



RE INVEST 2050

Advancing low-carbon innovation
in the forest fibre and paper industry

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CEPI would like to thank all companies,
national associations and individual experts
that participated in the project.

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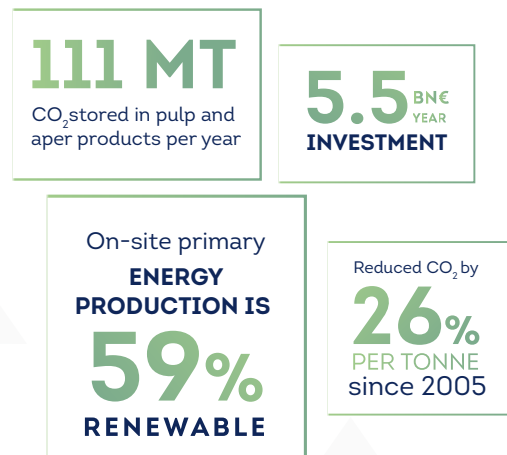
Executive summary

A future-oriented industry

From forest fibre technology to advanced paper design, the forest fibre and paper industry is a leader of the low-carbon circular bioeconomy transition. Our products add value to European society at large, as they are renewable, recyclable, bio-based, innovative and Made in Europe.

Our vision is to advance this transformation in Europe, coupling value creation and decarbonisation through product innovation, enhanced productivity and process efficiency.

Our industry is a central element in one of the key industrial value chains delivering sustainable growth and jobs in Europe.



The concept

The project REINVEST 2050 is a commitment of the forest fibre and paper industry to demonstrate how the industry is actively taking responsibility in reducing its carbon emissions, as well as playing a leading role in providing bio-based alternatives to more carbon-intensive products.

As a biannual commitment, this edition of REINVEST 2050 gathers 21 case studies from 12 EU countries, involving 16 companies representing a diverse array of projects carried out over the past two years. By improving energy efficiency and switching to renewable energy sources as a main tool to reduce our carbon emissions, our industry contributes to meeting climate change and energy goals.

In addition, our innovative products help society shift from fossil-based products to sustainable, renewable and recyclable products and solutions thus playing a pivotal role in the transition towards a low-carbon economy.



REINVEST 2050

Advancing low-carbon innovation
in the forest fibre and paper industry





Smurfit Kappa future energy project at Nettingsdorf paper mill

Project Description

Established in 1851, the Smurfit Kappa Nettingsdorf Paper Mill kicked off its 'Future Energy Project', which involved investing in innovative new technologies to further reduce emissions alongside increasing production output. The project focuses on two main areas: Firstly, the recovery boiler is an integral part of the chemical production methods used to make kraftliner. During the manufacturing process, wood is dissolved alongside pulping chemicals to form what is called "black liquor" and pulp. This liquor is then separated from the pulp and sent to the recovery boiler. Inorganic chemicals are recovered for use in the pulping process and dissolved organic lignin (a biomass component of wood) is used as fuel to generate steam. The new, state-of-the-art recovery boiler planned for Nettingsdorf, produces energy from biomass and will reduce CO₂ emissions at the mill by 40,000 tonnes. The Nettingsdorf Paper Mill will be the first kraftliner producer to operate with a recovery boiler only. Steam plays an important part in the paper production process, as it is used both for power generation and for other processes such as drying paper. Any heat released during combustion can

be recovered as high-pressure steam in the top of the recovery boiler, and is then transferred to the steam turbine. The second part of the Future Energy Project involves the implementation of a sophisticated new steam turbine, which will work in tandem with the new recovery boiler to increase energy efficiency.

Project Purpose

The Future Energy Project will increase the mill's sustainability achievements in line with Smurfit Kappa's overarching strategic sustainability priorities. Smurfit Kappa has a long-term commitment to sustainable business practice. In its 2017 Sustainable Development Report, the company reported that Smurfit Kappa had achieved a 26.1% reduction of specific fossil CO₂ emissions for its paper and board mills, three years ahead of its original target of 25% by 2020.



