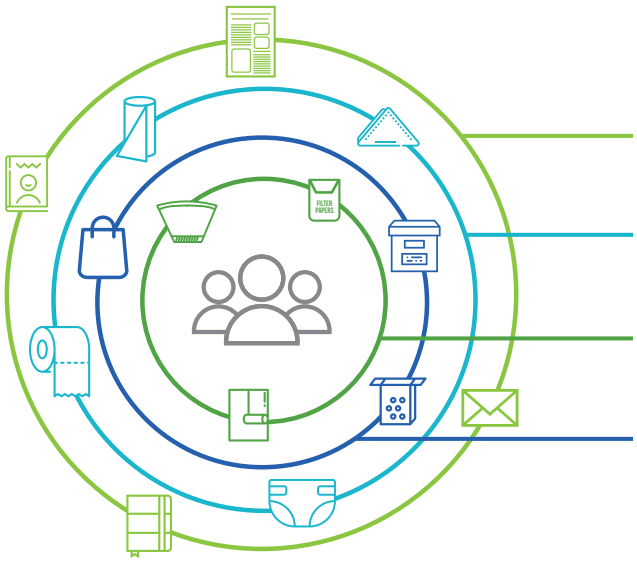


NEWSPRINT, PRINTING AND WRITING PAPER

HYGIENE PAPER

OTHER PAPER AND BOARD

PACKAGING PAPER AND BOARD

92.2 MILLION TONNES (MT) OF TOTAL PRODUCTION IN 2017

PACKAGING PAPER AND BOARD	47.3 MT	51.3%
CASE MATERIALS	29.1 MT	31.6%
OTHER PACKAGING & PAPER	14.0 MT	15.1%
WRAPPING	4.2 MT	4.5%
NEWSPRINT, PRINTING AND WRITING PAPER	33.3 MT	36.2%
COATED PAPER	12.9 MT	14%
UNCOATED PAPER	14.4 MT	15.6%
NEWSPRINT	6.0 MT	6.6%
HYGIENE PAPER	7.4 MT	8.1%
OTHER PAPER AND BOARD	4.1 MT	4.5%

51% PACKAGING PAPER AND BOARD

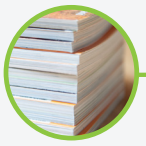
EXAMPLES

Mainly used for wrapping and packaging purposes.

- Boxes
- Bags
- Packaging
- Wrapping
- Toys and Games
- Product Displays

36.2% NEWSPRINT, PRINTING AND WRITING PAPER

EXAMPLES



Represents the sum of newsprint, uncoated mechanical, uncoated woodfree and coated papers.

- Newspapers
- Magazines
- Books
- Brochures
- Catalogues
- Flyers
- Envelopes
- Greeting Cards

8.1% HYGIENE PAPER

EXAMPLES

Covers a wide range of tissue and other hygienic papers for use in households or commercial and industrial premises.

- Toilet Paper
- Tissues
- Napkins
- Kitchen Paper
- Nappies
- Sanitary Napkins

4.5% OTHER PAPER AND BOARD

EXAMPLES

Are used for industrial and other special purposes.

- Gypsum Liners
- Insulation
- Waxing
- Stock of Filter Paper
- Building Materials
- Roofing Materials
- Asphalting

THE PAPER VALUE CHAIN

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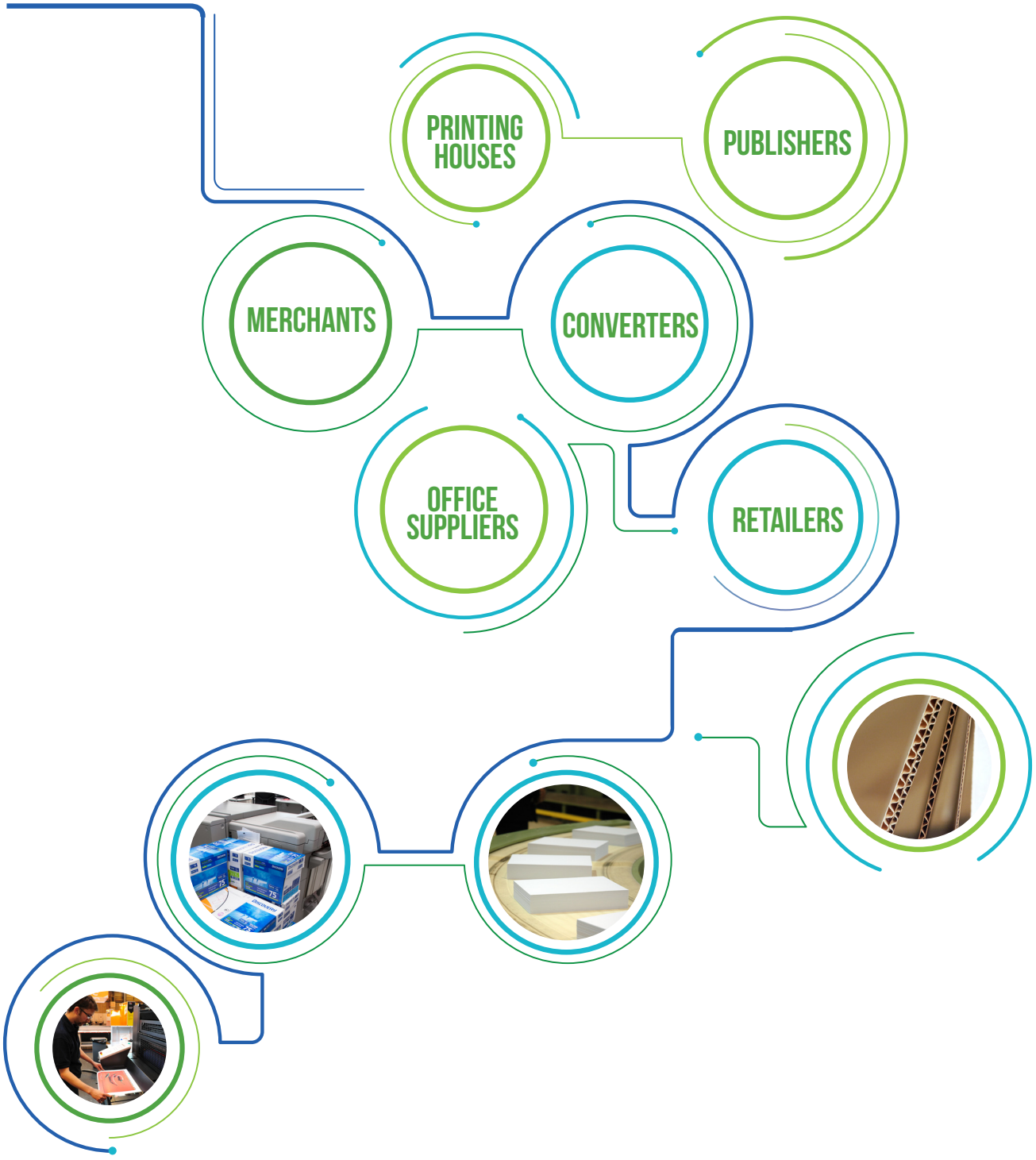

Our products are made using renewable and recyclable resources that come from **certified natural forests.**

CEPI has a long standing commitment towards sustainable forest management and the use of forest resources.

Consumers can be certain that products are made in sustainable ways that respect the environment.

