



RE INVEST 2050

ADVANCING LOW-CARBON
INNOVATION IN THE FOREST
FIBRE AND PAPER INDUSTRY



Executive summary

Once again in exceptional circumstances, Cefi is proud to present the fourth edition of REINVEST2050. Since the publication of the last edition in 2021, companies have faced multiple challenges that frustratingly slowed down investment decisions. Having embraced the post-pandemic recovery, businesses in our sector have been experiencing regulatory uncertainty, raising carbon prices, and skyrocketing costs for raw materials and energy. However, this publication showcases 15 successful projects to reduce our carbon emissions that have been completed over the past two years across Europe.

Recently, European decision makers have agreed on key files of the Fit for 55 package which is paving the way to climate neutrality by 2050. It is now up to Member States to transpose key Directives of the updated climate and energy regulatory framework, while the Commission works on implementing the reform of the Emissions Trading System. The next months will see the amendment of the Electricity Market Design. In this context, the access to affordable fossil-free energy will be essential in order to keep our industry internationally competitive.

Today's investment decisions in order to reach climate neutrality by 2050

The forest fibre and paper industry demonstrates its commitment to reducing carbon emissions and providing bio-based alternatives to carbon-intensive products through REINVEST2050. Its fourth edition features 15 case studies from 8 European countries, involving 13 companies representing a diverse array of projects carried out over the past two years despite regulatory uncertainty, raising carbon prices, and skyrocketing costs of raw materials and energy.

By improving energy efficiency and using renewable energy, our industry contributes to meeting climate change and energy goals whilst promoting innovative, sustainable and recyclable products. Our products aid in shifting society away from fossil-based products and play a crucial role in the transition towards a low-carbon economy.

The industry aims to advance the industrial transition in Europe by integrating value creation with decarbonisation through product innovation, boosting productivity, and improving process efficiency. The pulp and paper sector holds a critical position in supporting the EU's quest for climate neutrality.

Cefi's members and companies are ready to engage in a dialogue with policymakers at both national and European levels to ensure the adoption and implementation of facilitating measures. Policies must maintain the international competitiveness of the European industry and promote carbon-saving solutions through a regulatory framework that supports energy efficiency, availability of affordable climate-neutral energy sources, the gradual elimination of fossil fuel combustion, and safeguarding against the risk of carbon leakage.

The industry's transition towards 2050

A just and sustainable transition will necessitate the dedication and cooperation of all stakeholders, including industry sectors, society, and individual Member States. As the pulp and paper sector strives to meet the climate neutrality goal by 2050, it is essential to simultaneously deploy a wide variety of clean technologies and fossil-free solutions across different regions.

Our objective is to expand our product portfolio and enhance the environmental performance of multiple industrial ecosystems, ultimately increasing the competitiveness of the entire European economy. This is why Cefi continues to inspire innovation in the industry and beyond through the Energy Efficiency Solutions Forum, sharing knowledge and demonstrating new technologies.

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SCA



Metsä



storaenso



SÖDRA



UPM BIOFORE BEYOND FOSSILS



sappi



LUCART
SHARING THE FUTURE



Energy efficiency



Renewable energy



Communities & Bio-products

Phasing out coal: upgrade of Boiler 11 at Sappi Gratkorn

sappi

Project description

As part of Sappi's global long-term commitment to sustainability and its focus on climate action, Sappi Gratkorn's Boiler 11 was completely modernised in 2022. This investment in state-of-the-art technology has seen a shift from coal to multi-fuel, with the goal of ultimately using only renewable and clean energy. The modernised boiler is now fuelled by biomass and natural gas.

The rebuild allows Sappi Gratkorn to reduce its CO₂ emissions by 30%, and is a big commitment to boosting the decarbonisation of the paper sector. This transition makes the production site more independent during these uncertain times in the energy market. This investment is part of a larger-scale decarbonisation strategy for Sappi Europe, which in the near term seeks to deliver a 25% greenhouse gas reduction by 2025. The technology for the project also enabled Sappi Gratkorn to sharply reduce particulate and NOx emissions.

Modernising a boiler is a major undertaking; at Gratkorn, it was a three-year project. Construction started in August 2021 after pre-feasibility planning and engineering. We began by dismantling the old boiler parts and then installing state-of-the-art equipment. Commissioning began in June 2022, followed by full start-up in September.

At peak times the project involved over 200 people, with teams from Sappi and our partners working together to carry out this ambitious project. Those partners included Sumitomo Heavy Industries OY as a technology provider, FMW Industries as fuel handling supplier and Siemens Energy, whose process control technology made the system even more resource-efficient.

This project shows that the green energy transition is not in some distant future: it is happening in the here and now at Sappi around the world.



Main features:

- **CO₂ Emissions saved (tCO₂)**
130kt/y reduction of fossil CO₂ emissions
- **Investment**
€35 million
- **Partnerships**
Sumitomo Heavy Industries OY as boiler supplier, FMW Industries as biomass handling supplier, Siemens Energy as electrical and automation supplier



Christian Roth

Senior Project Manager, Sappi Papier Holding GmbH

"The project has inspired all of us at Sappi to move forward ambitiously and not shy away from complex projects that make our sites future-proof and climate-smart," says Christian Roth, Senior Project Manager.

"Making pulp and paper is energy-intensive. With new technology, Boiler 11 has shifted to being a multi-fuel boiler. The goal is to finally use only sustainable, renewable fuels.

"This is part of Sappi Europe's decarbonisation roadmap, which includes close to 80 projects by 2025. The main objective is to reduce emissions of Scope 1 and 2 greenhouse gases by 25% by 2025 and to increase the share of renewable energy to 50% (compared to 2019)."