Günter Hochrathner
CEO of Smurfit Kappa
Nettingsdorf

Our commitment to sustainability and circular business practices is embedded in all that we do and is the reason that we already have the lowest energy consumption in our industry. We have reduced our specific fossil CO₂ emissions per tonne of paper by around 70% in the past decades. However, at Smurfit Kappa we always strive to go further, and identify other innovative ways to become even more sustainable. The Future Energy Project represents a very important step for the mill and will take us to the next level. We have made significant progress since we first announced the investment in July 2017. The new boiler and turbine will work in harmony and will increase our production, along with lowering emissions. This increased efficiency will benefit both our people and indeed the wider community. Nettingsdorf has a long history as a local employer for the area, and this project secures the long-term future of the mill.

Main Features:

CO₂ Emissions saved (tCO₂)

Reduced CO₂ emissions at the site by two thirds (1.5% of Smurfit Kappa's total volume) and reduced further emissions such as particulates and TRS (Total Reduced Sulphur Compounds).

Investment

€134 million



CO₂ reduction and energy efficiency at Zellstoff Pöls AG

Project Description

From 2011 to 2018, Zellstoff Pöls AG has undertaken comprehensive measures to reduce emissions of fossil CO₂ and to increase overall energy efficiency. One of the most significant projects was to ensure efficient use of the waste heat flow from the process, by supplying it to a district heating network. An 18 km supply line provides industrial plants, public facilities and private households with heat energy from Pöls.

A further increase in energy efficiency was accomplished with the installation of two flue gas coolers in the recovery boiler. The thermal energy of the flue gas heats up the feedwater, which results in a significant reduction of steam. A new system of heat exchangers in the recovery boiler enabled the use of another heat flow, which led to an additional reduction in steam consumption.

By commissioning a tall oil plant, it was possible to further process tall soap resulting from the processing into crude tall oil. This substance can be used as a substitute for fuel oil. Due to its special properties, tall oil is also in great demand in the chemical and cosmetic industries.

By using an additional waste heat stream from the pulp mill, the temperature in the paper production water cycle increases, which brings considerable advantages.

A further significant energy efficiency measure is the ability to recover the heat in the exhaust air extracted from the paper machine.

Project Purpose

Our projects during the past year have had the overall objective of reducing fossil CO₂ emissions and continually increasing energy efficiency in the mill. Linked to this is a decrease of primary energy demand and the economical usage of available energy sources (steam, electricity).

Project Evaluation

The consistent implementation of Zellstoff Pöls AG's energy efficiency strategy has led to savings in CO₂ emissions of approximately 160,000 tonnes per year.



Siegfried Gruber

Head of Project Engineering
Zellstoff Pöls AG

Increasing the benefit from our main raw material, wood, by pushing the mill's energy efficiency and generating new products, was one of the main goals, alongside mill optimisation, over the last 10 years. In 2011 Zellstoff Pöls AG invested in a new district heating system for the whole of the Murtal valley in Austria's federal state of Styria. Today 120 GWh of heat per year is delivered to more than 15,000 households in the region, through an 18 km pipe system. This project was only possible due to excellent relationships between industry, communities and several project partners. Above all, the environment is the winner, as no additional and valuable wood is burnt for heating purposes.

Main Features:

CO₂ Emissions saved (tCO₂)

16,000 tonnes per year

Investment

€60 million investment in CO₂ reduction projects (2011-2018)

Partnership

Zellstoff Pöls AG, Bioenergie Wärmeservice GmbH



Tork PaperCircle®

A one of a kind recycling service

Project Description

Essity, Europe's largest supplier of hand towels, is committed to contributing to a circular society, and has developed a service to help customers close the loop for their used hand towels. By collecting and recycling them into new tissue products, the carbon footprint is reduced by 40%*. Tork PaperCircle® is the first ever recycling service for paper hand towels.

Good partnerships are crucial for any circular initiative; you cannot go circular without collaboration. Tork PaperCircle® has established close relationships with customers, facility service companies and recycling companies, as well as among our own mills, with benefits for all involved. Even the end consumers are involved, as they have an important part to play.