A THRIVING INDUSTRY

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CEPI IN FIGURES

22% GLOBAL PAPER PRODUCTION

92% EUROPEAN PAPER PRODUCTION

18 MEMBERS IN EUROPEAN COUNTRIES

177.000 PEOPLE EMPLOYED

890 MILLS

495 COMPANIES

*€19 BILLION/YEAR ADDED TO THE EUROPEAN ECONOMY

*To the European GDP every year

63% EMPLOYED IN RURAL AREAS

*€82 BILLION TURNOVER ADDED TO EU ECONOMY EVERY YEAR

*To the European GDP every year

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90% OF THE PULP WE USE COMES FROM THE EU

Made in EUROPE

-68% REDUCED ACCIDENT RATE

2002 2014

22% OF PAPER PRODUCTION IS EXPORTED

EXCELLING IN SUSTAINABILITY AND COMPETITIVENESS

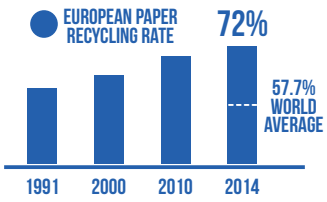
-43% CO_2 PER TONNE OF PRODUCT SINCE 1990

59% OF OUR ENERGY PRODUCTION AND USE IS BIO-BASED

IN EUROPE EVERY PAPER FIBRE IS RECYCLED **3.6X**

2X HIGHER INVESTMENTS THAN AVERAGE MANUFACTURING

93% OF WATER USED IS RETURNED IN GOOD CONDITION TO THE ENVIRONMENT



72.3% WORLD RECYCLING CHAMPION

1M³ = **2.38X** MORE RESOURCE EFFICIENT WITH 1M³ WOOD

CONTACT PERSONS

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DATA QUALITY

We pride ourselves in ensuring that our statistics are third-party quality assured. Deloitte has issued a limited assurance statement verifying the quality of the data we collect.

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2050 OUTLOOK

The European forest fibre and paper industry is at the forefront of a low-carbon bioeconomy in which renewable raw materials replace fossil resources, improving the environment, as well as the quality of everyday life.

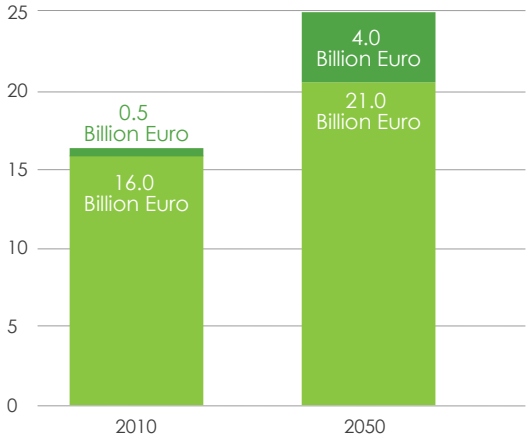
Our 'Investment Roadmap' follows the 2011 vision to decarbonise by 80%, while creating 50% more added value, by 2050. This vision is based on product innovation, market developments, enhanced productivity and process efficiency.

2050 is not as far away as one may think. Due to constant economic changes the time span for action is short. There are two investment cycles for our capital intensive industry in that timespan; in other words, "2050 is two paper machines away". With this in mind, policymakers and industry have fewer opportunities to make the right choices.

We stand by our ambition to make the low-carbon circular bioeconomy a reality in Europe and we can achieve this with the right pro-investment policies and financing conditions in place.

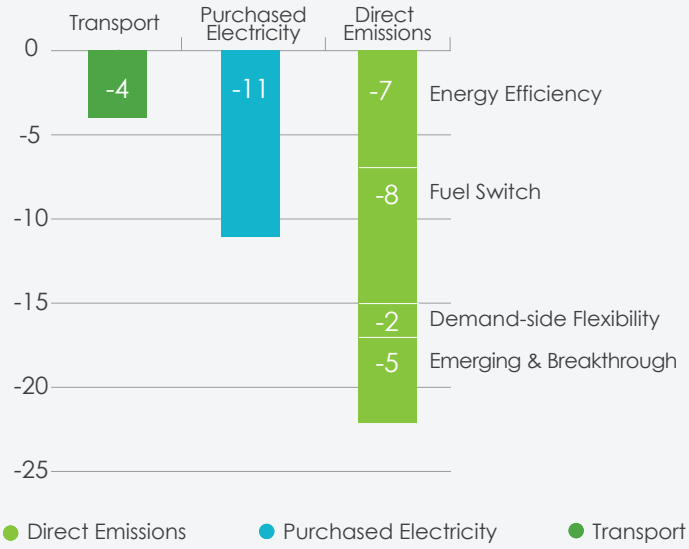
PROJECTING OUR VISION

ADDED-VALUE GROWTH PROJECTION FOR THE EUROPEAN FOREST FIBRE AND PAPER INDUSTRY BY 2050 (IN BILLON €)