Demo plant producing new Muoto® packaging products



Project description

Muoto® packages are three-dimensional wood fibre packages that come directly from the production line. They are recyclable and made from renewable raw materials, making them a good alternative to plastic and aluminium. The greenfield demo plant in Äänekoski, Finland relies on an entirely new technology: it presses the wood-based material into its final form, allowing product properties to be tailored for the intended use. This collaborative project with Valmet received second prize in the international Quality Innovation Award competition and won the category for 'Potential Innovations' in the Finnish Quality Innovation Award competition in 2022.

The demo plant was inaugurated in August 2022 and employs 10 people. The team has tackled challenges ranging from ironing out the kinks in the novel production technology to finding products that perfectly suit market demand.

Project purpose

The main goal of the project is to develop a process enabling the production of **Fibre-based 3D packaging that compete with fossil-base packaging**. This would present the packaging industry with a new, more sustainable alternative for various applications.

- Reduce waste by protecting products and guaranteeing food safety
- Replace plastics
- Fossil-free mills and raw materials by 2030
- Resource-efficient production and materials
- Sustainable supply chain, minimising waste and transport
- Recyclable and biodegradable

Project evaluation

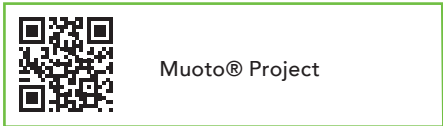
It is important that new, competitive value-added products are developed from renewable raw material. Muoto® is made from fossil-free raw materials, and enriches people's everyday lives. Our target is a cost-competitive solution meeting the required technical properties for packaging.

The next step is to evaluate the project against its potential and finalise the commercialisation of the concept.



Main features:

- **CO₂ Emissions saved (tCO₂)**
Based on preliminary calculations, the impact on saved GHG emissions is remarkable when replacing plastic packaging in the market. The total impact should be positive in many cases even compared to reusable solutions.
- **Investment**
At the end of 2020, Metsä Group's innovation company Metsä Spring and Valmet announced they would be investing a total of approximately €20 million in the demo plant.
- **Partnerships**
The project has been jointly developed by Metsä Spring and Valmet, combining Metsä Group's expertise in production and packaging design, Metsä Spring's innovative organisation and Valmet's experience as a technology supplier.



Muoto® Project



Jarkko Tuominen
Vice President Projects, Metsä Spring Oy

"From the outset, the core objectives of our project have been high quality, safety and sustainability. We have succeeded in creating a wood fibre-based product that achieves these goals. We are now developing Muoto® to be tested in the packaging industry. Making this kind of product and ensuring we meet customers' needs requires seamless collaboration and multidisciplinary. Our schedule is tight, but we have kept to it by anticipating and tackling challenges in many areas. We have a team of professionals from Metsä and Valmet, our main partner, and from many other different disciplines working together on the project, and the goal is clear."

New state-of-the-art pine sawmill in Rauma, Finland



Project description

Metsä Group launched a state-of-the-art sawmill in Rauma, Finland. The mill started up at the end of September 2022 and operates three shifts. The facility is a global leader in technology, efficiency and operating models, and responds to the demand for high-quality, sustainably produced sawn timber. It relies on technological innovations such as machine vision, self-learning AI and integrated information systems that control various functions.

Sawn timber is a sustainable product that can help the world achieve our decarbonisation goals by storing the carbon contained in trees in products throughout their lifecycle. The sustainability of our sawn timber is based on sustainably-managed forests, certified and traceable wood raw material and low-carbon production.

Project purpose

The pine sawmill increases forests' value, enables fossil-free production and increases output of products that store carbon for a long time.

The Rauma sawmill is three times faster than a conventional mill; the maximum sawing speed is 250 metres per minute. A pine log is sawn into timber products in just over one second, and the logs are sawn with careful optimisation.

Rauma's single central control room reflects our pioneering approach. In practice, this means that sawn timber passes through the processing line without manual work stages.

A responsible supply chain and data collection will ensure that our customers have access to strong, first-class Nordic pine sawn timber. The wood we use is traceable.

Project evaluation

Rauma sawmill boasts state-of-the-art technology and unparalleled efficiency. As the most advanced sawmill in the world and Finland's largest-ever sawmill investment, it has created benefits for the entire industry.



Visit virtual sawmill in a 360° view

Main features:

- **CO₂ Emissions saved (tCO₂)**
The sawmill is next to Metsä Fibre's pulp mill, which enables 100% use of wood material. Wood chips from the sawmill are used to make pulp, while the pulp factory provides the sawmill with the heat and electricity it needs. This industrial symbiosis will enable both mills to operate entirely without fossil fuels by 2030.
- **Investment**
The value of the investment is approximately €260 million, the largest sawmill investment ever in Finland. The new mill has directly created 100 new jobs in Rauma, and provides work to about 500 people along its direct value chain. The sawmill's employment impact during the construction phase was roughly 1,500 people per year.



Liisa-Maija Perävainio
Mill Manager at Metsä Fibre Rauma Sawmill

"The Rauma sawmill project has from the very beginning represented a leap forward in both technology and the use of automation, as well as in the operating model. This will certainly drive advances across the entire sawmill industry. We created completely new solutions, and in some cases took ideas from other industries and made them work in new ways. Rauma Sawmill produces high-quality sawn timber that supports our customers' efficient use of raw materials. As carbon-sequestering materials, wood and sawn timber are materials of the future. We will see an increase in their use."

A public-private decarbonisation partnership for positive change



▲ Project description

To provide a new heat source for Cartonnerie Gondardennes (CG), we built a 3.7-km steam pipe from the Flamoval municipal solid waste incinerator (MSW). CG supplies demineralised water to the MSW, which sends back steam for drying paper and cardboard.