Project Purpose

We are currently running pilot programmes in Germany, the Netherlands and Belgium and are already in the process of starting more customer pilots in these countries. The service will be implemented in Sweden in 2019, followed by further expansion in Europe within the next two to three years. With Europe's largest network of production mills, together we can

ensure that our customers can close the loop for their used paper hand towels locally.

This initiative is also leading the way in the shift that is happening towards a different handling of resources. We are aiming to get paper hand towels approved as recyclable under the EN643 standard, allowing anybody to recycle hand towels on an industrial scale.

Project Evaluation

Tork PaperCircle® was commended by the European Paper Recycling Awards 2017 in the European Parliament, and presented with two Innovation Awards at InterClean 2018. Tork PaperCircle® also won the Sustainability category at the 2018 European Cleaning & Hygiene Awards. Furthermore, Tork PaperCircle® is an important innovation for sustainability and circularity – both for Essity and for our customers. For Essity as a concrete step towards a circular society, and for our customers as a way to become more sustainable and circular, and to be able to communicate this to their employees and partners.



Kersti Strandqvist

Senior Vice President
Sustainability Essity

At Essity we are committed to contributing to a sustainable and circular society. This is an important objective in our business strategy, which is aligned with the UN sustainable development goals. This innovative service is a concrete way to contribute – especially to SDG 12 and 13. Circularity is an important part of our strategy, for us as well as for our customers, and we work in partnership with them to reduce CO₂ emissions. This means that through designing for circularity we can create more from less and reduce resource use, while maintaining or enhancing the performance of our hygiene and health products. With Tork PaperCircle® we are reducing the carbon footprint by 40%*.

Main Features:

CO₂ Emissions saved (tCO₂)

59* tonnes, potentially increasing to 2,500* tonnes per year by 2020.

Investment

Minor investments e.g for piping to optimize the recycling process.

Partnerships

Commerzbank, Gegenbauer, Mandauschas as well as our own mills.

*Based on a Life Cycle Assessment (LCA) for Europe, where the avoided processes have been taken into account, conducted by Essity and verified by IVL, Swedish Environmental Research Institute Ltd. 2017



Decarbonisation by investing in the modernisation of Mondi's Štětí mill

Project Description

Over the past 10 years Mondi Group has invested more than €1 billion in modernising its operations. These projects have included a strong focus on improving energy efficiency and increasing the contribution of on-site renewable energy generation, helping us reduce annual CO₂ emissions by 1.3 million tonnes by 2017, against a 2007 baseline. A recent example is the €335 million investment in our pulp and paper mill in Štětí, Czech Republic. It includes the replacement of the recovery boiler, with projected benefits that include increased energy efficiency, electricity self-sufficiency and lower carbon intensity, as well as reduced emissions to air and water (including a significant reduction of SO₂, TRS and AOX). The mill's specific CO₂ emissions will decrease by 13%.

Project Purpose

The Štětí project is fundamental to increasing production and significantly improving the mill's environmental performance. It includes the reconstruction of fibre lines, debottlenecking of the existing packaging paper machines and a new recovery boiler. Together these projects will allow the mill to become energy self-sufficient, reducing its costs and environmental footprint.

As we are increasing our market pulp production we are able to use excess heat in the energy-intensive market pulp drying process, as well as in our bleaching process, to further decrease AOX emissions in the effluent. The mill's total saleable production volume will be increased by 55,000 tonnes a year, and the annual market pulp capacity by 90,000 tonnes.

Project Evaluation

The investment will secure around 1,500 existing jobs in the Ústí region and create new ones. Importantly, the new recovery boiler, expected to start up in late 2018, will not only improve energy efficiency and significantly reduce GHG emissions, but will reduce malodorous gases by collecting them more efficiently and combusting them in the new boiler.



Roman Senecky
Managing Director

Our ambitious vision is to secure our position as 'Europe's Speciality and Sack Kraft Paper capital'. Ecoflex is the umbrella name for all the steps we will be taking to achieve this goal. The first important project milestones include modernising and preparing Štětí's infrastructure to strengthen the set-up of the mill, which will ultimately increase paper production levels. With state-of-the-art technology, which will enable environmentally friendly production, the investment project will have a positive impact on the region's economic development, with many local contractors involved in the construction period. The ecoflex project will ultimately offer the mill and our employees production stability and potential for further growth, while continuing the nearly 70-year tradition of paper production in Štětí.