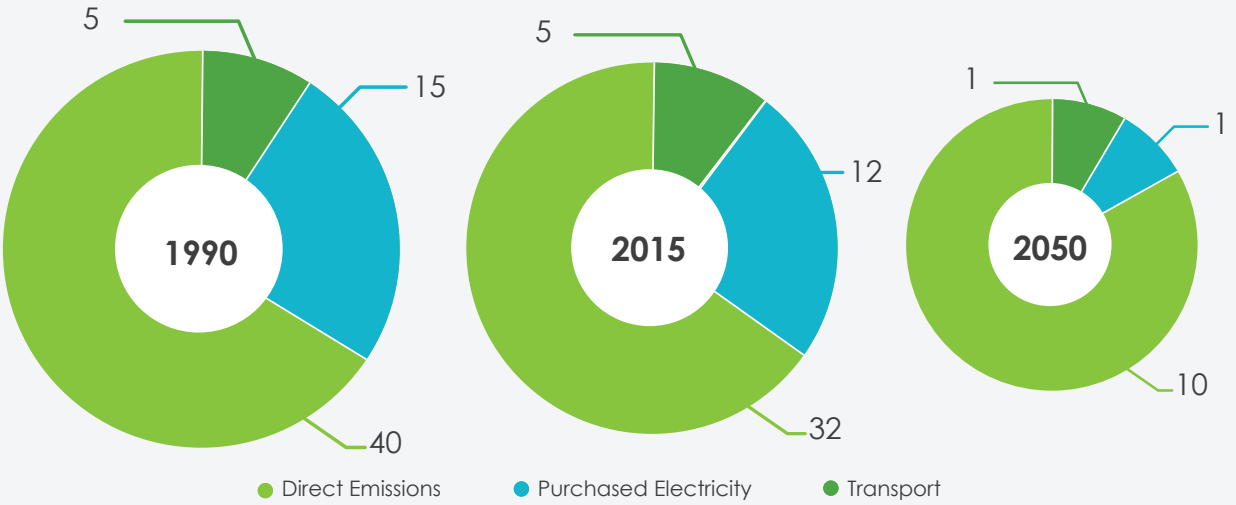
Source: Eurostat/ICF/RISI/CEPI 2016

2015-2050 PATHWAYS FOR DECARBONISATION



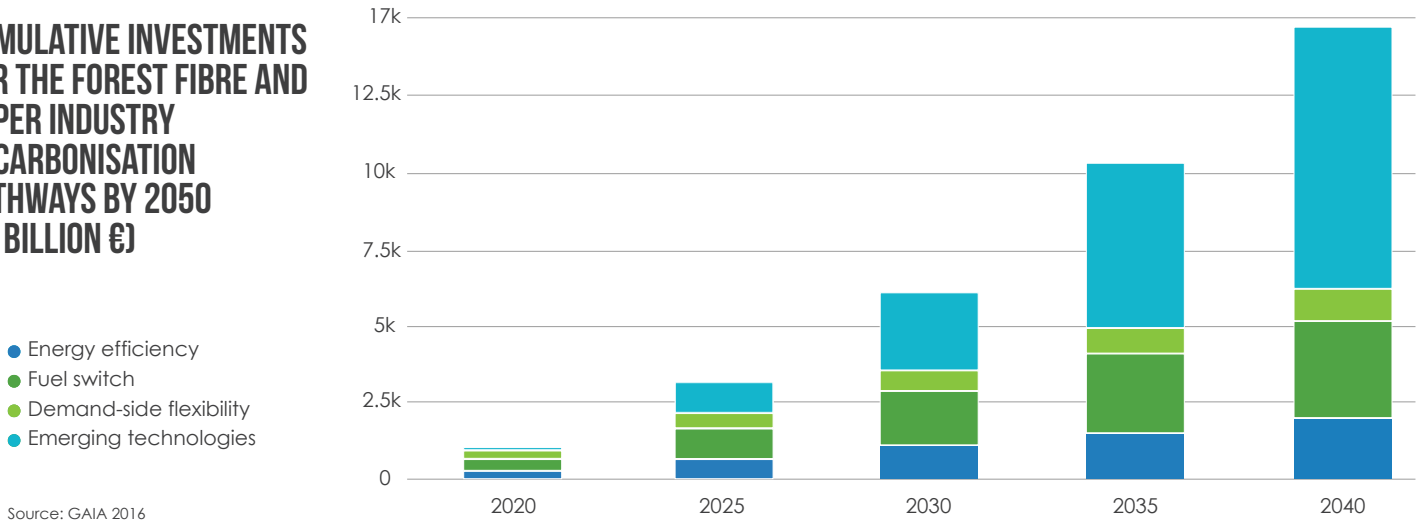
Source: GAIA 2016

CO_2 EMISSIONS REDUCTION AND DECARBONISATION PATHWAYS FOR THE EUROPEAN FOREST FIBRE AND PAPER INDUSTRY BY 2050



Source: GAIA 2016

CUMULATIVE INVESTMENTS FOR THE FOREST FIBRE AND PAPER INDUSTRY DECARBONISATION PATHWAYS BY 2050 (IN BILLION €)



Source: GAIA 2016

MAIN FACTORS AFFECTING LONG-TERM DEMAND OF PRODUCTS

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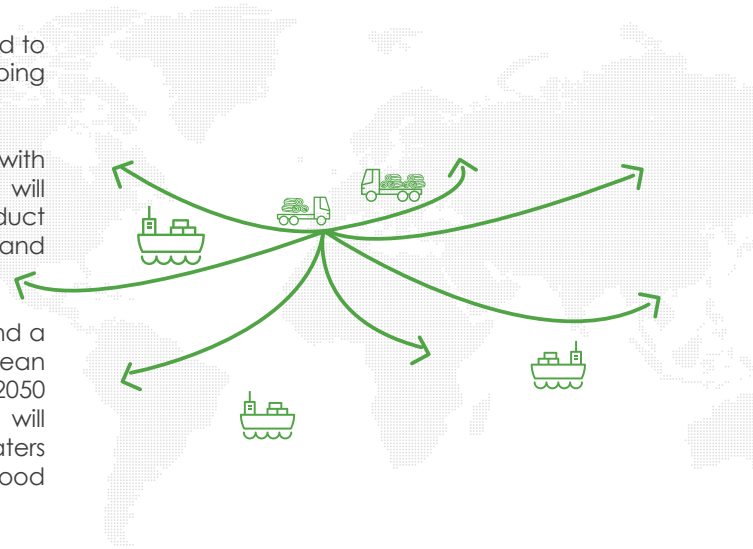
THE MARKET

Europe's shrinking share of global GDP

The growth in European industrial output is expected to slow down in the coming years, while that of developing markets is expected to grow.

We expect our industry to continue to grow in line with EU GDP, by about 1.5% a year on average. We will however see different growth rates in different product categories such as paper used for publications and packaging.

With an increasingly limited amount of resources and a declining share of global output the European economy and industry will need to adjust to the 2050 reality. It is important to ensure policy framework will continue supporting forest management, which caters to the sustainable supply and cascading use of wood resources.



The maturing of European markets and the bulk of global demand outside Europe

While we expect growth to remain steady in Europe, we are likely to see a faster pace in other parts of the world. This means our industry will need to adjust to new customer behaviour, new demands and requirements from society at large.

Although Asia is fast becoming a major producer and consumer of paper products, European consumption per capita will remain higher in the coming years. The paper production capacity in China has and will nevertheless continue to have a big influence on the European forest fibre, pulp and paper markets. In this vein creating value from European pulp and paper products will become even more important.

Our industry's future lies in further integrating our activities with other sectors. New business models, products and services will enhance the use of printing and writing paper and the growing need for innovative packaging and hygiene solutions.

By adding new functions and services to existing paper and board products, such as connectivity, anti-counterfeiting, water-repellence and so on, we will offer new means to differentiate European production from global competition.

From food additives to biocomposites, to advanced biofuels and nanocellulose, these emerging bio-based products will indeed bring even more growth opportunities for renewable, low-carbon bioeconomy that provides a sustainable alternative to a fossil-based economy.

At the same time, the European forest fibre and paper industry is exporting more and more outside of Europe (in 2017, exports rose by 5.2%).

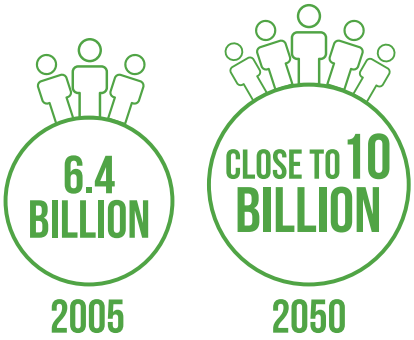
Yet, tariff barriers, applied to nearly half of the exports, and protectionist subsidies for rival goods, create an uneven playing field, restricting market potential. Despite this, we are proud to continue exporting 21% of our production.

DEMOGRAPHICS

Offering a sustainable alternative in an increasingly populous global economy

The world's population reached 7.5 billion people in June 2017 and the UN predicts this substantial growth to continue until 2050, when it forecasts global population to reach close to 10 billion people.

By 2050 the EU will have a relatively old and educated population when compared to the rest of the world. To maintain economic influence, it will need to extract the highest possible value from limited resources. By developing an economic system based on biological resources, supplied and renewed by nature, the planet can sustain our society. A low-carbon bioeconomy pioneered by the European forest fibre and paper industry could become the greatest single driver of the global economy.



MAIN FACTORS AFFECTING LONG-TERM DEMAND OF PRODUCTS

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CONSCIOUS CONSUMERS

Our products: a sustainable and innovative alternative for the European bioeconomy

With a growing global population and increased per capita wealth, consumers are becoming increasingly conscious of resource scarcity and the need for efficiency. In the context of greater consumer awareness, societal demands for sustainable products will only grow.

The European forest fibre and paper industry believes at its core in a production cycle that maximises the value from wood. At the same time, demand for European wood is growing, notably in terms of bioenergy use.

By mobilising the use of wood in more sustainable ways, together with using more innovative means to optimise the added value of raw materials, this would help better balance supply and demand for wood.