The project uses innovative methods to transport steam over a long distance with almost no heat loss. Decarbonisation was the main driver of the project.

The main stakeholders were:

- Cartonnerie Gondardennes paper mill
- The municipal union (Syndicat Mixte Flandre Morinie) managing the incinerator
- Municipalities' association (CAPSO), local authorities and landowners (VNF, SNCF)

This public-private partnership faced several technical, administrative and economic challenges, notably:

- The need for the pipe to cross a canal
- A lack of visibility on energy savings (at a time when gas was largely affordable)
- Project financing
- Risk sharing between the paper mill and the incinerator
- An initial lack of acceptance by the public: information sessions were held and the synergies with CG were seen as a guarantee

▲ Project purpose

For CG, the objectives were:

- Decarbonisation of recycled paper production, aligned with CSR commitments
- Resilience of industrial activities by reducing dependence on fossil fuels
- Competitiveness of steam production

▲ Project evaluation

Discussions between the paper mill and the municipal union began in 2012 and 2022 was the first year the steam network operated. This project allowed a reduction of 24,000 tonnes of CO₂, while limiting exposure to natural gas market price volatility. Total investments were €13.85 million. Further developments aim to extend the heat supply to 12 months from seven beginning in 2028, to reduce paper mill CO₂ emissions by 14,000 tonnes of CO₂. Such a project is viable, profitable and replicable for any paper mill located near an incinerator.



Main features:

- **CO₂ Emissions saved (tCO₂)**
24,000 tonnes in 2022
- **Investment**
The overall cost of the project is €13.85 million, with a subsidy of €2.4 million from ADEME (French agency for energy transition) and €2.656 million from the European Regional Development Fund (ERDF)
- **Partnerships**
Companies and stakeholders involved in the project: CAPSO, SNFC, VNF, EHTP, VEOLIA, STEIN, LEVIA, Elysei, KSB



Laurent Fischer & Paul-Loup Tronquoy

Managing Director

President of Syndical Mixte Flandre Morinie,
mayor of Bergues

Laurent Fischer (CG): "Our combined efforts make this heating pipe network valuable, profitable and sustainable for everyone. Ten years after the first discussions, we saved 24,000 tonnes of CO₂ in 2022! This project is a viable, replicable response to the challenges of decarbonisation."

Paul-Loup Tronquoy (SWM): "This project was an obvious ecological solution from the start, which was confirmed in 2022. For the SMFM, the CO₂ emission reductions are equivalent to 7,500 cars travelling 20,000 km! Such a project is also economically relevant for both parties, with a rapid return on investment, and brings social benefits to the community and to Cartonnerie Gondardennes."

Sustainable value creation in Gien, France: local-powerful collaboration



Project description

Paper production is energy-intensive, requiring large amounts of gas to generate steam for drying. The steam recovery project launched at Essity's plant in Gien delivers steam from a municipal incinerator 3.5 km away, which burns waste from the facility as well as local household waste.

The main challenge was to convince the management to commit to a long-term energy supply contract (13 years of supply, beyond the two years required for implementation and commissioning); the commercial terms had to ensure returns for the investor (the Public Service Delegate).

Project purpose

The goal is to reduce Essity's dependence on fossil fuels. The company set up the project together with two external stakeholders: Paprec Energies, part of the leading French recycling company; and SYCTOM, an association of local governments. It covers at least 70% of Essity's steam needs. Because the factory needs steam year-round, Paprec Energies is able to satisfy regulatory requirements for the generator that it couldn't meet if it only supplied a district heating network, with seasonal demand. The project helps mitigate increases in household waste processing fees.

Project evaluation

The project has cut the Essity plant's gas consumption by 87 GWh, reducing direct CO₂ emissions by 16,000 tonnes. The Essity plant is the largest gas consumer in the Loiret Department, so the project will make a significant contribution to meeting the government's plan, announced in October 2022, to cut energy consumption by 10% by 2024. Recent increases in European gas prices mean the economic benefits are far greater than was expected when it was set up three years ago.

Main features:

- **CO₂ Emissions saved (tCO₂)**
16,000 tonnes (circa 17% of the plant's total direct emissions). Essity is committed to reducing the Group's overall direct emissions by 30% in 2030 (in comparison to 2018).
- **Investment**
about €10.5 million by the asset operator, Paprec Energies, mainly for the pipeline, the heat exchanger, and the civil engineering costs
€150 K€ by Essity to enable the connection
- **Partnerships**
Two external parties (Paprec Energies and the intercommunal association) were selected after a call for tender for a delegation of public services to be part of this project. The initiative also received the financial support and recognition of the French Government via its Environmental Agency (ADEME), and was supported by local authorities (Préfecture and DREAL).



Andrick Lacroix

Energy Procurement Manager France & Benelux

What is exceptional about the project?

It won a subsidy from the National Environmental Agency (ADEME). It ensures a competitive steam cost for Essity long-term.

Can this project be a model for the future?

Other Essity facilities aren't close enough to potential incineration assets, but it clearly demonstrates an opportunity for other industrials.

Is the project part of a bigger decarbonisation scheme?

Essity's journey to net zero includes low-carbon raw materials and fossil-free production. We have been pioneering accelerated innovation on reusable products and designing to reduce consumption. Other projects include recycling paper and packaging, and installation of biomass boilers.

The new UPM biorefinery in Leuna: driving decarbonisation with wood-based materials



Project description

In 2020, UPM started building the world's first industrial-scale biorefinery for wood to chemicals in Leuna, Germany. UPM Leuna will produce a range of 100% wood-based biochemicals that enable a switch from fossil-based products to sustainable alternatives for a number of end uses, such as plastics, textiles, cosmetics and industrial applications. Raw materials and other services for the biorefinery are sourced in the region, which enables local value creation and ensures compliance with high social and environmental standards.