***We can produce second-generation biofuels to replace crude oil, as well as renewable bio-based products. It also provides packaging solutions to limit food waste and it uses residues from the woodworking industry as its raw materials.**

***Once paper has served its purpose, the industry recycles it to make something new, also creating additional products from residues from the recycling process.**

DEMAND FOR NEW SKILLS

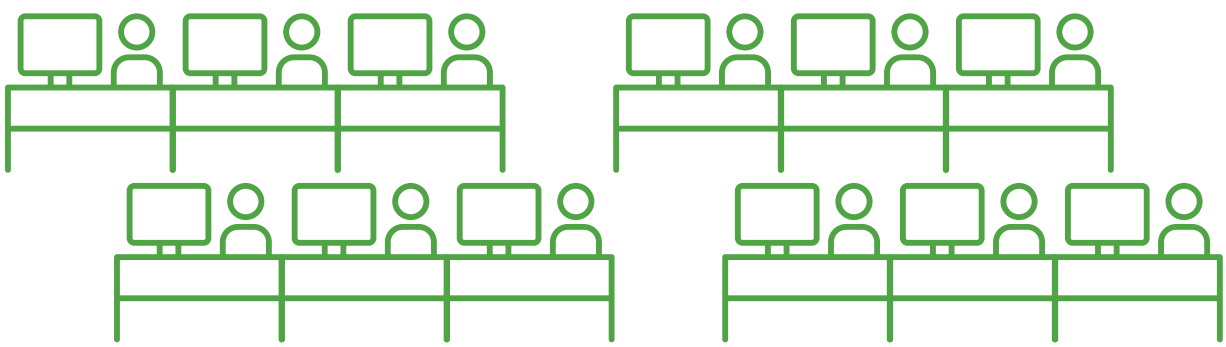
Achieving our vision for the low-carbon bioeconomy will require new skills

The move towards a low-carbon bioeconomy will not only require investment in technologies and new products – but also investment in people, knowledge and leadership.

In order to fully embrace the opportunities the bioeconomy offers, the European forest fibre and paper industry will need the capacity to attract young and talented, skilled employees.

Having a comprehensive approach to education and training that provides European industry with the skilled workers it needs to sustain Europe's low-carbon bioeconomy will be crucial.

You can read more about the steps we are taking to ensure that our future workforce is equipped with the skill sets needed to make this successful transition in our joint publication "Future skills for the paper industry". This publication was produced together with the trade union association Industriall and the support of the European Commission, DG Employment, Social Affairs and Inclusion.



MAIN FACTORS AFFECTING LONG-TERM DEMAND OF PRODUCTS

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DIGITALIZATION

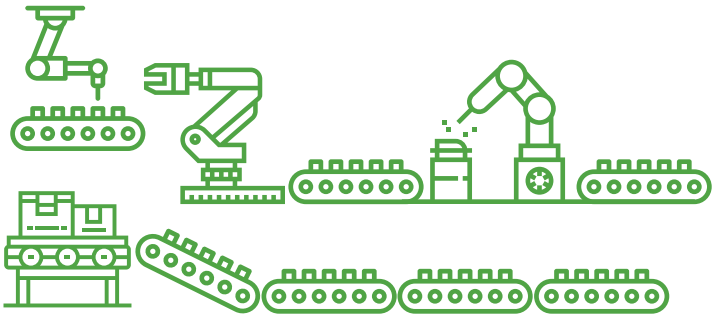
MANUFACTURING

ICT and digitalisation are transforming our production process in more ways than one

As an industry we have the capacity to integrate automation and information technologies into our production processes.

Industry 4.0 is currently being driven by macro-societal trends underpinned by recent technological developments, which we as an industry stand ready to benefit from.

Nevertheless, paper continues to be a particularly potent and effective tool when it comes to reading and learning, despite the digital trend. A multitude of recent studies demonstrate that in an increasingly digital world, young consumers in particular are opting for paper as their preferred means of communications.



At the same time, demand is continuing to increase for different paper-based product segments such as packaging that protects and secures your online purchase. New inventions in 'digital' paper-based product and the growing e-commerce mean the link between paper and digital will be even more prominent in the years ahead."

Demand for hygiene paper is also expected to grow in a world increasingly aware of hygiene and personal sanitary care.

Learn more about how the European forest fibre and paper industry is making 'Industry 4.0' a reality in our joint publication "Paper Industry 4.0 – What digital can do for the paper industry".

DEMAND - Digitalization

By 2020, an entire generation will have grown up in a primarily digital world. Familiarity with technology, and reliance on mobile communications, will transform how we work and consume.

Nevertheless, paper continues to be a particularly potent and effective tool when it comes to reading and learning, despite the digital trend. A multitude of recent studies demonstrate that in an increasingly digital world, young consumers in particular, are opting for paper as their preferred means of communications.

At the same time, demand is continuing to increase for different paper-based product segments such as packaging e.g. the Amazon packaging that protects and secures your online purchase. New inventions in 'digital' paper-based packaging and the flourishing e-commerce markets means the link between paper and digital will be even more prominent in the years ahead.

Demand for hygiene paper is also expected to grow in a world of hygiene and personal sanitary care is of increasingly importance. We cannot rule out a world where a market for 'digital' hygiene paper will also be of importance for tech-savvy consumers.

CONTACT PERSONS

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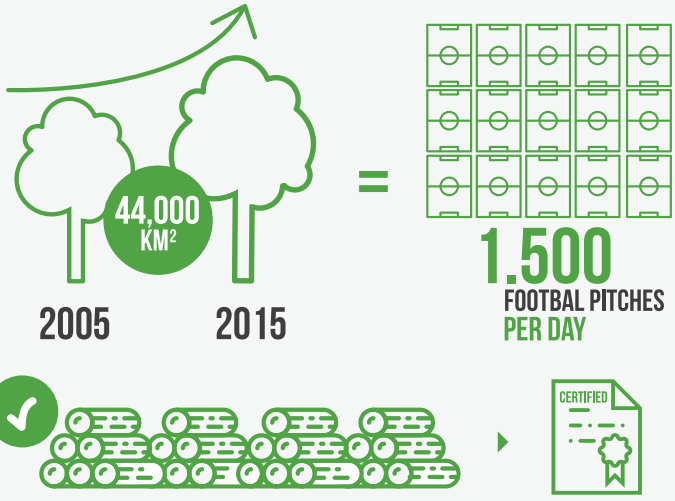
THE FOREST OUR CALL TO LIFE

EUROPEAN FORESTS ARE GROWING



According to figures from the Forest and Agricultural Organisation of the United Nation (FAO) between 2005 and 2015, European forests grew by more than 44,000 km2 – an area bigger than Switzerland – this amounts to over 1,500 football pitches of forest growth every day! Today, European forests stand 30% larger in area than they did in the 1950s.

In Europe, the use of forests is also subject to stringent legislation and wood comes from well-managed forests where the cycle of natural regeneration, planting, growing and logging is carefully controlled.

We, the European forest fibre and paper industry committed early on to sourcing wood from sustainably managed forests. The industry has supported the development of criteria and indicators in the 'Forest Europe' process. This intergovernmental process provides general guidelines which all EU Member States implement nationally.

Through legislation, Member States define binding requirements that operators have to fulfill when planting, thinning, logging and managing forests.

Sustainable Forest Management (SFM) is driving Europe's forest growth. The industry has also invested in the use of forest certification schemes such as the Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification (PEFC) and further voluntary schemes. CEPI actively participates as a member in these schemes.

- 90.4% of forests owned or managed by the European pulp and paper industry are forest management certified.
- >90% of the pulpwood we use is sourced from the EU
- 83.2% of pulp purchased by the European pulp and paper industry is certified.
- 70.7% of wood, woodchips or residues from saw mills we purchase come from forests that are certified.

BIODIVERSITY IS THE BASIS FOR OUR BUSINESS

Well-managed forests provide a natural habitat for wildlife. **The European Environment Agency** (EEA) has stated that 'Forestry practice in Europe is developing in a way that can be considered good for biodiversity.' All pulp imported to Europe is covered by the **EU Timber Regulation** which prohibits imports of wood products from illegally harvested timber.

We rely on forests to deliver the raw material for pulp and paper products. It is vital to the success of our business that the industry acts responsibly and promotes biodiversity, forest health and productivity, as well as providing the many other benefits from forests that society needs.

Please **contact us** to learn more about how we promote biodiversity.

GENERATING EMPLOYMENT IN RURAL AREAS

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Forests also have an important economic role beyond providing a renewable base for resources as they provide vital income and employment in **rural areas** and down the forest-based value chain. In fact, **63% of the employees** in the European forest fibre and paper industry are employed in rural areas.

A CLEVERER WAY TO USE WOOD THAN JUST BURNING IT FOR ENERGY

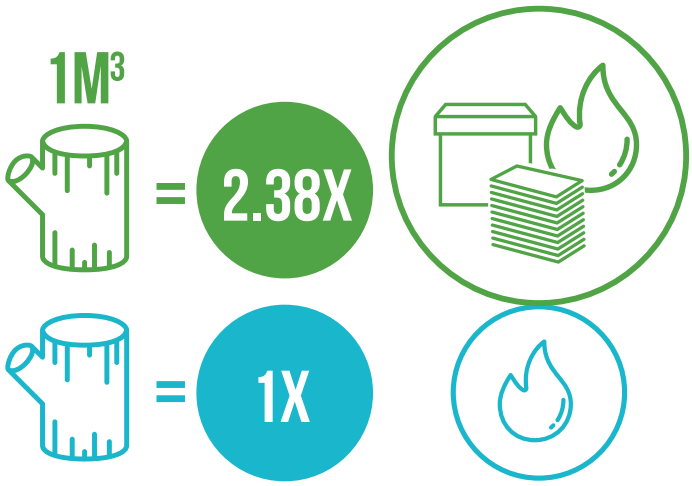
Forest biomass comes from sustainable sources and using wood for bioenergy should only be considered on the basis of the "cascading use of wood principle".

The **cascading use of wood** is a principle is one which naturally follows a market-based approach, which should lead to specific measures to balance subsidy-induced market distortions.

This principle promotes the most efficient use of natural resources, optimising value creation and using the material firstly for food (ideally), then products and finally for energy.

To ensure the continuing health and sustainable use of forest raw materials in Europe, solid biomass should only be eligible for subsidies when it is proven to be efficient.

This cascading principle allows for a situation where every wood fibre is used in average almost **2.5 times** instead of just one, which contributes to resource efficiency and increased value creation for European society. The by-products that are produced by our industry can then be used by other industries, leading to industrial symbiosis e.g. leftover bark is often used as a means of biomass that can heat for district heating.



CASCADING USE
EFFICIENT USE OF NATURAL RESOURCES

PULP AND PAPER PRODUCTION VS. BURNING WOOD FOR BIOENERGY

USING WOOD OR PAPER FOR RECYCLING FOR ENERGY – 1X ADDED VALUE

VS.

USING WOOD FOR WOOD PRODUCTS, PULP & PAPER, RECYCLED PAPER AND CREATING ENERGY – 9X MORE ADDED VALUE AND 7X MORE JOBS

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2050 INVESTMENT ROADMAP

Contact us to learn more about our 2050 'Investment Roadmap' to a low-carbon bioeconomy

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BIOECONOMY AND INNOVATION

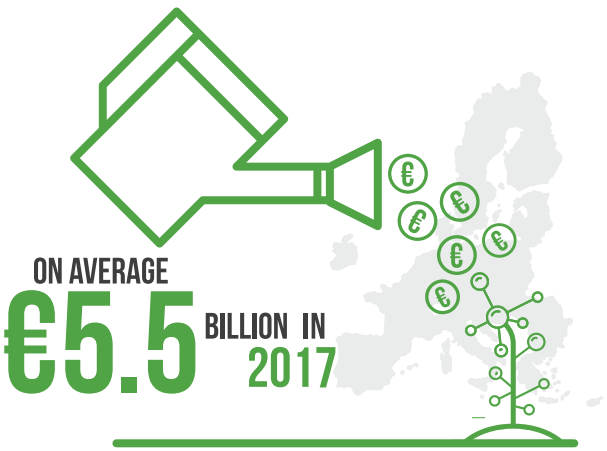
The European forest fibre and paper industry's vision of 80% decarbonisation combined with 50% value added until 2050 is realistic if the right conditions are created.

We need a shared vision in order to build a vibrant, low-carbon bioeconomy and accelerate industry transformation.

By achieving our 2050 vision we can become the European hub for the bio-based economy, integrating wood fibre, bio-based products and novel recycling.

The many challenges will be technical, material and financial, but also political and emotional. Leveraging investments and accessing raw materials are two cornerstones of industry's competitiveness.

NEW INVESTMENTS FOR NEW PRODUCTS AND SERVICES



SINCE 2010, THE FOREST FIBRE AND PAPER INDUSTRY HAS INVESTED IN EUROPE'S BIOECONOMY MORE THAN TWICE THE AVERAGE OF OTHER MANUFACTURING SECTORS.

Industry has increased investment from 3.5 billion in 2010 to more than 5 billion in 2017. However, **in order to reach our vision, we need to keep this trend on track.**

About half of the additional investments are needed to ensure that we can deliver on our ambition to decarbonise. The other half is needed to innovate and develop new bio-based products and services.

EU regulation can play an important role in transforming industry but must be aligned, as outlined in our 2050 'Investment Roadmap', to allow the appropriate conditions for investment.

A European Commission real-time study on our industry, released in November 2016, indicated that over the past 10 years, direct regulatory costs have more than tripled, whilst on average direct and ETS-related indirect regulatory costs have absorbed more than 40% of the industry's annual profitability since 2004.

We are an industry that is capital-intensive and operates on long-term investment strategies – the average age of our production equipment is between 15 and 30 years – therefore regulatory certainty that takes account of investment cycles is crucial.

NEW INVESTMENTS FOR NEW PRODUCTS AND SERVICES

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CONTACT US TO DISCOVER MORE INNOVATIVE PRODUCTS: THE AGE OF FIBRE

MOVING AWAY FROM A FOSSIL-BASED ECONOMY

The European industry has already started the transformation by changing its fuel mix, producing bioenergy and reusing residue flows.

New product properties are being developed, part of a constant process of innovation within the industry. New functions are added and, further along, new products and services introduced. **A range of new companies and activities could grow out of today's industry** entering new business models and markets.

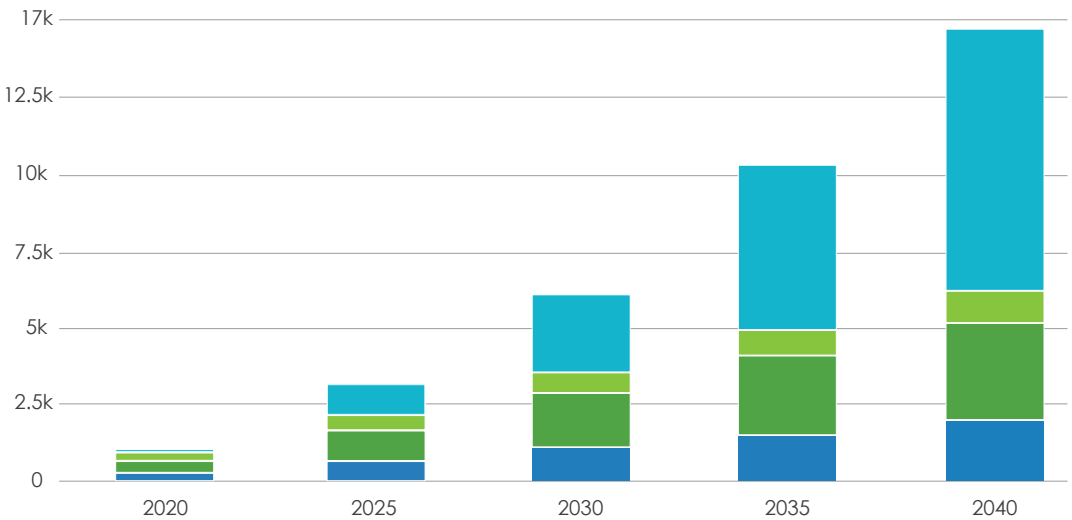
Companies are evolving and transforming. Those that produce wood, paper and board packaging are selling smart packaging concepts and services. Paper-based hygiene producers are fully part of the healthcare sector, using their value chain to provide solutions for an ageing society. Graphic paper producers contribute to an information industry in which paper and IT solutions are combined. Mills are developing into recycling, waste and energy hubs that support nearby towns and cities.