The technology and process have been developed by UPM over the past 10 years, mainly building on the company's own innovation capabilities and selectively working with international partners such as the Coca-Cola Company. This will now be complemented with partnerships that develop applications for products from the biorefinery. For instance, HAERTOL, a leading European engine and battery coolant maker, will integrate BioPura™ renewable monoethylene glycols produced by UPM into a new generation of sustainable coolants to support automotive's net zero ambition, and significantly reduce their Scope 3 emissions by switching from fossil-based to a renewable ingredient.

Project purpose

The biorefinery will enable a vital shift away from fossil-based to renewable materials across a wide range of industries, including automotive. UPM wood-based biochemicals will significantly reduce the CO₂ footprint of the final products they are used in.

Project evaluation

Construction of the biorefinery started in 2020 and is due to be completed by the end of 2023. UPM is investing about €750 million in the site. The biorefinery aims to produce 220,000 tonnes of chemicals per year. The investment was named Bio Act of the Year 2020 by the World BioEconomy Forum.



Main features:

- **CO₂ Emissions saved (tCO₂)**
Wood-based biochemicals reduce customers' Scope 3 emissions significantly by switching from fossil-based to a renewable ingredient.
- **Investment**
€750 million.
- **Partnerships**
The Coca-Cola Company, Changchun Meihe Science & Technology, HAERTOL and Dongsung Chemical of South Korea. Exclusive distribution agreements for RFF with Lehmann & Voss, Krahn Chemie, Azelis and Algol.



Michael Duetsch
Vice President UPM Biochemicals

"In the future beyond fossils, there will only be three sources of carbon: recycled materials, CO₂ capture and biomass," says Michael Duetsch, Vice President UPM Biochemicals. "Establishing a circular economy, reuse and recycling is very important but it is not enough – you will always have losses. We must compensate with sustainable materials made from renewable carbon to create the perfect, circular economy. We must move quickly if we want to mitigate climate change."

While UPM is using wood to produce renewable chemicals, the transformation of the chemical sector needs to go far beyond this, building on the scale-up of sustainable solutions across the board – from new recycling approaches to the use of synthetic chemicals.

Optimisation of energy consumption, balance between heat and electricity, CHP modernisation



Project description

Lucart S.p.A. has been using CHP technology in its Italian paper mills since the late 1980s, and today cogeneration remains the best technology for optimising the use of primary fuel. This project included a review of the electrical and thermal consumption of the three plants located in Lucca, and updates of existing cogeneration plants with the latest technologies.

Project purpose

The project was carried out in the three mills over about four years, and included three elements:

- optimise and reduce the plants' electrical and thermal consumption
- study the best energy supply solution in terms of environmental and economic sustainability
- analyse the mills' residual energy sources to find the best solution

Project evaluation

The most important actions and results were:

- Diecimo: modification of pulp refining sections, replacement of two cast iron dryers with steel dryers, complete replacement of the cogeneration plant with low-emission technology (NOx) capable of using a methane-hydrogen mix
- Porcari: replacement of one cast iron Yankee dryer with a steel Yankee dryer, complete replacement of the cogeneration plant with low-emission technology (NOx) capable of using a methane-hydrogen mix
- Castelnuovo Garfagnana: replacement of the gas turbine, use of the residual heat of the turbine fumes to heat the production premises, and a district heating project underway for public premises adjacent to the factory

The results were important for reducing consumption per tonne of paper produced and for reducing absolute tonnes of CO₂ produced.



Main features:

- **CO₂ Emissions saved (tCO₂)**
10,000.
- **Investment**
About €26 million.
- **Partnerships**
Baker Hugues, Solar Turbines, Tecnoterm Energy, Toscotec.



 **Massimo Pasquini**
CEO, Lucart S.p.A.

Lucart is strongly committed to decarbonising production, in compliance with the Paris agreement and the 2030 agenda.

The project is part of a broader plan drawn up by Lucart to reduce climate changing emissions related to energy consumption, which includes the technological upgrading of the European factories, installation of photovoltaic panels, biomass power plants for the production of electrical and thermal energy, reducing electricity consumption by revamping production systems, buying renewable energy through PPAs and increasing our recycled paper production capacity.

Photovoltaic systems for in-house energy generation



▲ Project description

The integrated factories that produce paper and transform it into sanitary products are not only energy-intensive but also “space-intensive”: production and storage occupy a significant area.

Historically, building design did not envisage the use of roof surfaces for photovoltaic panels. We have modified this approach for new buildings and analysed existing surfaces. This project was carried out in the Borgo a Mozzano and Avigliano factories, and resulted in the modification of many roofs to allow the installation of photovoltaic panels.

▲ Project purpose

Production of tissue paper, even when it is supported by cogeneration, requires significant inputs of electricity.

Collecting the solar energy that falls on the plant or nearby allows us to reduce the amount of energy we buy from outside sources. This, in turn, reduces the load on the grid.

▲ Project evaluation

In the Borgo a Mozzano plant, photovoltaic panels were installed in 2022 with a capacity of 2.5 MWp, and activation of a further 1.5 MWp is expected by the end of spring 2023.

In the Avigliano plant, in addition to the current capacity of about 1.0 MWp, a new 2.0 MWp plant will be started up in spring 2023.

About 97% of the paper mills’ energy production will be used for their own consumption.

Installing photovoltaic panels on the available surfaces is simple, but applying them in a tissue factory requires the application of important design principles: favouring integrated plants (paper mills + conversion); designing the surfaces of the buildings to house the photovoltaic systems; and creating a balance between electrical and thermal energy to make it possible to consume the electricity produced on-site.