The industry will become a springboard for diverse products and industries, multiplying the use and application of fibre-based insulation materials, nanocellulose, bio-composites, biochemicals and food additives, among others.

Find more about our 2050 Roadmap to a low-carbon bioeconomy: Investing in Europe for Industry Transformation. Request a copy at mail@cepi.org

PROJECTING OUR VISION

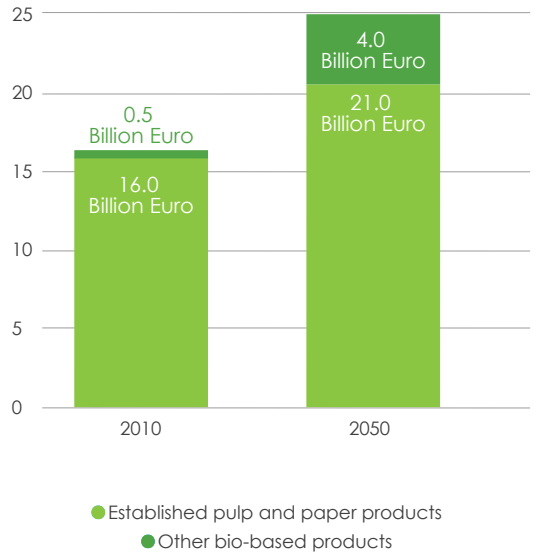
CUMULATIVE INVESTMENTS FOR THE FOREST FIBRE AND PAPER INDUSTRY DECARBONISATION PATHWAYS BY 2050 (IN BILLION €)



Source: GAIA 2016

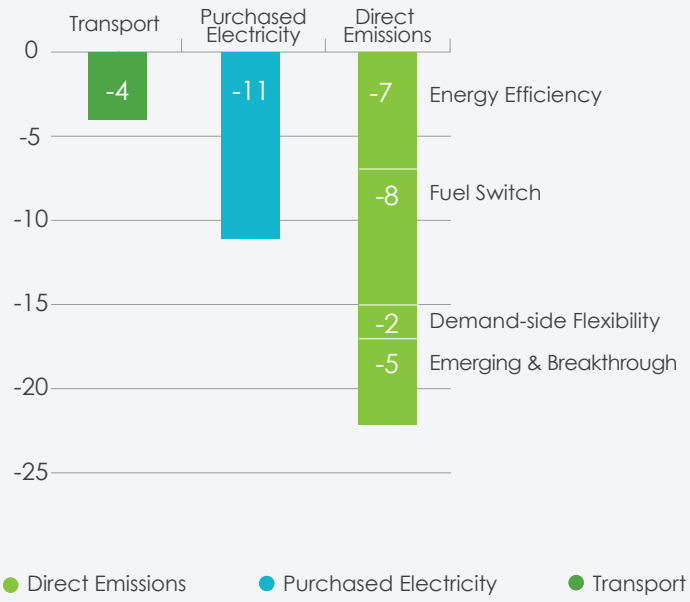
PROJECTING OUR VISION

ADDED-VALUE GROWTH PROJECTION FOR THE EUROPEAN FOREST FIBRE AND PAPER INDUSTRY BY 2050 (IN BILLON €)



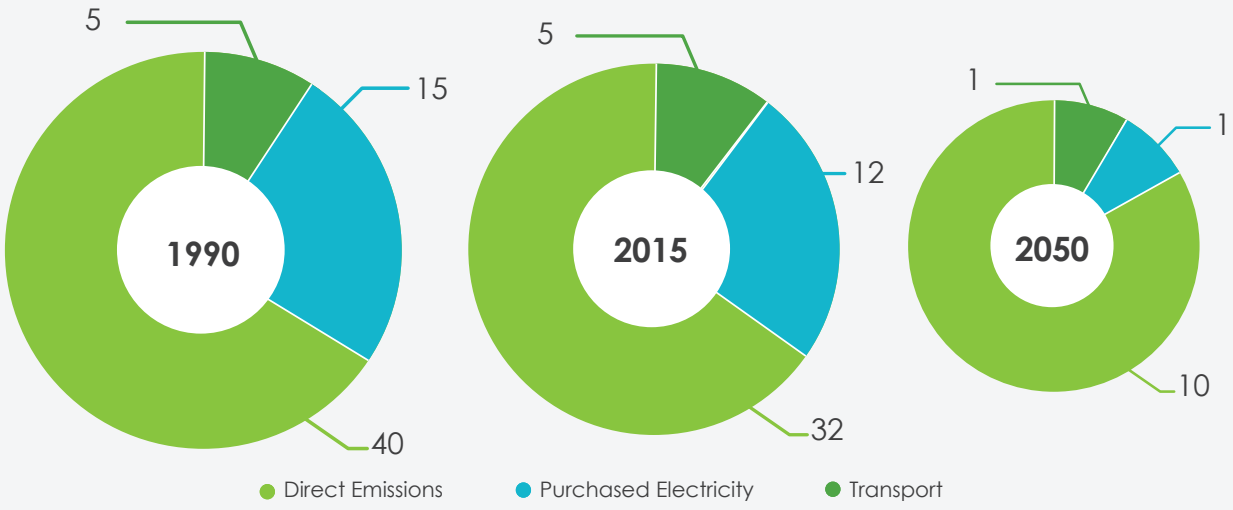
Source: Eurostat/ICF/RISI/CEPI 2016

2015-2050 PATHWAYS FOR DECARBONISATION



Source: GAIA 2016

CO_2 EMISSIONS REDUCTION AND DECARBONISATION PATHWAYS FOR THE EUROPEAN FOREST FIBRE AND PAPER INDUSTRY BY 2050



Source: GAIA 2016

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2050 INVESTMENT ROADMAP

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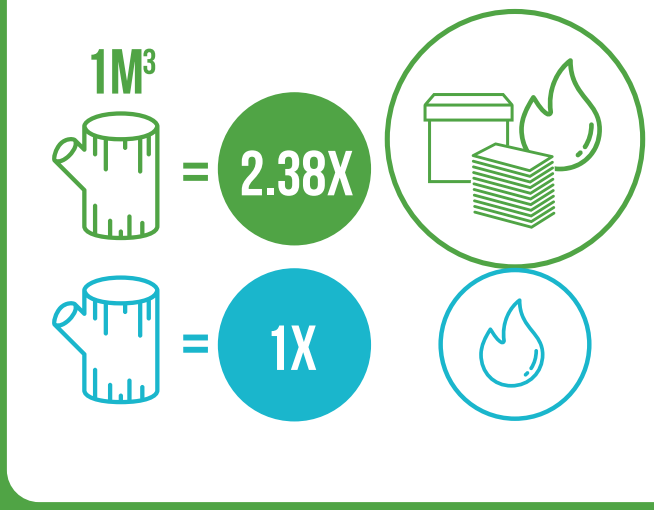
EXTRACTING FULL VALUE OF WOOD COMPONENTS

The life cycle of a paper product is composed of a series of value adding steps, from its extraction from natural, renewable resources until the end of its life.

In the Circular Economy, the end of the paper product's life is reconnected with its production by reusing the already extracted resources which are contained in used products through recycling

Moreover, promoting the use of the cascading principle where wood is first used as a raw material to make products, and where recycling is encouraged before the raw material is used for energy (and only when recycling is no longer feasible), is far more economical than burning it immediately for renewable energy.



A WORLDWIDE LEADER IN PAPER RECYCLING

Paper recycling in Europe reached the record level of 72.3% in 2017, keeping fibres in the loop longer and extending the benefits of their renewable origin. Our industry is now seeking to make another leap forward by reaching the elevated rate of 74% by 2020.