Main features:

- **CO₂ Emissions saved (tCO₂)**
3,000.
- **Investment**
About €7.5 million.
- **Partnerships**
EnelX, IEIS.

Naturcell innovative cellulose



Project description

Naturcell, an unbleached cellulose product, is part of the Ence Advanced line of differentiated products, meeting increasing demand for products of natural origin. It is recyclable, biodegradable and meets the highest standards of quality and sustainability. This product line allows us to supply cellulose for multiple applications replacing plastic or other materials with a higher environmental footprint.

Naturcell, made from unbleached eucalyptus pulp, features better runability and printability. It has zero carbon certification and is the first pulp on the market with a certified Environmental Product Declaration (EPD), which identifies and reports environmental impacts based on a life cycle assessment. It is zero waste certified, and generates more pulp from each tree.

The EPD is independently verified, confirming the transparency and accuracy of the data and allowing customers to compare products' environmental footprints.

Ence is the first pulp producer to commission an audit of our environmental footprint by Environdec.

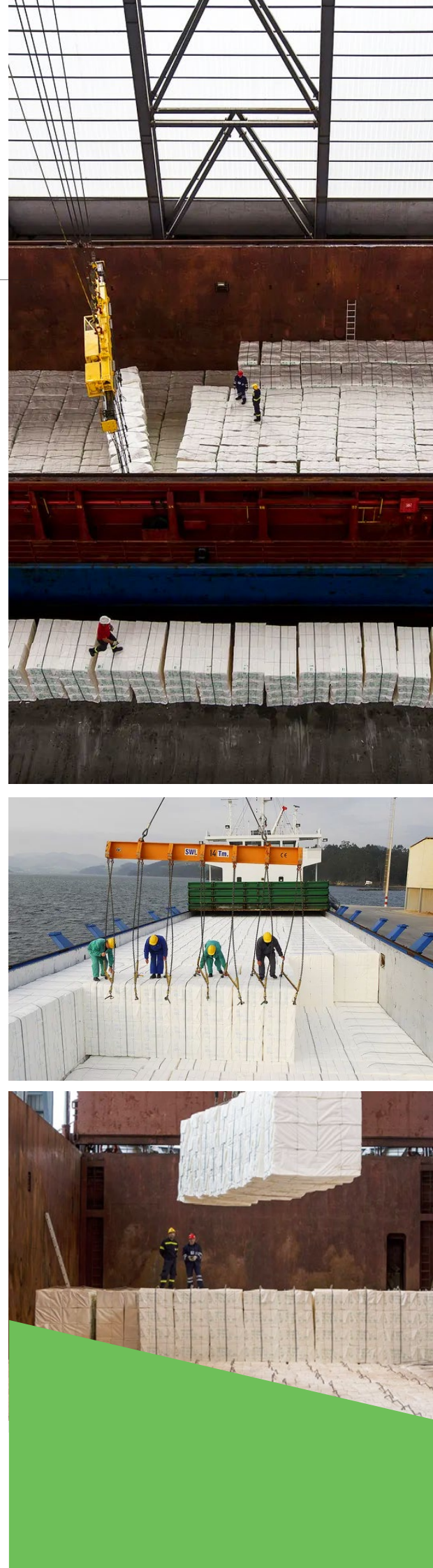
Project purpose

As society's commitment to the environment strengthens, we need to move to a more ecological production and consumption model. Some of Naturcell's distinctive features are its lower carbon footprint, more energy-efficient production and reduction in use of non-renewable resources and water.

Project evaluation

Naturcell allows diversification of our Asturian facilities' portfolio, providing greater flexibility, resilience and added value. Over 40 customers are in the process of approving Naturcell for their products. Notable end uses include:

- Hygiene paper
- Serviettes and napkins
- Paper cups
- Food packaging
- Fibre cement reinforcement
- Unbleached softwood replacement
- Plastic substitution
- Direct food contact applications
- Flexible packaging & moulded products
- Container board applications



Reducing transport-related emissions through product ecodesign: the “toilet paper in a box” project



▲ Project description

LC Paper repurposed its energy sourcing strategy over the last decade by implementing an in-house solar photovoltaic park (4 MWp on 20Ha adjacent to the mill); a high-capacity biomass boiler powered by the residues of nearby fire-prevention forest cleaning; and the partial replacement of natural gas with biomethane created in local farming industries. The result of those initiatives was a significant decrease in GHG emissions during the manufacturing phase of the product life cycle. However, a large share of emissions do not come from manufacturing but raw material sourcing and distribution – a reality that LC Paper wanted to change as part of its efforts to minimise the global life cycle emissions of its tissue products.

▲ Project purpose

To decrease transport-related emissions of toilet roll through a radical change in consumer packaging. Plastic film wraps were replaced by recycled folding board packs, resembling cereal boxes. This approach allows a much better use of space and higher pallets during transport, thus decreasing emissions. It also reduces single-use plastic to zero, while preserving product recognition through a fully printed design with a life-size picture of the package contents, which we call the “transparency effect”.

▲ Project evaluation

The main KPI was to get an automated packaging speed which could compete with traditional plastic films and deliver an attractive product price point. Since no such machinery was available, we had to develop the solution in-house, through a partnership with local machinery suppliers who weren't in the tissue industry. We hit the target, and our “cereal box” toilet paper products are now shipped throughout Europe, both under our own brand, Dalia, and through private labels.



Main features:

- **CO₂ Emissions saved (tCO₂)**
216 tCO₂ per year based on the last sales figures; 0.3 kg CO₂ per six-roll package.
- **Investment**
€2.5 million.
- **Partnerships**
Zorpack, a local machine builder.



Pau Vila
General Manager of LC Paper

Why did you choose boxes, instead of paper wrapping or compostable films?

We wanted to repurpose how our packaging impacts logistics and cut the share of distribution emissions over the product life cycle. We found paper wrapping and compostable film do not fundamentally improve logistics efficiency.

Does this change only apply to the exterior and the rolls inside the packages remain the same?

No: this is the latest step of a journey which started in repurposing the paper itself and how it was made, through the replacement of fossil-based energy with renewables; new materials and fibres; and rethinking product specifications, such as using two thicker plies instead of three thin ones, to get a premium-feeling product using less energy.

Kraftliner expansion to meet demand for renewable packaging and move towards fossil-free manufacturing



Project description

SCA invested 7.5 billion SEK in expanding the paper mill located in Obbola, northern Sweden. In Obbola, SCA produces unbleached Kraftliner, a paper used for transport and consumer packaging, and has built the world's largest and most efficient paper machine for Kraftliner production. The expansion will increase the annual production from 450,000 tonnes to 725,000 tonnes to meet the growing demand for renewable packaging.

As part of the project, SCA has replaced two oil-fired lime kilns, part of the chemical recovery process in pulp production, with one fired by biofuels. 8,000 m³ of oil consumption can be eliminated by replacing the oil with wood pellets - an environmentally-friendly and renewable energy source from sawdust with a high energy value. This means that carbon dioxide emissions from fossil fuels will decline by more than 20,000 tonnes per year. As this is the second of two paper mills with biofuelled lime kilns, SCA Containerboard's carbon footprint becomes significantly lower.

The expansion of the Obbola paper mill is of great value for many people and means that the mill will be around for many generations to come. The expansion will increase the purchase of timber in the surrounding region and will attract large companies and new establishments. The closest port, Umeå, will be expanded to meet larger capacity.

With parallel construction of the new paper machine, SCA was able to ensure full production during the construction period. SCA will keep the same product range as before, but with improved characteristics.

Obbola is one of few Kraftliner mills with expansion possibilities in Europe because its access to fresh fibre supply, knowledge from long experience, a high technological mill with infrastructure already in place and being a leading supplier with the possibility to grow with the customers.



Main features:

- **CO₂ Emissions saved (tCO₂)**
20,000 tCO₂ per year of emissions will be saved.
- **Investment**
Total investment of 7.5 billion SEK of which 1 billion in environmental improvements.
- **Partnerships**
Voith, PEAB, Valmet, Sweco, Afry, Eurocon, Andritz, Strängbetong, Kaj Johansson, Attacus, ABB, Siemens, Flootech.



Per Strand

Director for the Expansion Project in Obbola

"We have invested for the future and will be at the forefront not only because we have built the world's largest paper machine of its kind, but also the most modern and technologically advanced", says Per Strand, Director for the Expansion Project in Obbola.

"Investing in a new lime kiln meant getting rid of fossil oil but also meeting the need for increased capacity. Now, we will eliminate 8,000 to 10,000 m³ of oil per year.

By using wood pellets in the lime kiln, a residual by-product of our forestry and industrial operations, we maximise the value of the forest and obtain a resource-efficient value chain, he explains.

Large-scale electrification



▲ Project description

The project is part of our programme A fossil-free Södra, which aims to eliminate fossil fuels in production and transport by 2030. We have set GHG reduction targets within the Science-Based Targets initiative, committing to reduce absolute scope 1, 2 and 3 GHG emissions by 50% by 2030 from the base year 2020. Another commitment is that 70% of our customers by emissions, covering processing of sold products, will set science-based targets by 2027. Transport represents a big part of our GHG emissions, and electrifying both the internal operational machinery and truck transport will have a big impact. As Södra is a net producer of electricity, we also see advantages in becoming self-sufficient on energy for transport, and it gives us the possibility to use green electricity.

A crucial part of the project is to set up optimised charging infrastructure for both internal and truck transport. Partnerships with producers of vehicles and charging infrastructure are also important, and we need to develop new business models for our subcontractors within transport to minimise risk. We also aim to develop regional clusters to increase the number of charging stations.

▲ Project purpose

The purpose of the project is to decrease our GHG emissions by electrifying our internal transport and truck transport, to drive demand for electrified transport and to change business models, behavioural and logistical planning.

▲ Project evaluation

The project will be measured by how much electrification reduces GHG emissions and by the cost and return on investment, where we will also look into the cost of saving CO₂. The project will increase the pace of electrification of heavy vehicles and infrastructure, which will be beneficial for everyone, aiming to decarbonise by electrification. It will help build up a charging infrastructure that will benefit our region and can be reproduced elsewhere.



Main features:

- **CO₂ Emissions saved (tCO₂)**
100-150 tCO₂ eqv.
- **Investment**
in new vehicles, charging infrastructure and power supply.
- **Partnerships**
within the value chains.



Henrik Brodin

Head of Energy and Programme Director, A fossil-free Södra

Is the project part of a bigger scheme towards decarbonisation?

It is a part of our fossil-free Södra programme, to decarbonise our value chain in line with our targets approved by the SBTi. Electrification is our main project in the area of transport.

What is exceptional about the project?

It is a central project with a high focus on partnership, and six parallel work packages and several local projects changing local infrastructure, health/security and energy supply. It involves almost the entire company, with all business areas and, most of all, support functions.

Can this project be a successful model for the future?

I am convinced it will be a model for transformation, and we will see other organisations follow.

A fibre-based lid to replace plastic: Project Picadeli



Project description

Picadeli, Europe's leading healthy fast food company, sought to replace its single-use plastic lid with a formed-fibre lid. The new PureFiber™ lid is plastic-free, PFAS-free, renewable, recyclable, biodegradable and saves about 120 tonnes of plastic waste annually.