In some regions, recycling rates can reach up to 80%, which is probably the maximum rate from a practical perspective.

Paper is recycled on average 3,5 times a year in Europe, and over 50% of the raw material we use consists of paper for recycling.

Some paper products cannot be recovered for recycling because they are kept for long periods of time (books) or archived (records); others are destroyed or contaminated when used (e.g. tissue and hygiene paper).

Paper cannot be recycled indefinitely as fibres get too short and worn out and therefore can no longer be used in creating new paper. Hence, virgin fibres from trees are needed to continue the cycle. These new fibres come from renewable, sustainably-managed forests and continue the loop.

WORKING WITH THE FULL PAPER RECYCLING CHAIN

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CEPI leads the secretariat of the European Paper Recycling Council (EPRC), set up as an industry self-initiative in November 2000 to monitor progress towards meeting the paper recycling targets set out in the 2000 European Declaration on Paper Recycling. Since then the commitments in the Declaration have been renewed every five years.

The EPRC committed itself to meeting both a voluntary recycling rate target of 74% in the EU-27, Switzerland and Norway by 2020 as well as qualitative targets in areas such as waste prevention, ecodesign, and research and development.

Contact us to find out more about the EPRC.

FOSTERING A EUROPEAN NETWORK FOR INDUSTRIAL SYMBIOSIS

When different organisations get together in a network to foster eco-innovation and long-term culture change, it is called industrial symbiosis.

Creating and sharing knowledge through these networks means that different parts of the supply chain can share their expertise and create new solutions for the future if they are acting on their own accord.

What all synergies have in common is that they reduce costs and generate new value for the companies involved, as well as creating significant environmental benefits such as reduced landfill and greenhouse gases. In addition, the synergies generated through economic activity have further social benefits with the creation of new businesses and jobs.

HOW WE DO IT - CIRCULAR ECONOMY BEST PRACTICES

THE REFFIBRE PROJECT: IMPROVING RESOURCE EFFICIENCY

The paper and board production process, especially in the case where paper for recycling is used as the raw material, leads to the generation of large amounts of side streams –mainly sludge, other rejects and process water.

The Reffibre Project project identified a number of opportunities to valourise these side streams, either those already on the market or in various stages of development.

IMPACTPAPEREC : SEPARATE COLLECTION AND QUALITY

A pre-requisite for a high recycling rate is separate collection at source and high quality. CEPI was involved in the Horizon 2020 programme IMPACTPapeRec, with the aim to of helping municipalities improve separate collection of paper and board for recycling.

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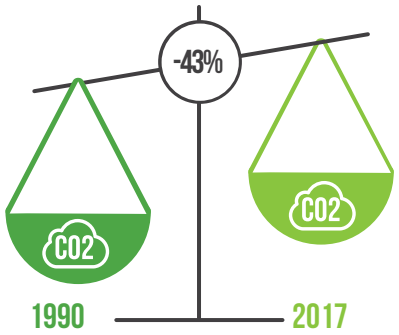
ENERGY & CLIMATE

Our relatively low Greenhouse Gas (GHG) emissions are notably the consequence of the shift from mechanical to chemical pulp processes, driven by market developments and product evolution, but also of the growing use of less carbon-intensive or even carbon-neutral sources of energy, such as bioenergy, and by investments in state-of-the-art production technologies.

The sector is becoming increasingly energy self-sufficient by using its own process by-products and residues to generate renewable energy in its Combined Heat and Power (CHP) installations and biomass boilers.

SIGNIFICANT PROGRESS HAS BEEN MADE IN THE LAST YEARS



Over the past five years, we have achieved a reduction of our total (direct and indirect) carbon emissions by 43% per tonne of product from 1990 to 2017.

NEW DES PULPING TECHNOLOGY!

An industry consortium is currently working on developing a radically new, sustainable and techno-economically feasible pulping technology for wood based on deep eutectic solvents (DES), a new class of natural solvent which has the unique ability to dissolve wood components at low temperature and atmospheric pressure.

The technological breakthrough expected through the development of such new DES pulping technology could reduce process energy intensity by at least 40% and investment costs by 50% compared to traditional chemical pulping technology.

Provides is a research and innovation project (RIA) within the Biobased Industries Initiative. Contact us to read more about PROVIDES and DES.

IMPLEMENTING THE PARIS CLIMATE AGREEMENT

The Paris Agreement to maintain global temperatures well below 2°C will increase pressure towards reducing carbon emissions.

The European forest fibre and paper industry has already confirmed its vision to decarbonise by 80%, while creating 50% more added value in its 2050 Roadmap.

Contact us to learn more about our vision outlined in our 2050 'Investment Roadmap' of a low-carbon bioeconomy.

Our 'To our Roots and Beyond' project goes even further in demonstrating how in practice we are turning this vision into reality with case examples in the area of renewables and energy efficiency.

Learn more about this at www.cepi-rootsandbeyond.org

FACING THE FUTURE: MITIGATING CLIMATE CHANGE AND DRIVING THE TRANSITION TO A LOW-CARBON CIRCULAR BIOECONOMY

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New production technologies
-7 MILLION TONNES CO_2 BY 2050

ENERGY EFFICIENCY

Improvement in processes and investments in state-of-the-art technologies are expected to continue, driven by competitiveness and productivity. The transition to industry 4.0 will also deliver efficiency gains.

Low- to no-carbon energy sources
-8 MILLION TONNES CO_2

FUEL SWITCH

Driven by economic, environmental and political reasons, the industry is in the process of switching from carbon-intensive energy to that which emits less carbon dioxide, in particular renewable energy.

Leveraging on-site cogeneration assets
-2 MILLION TONNES CO_2

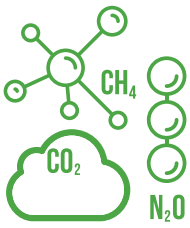
DEMAND-SIDE FLEXIBILITY

Having the possibility to adapt our electricity consumption (demand-side flexibility) offers a range of advantages, such as reduced consumption costs, enhanced generation adequacy and greater accommodation of intermittent renewable energy sources. Provided relevant market and regulatory arrangements are in place, a lot of market potential can be achieved.

Innovative and disruptive solutions
-5 MILLION TONNES CO_2

EMERGING/BREAKTHROUGH TECHNOLOGIES

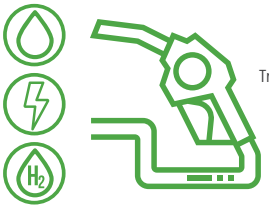
In addition to some of the breakthrough concepts identified in the **Two Team Project** such as the **"Deep Eutectic Solvents"** technology, now under development, other innovative and disruptive solutions could complement the emission reduction effort by some 5 million tonnes of CO2.



Over the coming 35 years
-11 MILLION TONNES CO_2

INDIRECT EMISSIONS

As European power production acclerates its decarbonisation, the forest fibre and paper industry's indirect emissions from purchased electricity will decrease by **11 million tonnes over the coming 35 years.**



Transport efficiency and alternative transport fuels
-4 MILLION TONNES CO_2

TRANSPORT

Emissions reduction will also come from the combination of improving transport efficiency and using alternative transport fuels, such as biogas, advanced biofuels, electricity or even fuel cells. This should lead to reducing the sector's transport footprint by 4 million tonnes of CO2 emissions.

THE EUROPEAN FOREST FIBRE AND PAPER

58% of the industry's total primary annual energy consumption is **BIOMASS BASED.**

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ENVIRONMENT

Sustainability is central to all European paper industry activities and a large proportion of our resources are devoted to ensuring that the industry minimises its environmental impacts. For many decades, the European paper industry has invested in environmental improvements. By systematically managing the environmental impact of pulp and paper manufacturing, overall environmental performance continually improves. Within the CEPI membership, 89% of production capacity is certified or registered according to the internationally recognised environmental management standards ISO 14001 and EMAS.