Picadeli's concept provides over 2,000 outlets throughout Europe and the US with digitalised salad bars where consumers mix their own salads. The company replaced its plastic bowls with cardboard a few years ago, leaving the lid as a challenge. Plastic-free lids were available for drinking cups, but not in larger sizes.

Stora Enso helped Picadeli develop a brand-new product. The raw material is wood pulp from sustainably-managed forests in Scandinavia. PureFiber™ by Stora Enso can be produced in almost any shape where today conventional PE, PET and other plastics are being used, such as cups, bowls, clamshells, plates and coffee cup lids.

Project purpose

With a strong focus on sustainability, Picadeli set a target to reduce their plastics use by 50% by 2025. Because of this, they wanted a plastic-free lid for their take-away packaging. PureFiber™ helps save 120 tonnes of plastic waste annually. Stora Enso started making ready-made formed-fibre single-use packages in 2020, helping brand owners such as Picadeli reach their sustainability targets.

Project evaluation

These products promote food safety by having a transparent supply chain. Products are made in Sweden with 100% bio-based electricity, using local sourcing of raw material and short transport routes of raw material, creating job opportunities in Europe. A critically reviewed LCA study shows PureFiber™ products offer a CO₂ footprint about 75% smaller than alternative packaging materials such as plastic or bagasse.



Main features:

- Picadeli will replace 10 million plastic lids yearly with the PureFiber™ lid, cutting about 120 tonnes of plastic waste. The carbon footprint of the PureFiber™ lid is up to 75% smaller than alternative materials such as plastic or bagasse. The new formed-fibre lid, like other Stora Enso PureFiber™ products for take-away food, is plastic-free, recyclable, biodegradable and free from PFAS and other forever chemicals.



Christine Soome

Food Concept Developer at Picadeli

"We tested the first prototype in a big mall in Gothenburg," says Christine Soome, Food Concept Developer at Picadeli. "I was there myself and got comments such as 'finally, the plastic lid has gone!'"

Other features include the sound the lid makes when it's attached to the bowl, proving that it's tightly sealed. Also, you can stack salad packages on top of each other for easy carrying. The design was a collaboration between Picadeli's marketing department and Stora Enso's packaging designer.

We've been close partners in all steps, which is a big part of the success. It hasn't been a customer/supplier relationship but a cooperation between our companies. It has been great fun and very rewarding!

Crown Native, a WFU paper produced with sugar beet fibres



Project description

Crown Native is a paper developed by Crown Van Gelder International B.V. (CVG). 20% of the cellulose fibres come from sugar beet, from the residual flow of a nearby processing plant. Sugar beet fibres contain hardly any lignin, making it easier to produce 'wood-free' (lignin-free) paper without the energy-intensive removal procedure. We designed a new process for selecting, storing and treating sugar beet fibres, creating the kind of continuous production process that paper mills use.

Crown Native has all the benefits of a wood-free uncoated or light coated paper, with a 16% smaller environmental footprint.

What makes your project innovative relatively to decarbonisation?

We carried out a life cycle analysis, from the moment a tree is harvested in a FSC/PEFC certified wood to when 1 tonne of paper leaves CVG. One tonne of dry sugar beet pulp has 80% less environmental impact than 1 tonne of dry wood cellulose; we replace 20% of the wood cellulose, giving a 16% reduction. This comes from avoiding lignin removal, and using as input a local residual stream rather than a primary source further away.

Project purpose

Our life cycle analysis showed that using WFU (woodfree uncoated) pulp was by far the greatest driver of our environmental footprint, leading us to explore beet pulp – which also adds strength to paper. We had to develop our own technology to use sugar beet pulp and develop a continuous process.

Project evaluation

Sugar beet fibre is hydrophilic with good binding properties, but it reacts in a different way to standard wood cellulose. We had to understand how grinding and refining influences the retention chemistry, the runability of the paper machine and the properties of the paper, which entailed a significant investment of time and resources.



Main features:

- **CO₂ Emissions saved (tCO₂)**
6% CO₂ eq. saving per tonne of produced paper is achieved. This corresponds to 82 kg CO₂ eq. per tonne of paper.
- **Investment**
Ca. €5 million.
- **Partnerships**
Cosun Beet Company (the Netherlands).



Jan Rops
Product Manager Crown Native

Our small paper mill has once again changed the world of paper. 18 years ago we did it by launching our world famous Letsgo High Speed inkjet paper; today we are pioneering the use of alternative fibres from agricultural residues on an industrial scale.

It wasn't an easy process, and we have to thank our development partners and launch customers. Most Crown Native users are in food packaging or commercial print, and they enjoy the benefits of this new product. It is food safe, strong and has a special "ecological" look, with small particles coming from the beet skin; you can tell just by looking at it that there's a story behind it. We are exploring other alternative fibres as we seek to make the economy more circular and more sustainable.

Biogas from Papierfabriek Doetinchem's wastewater



Project description

Process water at *Papierfabriek Doetinchem* is being reused internally several times, resulting in residual water concentrated with organic matter. This residual water of 35°C is pumped to a new sewage treatment plant via a dedicated 4.5 kilometer pressure pipe. At this plant, at the site of the local water board, biogas is produced from the wastewater and combined with the biogas that is produced by a sludge digester of the water board. The biogas is returned to the paper mill via the same route and/or processed into green gas and supplied to the local natural gas network. That's what we call innovation!

Project purpose

The biogas produced is used to replace natural gas for steam production and for consumption by households.

The aim of the project is to get as high as possible in the sustainability pyramid in the smartest way possible. This process total process became significantly more energy efficient. For example, electricity was previously used to remove organic matter from the water; now it is the exact opposite. The sustainable treatment of the residual water saves 2,300 tonnes of CO₂ annually, which is comparable to the natural gas consumption of one thousand households.