MAKING SENSE OF MATERIALITY

CEPI has worked with Deloitte to identify the sector's significant impacts: what is material in pulp and paper industry. The assessment of the sector on the European level produced detailed matrices and Key Performance Indicators for the identified five most material issues.

One size doesn't fit all: It is understood that each individual organization will have its own ranking of material topics – depending on its core business, its key markets, countries of operation and other specifics of the organisation.

Ultimately, one of the objectives of this process is to support CEPI's members can run their own materiality analysis, starting with the industry-wide view presented here – and customizing it further to their own organisation. This is supported by a separate document, the 'How to' toolkit.

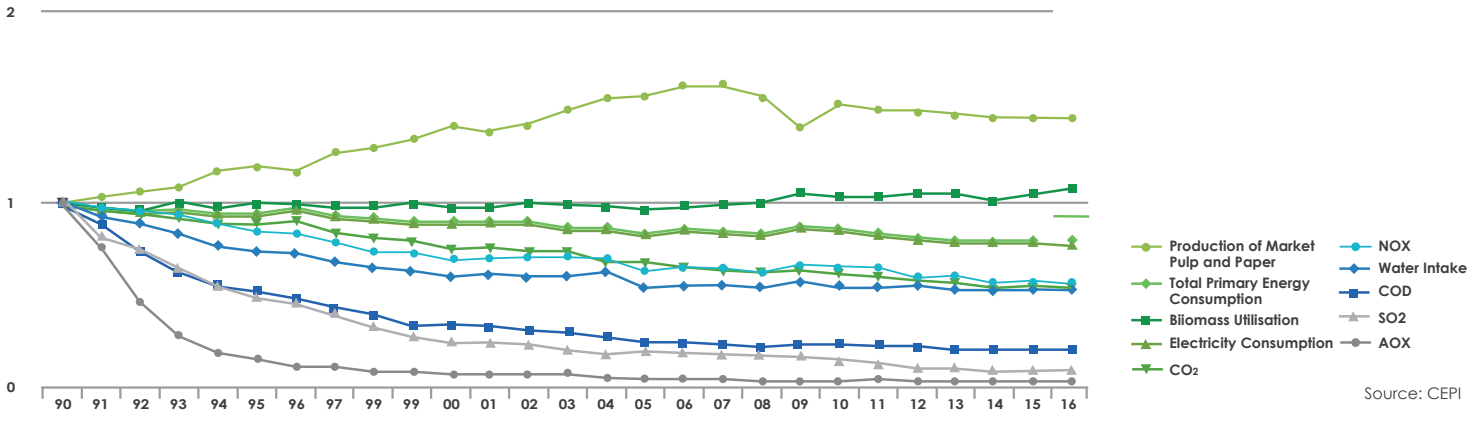
Please **contact us** to learn more about Deloitte's Assessment and the 'How to' toolkit.

PRODUCING MORE WITH LESS

CEPI figures show that there has been an absolute decoupling of economic growth from environmental impacts since 2000. In short, paper of equivalent or even superior quality is now being produced using fewer resources.

DECOUPLED GROWTH LEVELS AND ENVIRONMENTAL IMPACT INDEX (1990=1)

CEPI Statistics - Status as of 2016



Source: CEPI

93% OF WATER WE USE IS RETURNED TO THE ENVIRONMENT IN GOOD QUALITY

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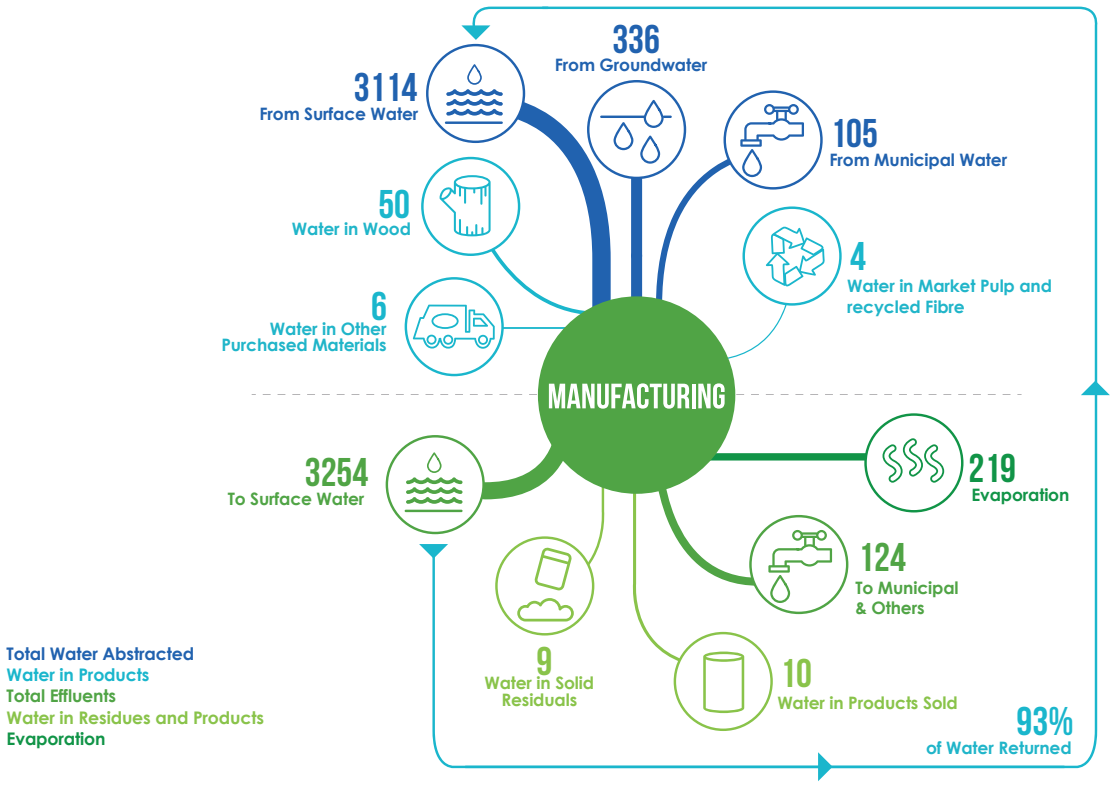
Water Profile for the Pulp and Paper Industry- CEPI Countries 2016
Million M3



SUPPORTING SAFE USE OF CHEMICALS, MINERALS AND ENZYMES TO IMPROVE PAPER PRODUCTS' FUNCTIONALITIES

Chemicals are used in the paper industry in different parts of the pulp and paper making process. They can be divided into three main areas: process chemicals, functional chemicals and coating chemicals. These chemicals have different functions and a different influence on the sustainability of a paper product.

FUNCTIONS	IMPACT
• Filler Increase • Optimisation of Fibre Composition • Basis Weight Reduction • Reduction of Fibre Losses	FIBRE SAVINGS
• Better Dewatering • Elimination of Size Press	ENERGY SAVINGS
• Paper Machine Speed Increase • Time Efficiency Optimisation (Breaks, Cleaning) • Material Efficiency Optimisation (Claims) • Elimination of Size Press	PRODUCTIVITY INCREASE

Minerals used in papermaking include talc, kaolin and calcium carbonate. Paper and board consists predominantly of cellulose fibres, naturally-occurring minerals such as calcium carbonate and natural polymers such as starch. The increasing use of calcium carbonate is especially significant: in 2012 more than half of the non-fibrous material used in the paper industry was calcium carbonate. The increase in the use of non-fibrous raw materials has allowed for a more efficient use of fibres and improved functionalities of finished paper products.

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