Project evaluation

The industrial water treatment plant in Etten, which opened in October 2022, is a wonderful example of industrial symbiosis. The expertise, facilities and resources of a municipal waste water treatment is smartly combined with the both the biogas potential of residual water and the renewable energy needs of a paper mill, via a joint investment in digestion equipment and pipelines.



Youtube Video



Main features:

- 1.500.000 m³ biogas per year
- 2.300 tonnes CO₂ savings per year.



 **Bart Broens**
Operational Director

Papierfabriek Doetinchem produces lightweight packaging paper and tissue based on recycled paper. The mill pays a great deal of attention to recycling, saving materials and biodegradability. The white, brown and coloured paper products find their way to customers all over the world.

This project significantly reduces natural gas consumption and CO₂ emissions by 2.300 tonnes per year. It is not so much a technological innovation, but above all an innovation in the field of cooperation and finding (local) synergies. The Rijn en IJssel water board, Waterstromen and Papierfabriek Doetinchem, could not have achieved this individually.

Participating companies



Cartonnerie Gondardennes

Cartonnerie Gondardennes is an independent French family business (CGW Packaging group), a leader in corrugated cardboard for 125 years. Located on a 30-hectare site in Wardrecques, the plant is one of the largest in Europe, producing nearly 180,000 tonnes of recycled paper per year and more than 250 million m² of corrugated board with three corrugators, while developing the production of packaging.



Crown Van Gelder

Crown van Gelder (CVG) is an independent paper mill that has been making speciality papers for 126 years in Velsen-Noord, near Amsterdam. Crown is famous for its Letsgo High Speed inkjet papers, but also because of its unique approach to the market. CVG is in continuous dialogue with customers, converters, equipment manufacturers, publishers, ink and coating suppliers and others, delivering unique product and business development.



Ence

Ence is a company firmly committed to sustainability, competitiveness and people. In accordance with these values, our cellulose biofactories and renewable energy generation plants are today among the best in the world in terms of environmental management. And we continue investing and working to innovate and improve our processes, bringing environmental, social and economic benefits in the regions where we operate.



Essity

Essity is a leading global company dedicated to improving people's well-being through hygiene solutions. It has been doing so by contributing to a sustainable and circular society. In France, Essity has six production sites and one global R&D centre. The site in Gien manufactures toilet paper, tissues and paper towels. Essity is a key partner of several international organisations to help raise awareness of hygiene and health issues worldwide.



LC Paper

LC Paper is a family-owned tissue mill in north-eastern Spain, with 142 years of history. It was the first Spanish mill to be ecolabel-certified, the first tissue mill with B Corp certification and has implemented innovations such as alternative energy sources (recirculation of CHP gases, photovoltaic, biomass, biomethane) and efficiency improvements, for which it holds several patents. LC Paper has been making converted products since 2019.



Participating companies



Lucart

Lucart, a leading European maker of tissue paper products, airlaid products and MG paper, was founded in 1953. Its consolidated turnover amounts to more than €700 million, with more than 1,700 employees in 10 production plants (five in Italy, one in France, one in Hungary, two in Spain and one in the UK), and a logistics centre in Italy. Lucart is part of the UN Global Compact Network Italy.



Metsä

Metsä Group is a Finnish forest industry group and a leading maker of products from renewable northern wood. Our portfolio includes sustainable forestry services, wood products for construction, pulp, various innovative bioproducts at different stages of R&D&I, paperboard for packaging, tissue and cooking papers. We are leading the way in advancing the bioeconomy, investing in growth, bioproducts and a fossil-free future. Metsä Spring, our innovation company, is a strategic investor and igniter of innovation in the wood-based circular bioeconomy.



Papierfabriek

Papierfabriek Doetinchem produces lightweight packaging paper and tissues based on recycled paper. The mill pays a lot of attention to recycling, saving materials and biodegradability. The white, brown and coloured semi-finished products find their way to customers all over the world. Papierfabriek works in 5 shifts (24/7) and has over 150 employees.



Sappi

Sappi is a leading global provider of sustainable wood fibre products and solutions, in the fields of dissolving pulp, printing papers, packaging and speciality papers, casting and release papers, biomaterials and bioenergy. At Gratkorn, Sappi operates an integrated pulp and paper mill with its own power plant and wastewater treatment plant. Every year, Gratkorn produces 250,000 tonnes of chlorine-free bleached pulp and 950,000 tonnes of paper.



SCA

The core of SCA's business is the forest: Europe's largest private forest holding. Around this unique resource we have built a sophisticated value chain based on renewable raw material. We offer packaging paper, pulp, wood products, renewable energy, services for forest owners and transport solutions.

In 2022 SCA had about 3,300 employees, with sales of 21 billion SEK. SCA was founded in 1929 and is headquartered in Sundsvall, Sweden.





Södra

Södra was founded in 1938 on the idea that we are stronger together. We are now the largest forest owner association in Sweden, with 51,000 family forest owners as our members. Together, members of Södra own a world-leading industry that processes forest raw material into renewable products such as pulp, timber, building systems, liquid bioproducts and energy. With our roots in the forest, we are creating the future.



Stora Enso

Stora Enso is a leading global provider of renewable solutions in packaging, biomaterials, wooden construction and paper.



UPM

We deliver renewable and responsible solutions and innovate for a future beyond fossils across six business areas: UPM Fibres, UPM Energy, UPM Raflatac, UPM Specialty Papers, UPM Communication Papers and UPM Plywood. We are committed to the UN Business Ambition for 1.5°C and science-based targets to mitigate climate change. We employ 17,000 people worldwide, with annual sales of about €11.7 billion. Our shares are listed on Nasdaq Helsinki Ltd.





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