Main Features:

CO₂ Emissions saved (tCO₂)

The mill's specific CO₂ emissions will decrease by 13%

Investment

€335 million



Metsä

Reshaping the forest-based bioeconomy through innovation

Project Description

In May 2018, Metsä Group established an innovation company, Metsä Spring Ltd. Its mission is to identify and develop new business opportunities for the larger Metsä Group ecosystem, i.e. within the sustainable circular bioeconomy. Having a separate company was expected to significantly increase innovation efficiency and improve Metsä Group's ability to support the development of technologies that take us towards a low-carbon economy.

Metsä Spring wants to find early-stage business ideas and take them to the 'proof-of-concept' phase, together with innovators, co-investors, industrial actors and other partners. If proof of concept is achieved, industrial actors such as Metsä Group can take the idea to a larger scale. The new ideas can vary from manufacturing businesses to digital applications. The most important criterion is that they offer sustainable, low-carbon solutions based on renewable wood. The first potential business idea in Metsä Spring's portfolio is a new method for making textile fibres from wood. It is based on a novel concept with significantly lower environmental impact than conventional production.

Project purpose

Metsä Spring is essentially a new tool for accelerating the discovery of innovations. Broad collaboration with a variety of partners is essential for this purpose.

EU funding plays an important role in facilitating early-stage R&D, and financing is also available for more mature concepts. However, the 'valley of death' between these two phases, i.e. where the ideas are tested and further developed for market uptake readiness, often lacks proper financing resources. Metsä Spring helps its projects to cross this valley, and thus accelerates the EU's innovation engine.



Niklas Von Weymarn

CEO, Metsä Spring

It is important to develop new bioproducts to expand the portfolio of the forest industry. Wood-based textile fibres is a very promising area due to growing demand for sustainable fibres. Today, the production of cotton and oil-based textiles has notable environmental impacts.

Together with Japan's Itochu Corporation, Metsä Spring is investing €40 million in building a demo plant with an annual capacity of 500 tonnes of textile fibre made from softwood pulp. The plant will be integrated with Metsä Group's bioproduct mill in Äänekoski, Finland. If proof of concept is reached in the demo plant stage, Metsä Group could proceed to developing the idea on an industrial scale. This is a natural first project for Metsä Spring.

Main Features:

Partnerships

Companies, research and financing institutions.



Towards closed chemical cycles: Recycling sulphuric acid

Project Description

Metsä Group's next-generation bioproduct mill in Äänekoski, Finland uses several state-of-the-art technologies to contribute to the circular economy. Metsä Group is the first forestry company in the world to introduce a large-scale sulphuric acid plant as an integrated part of the Äänekoski site's pulp production. The plant captures and converts the mill's odorous gases into sulphuric acid, a chemical needed to produce tall oil, another of the mill's bioproducts. As a result, the bioproduct mill is self-sufficient with respect to this chemical, while its sulphate emissions to water and air are minimised. This investment is an important step towards a closed chemical cycle. The approximately €20 million investment is the first large-scale sulphuric acid plant in the world to be integrated into the pulp production process. With a value of €1.2 billion, the bioproduct mill is the largest investment in the history of the Finnish forest industry. Äänekoski is the most energy-efficient pulp mill in the world, and the centre of an industrial ecosystem in which other companies also participate. This unique plant produces approximately 35 tonnes – one truckload –

of sulphuric acid a day, equal to the amount required for the mill's daily tall oil production. Due to internal circulation, the chemical does not need to be purchased externally, reducing transport needs by 360 truckloads a year.

Project Purpose

While sulphuric acid is a common and relatively inexpensive chemical, converting sulphuric gases into sulphuric acid in an integrated manner close to the mill has considerable environmental benefits. Based on this experience, sulphuric acid plants may become more common in conjunction with pulp mills.

Project Evaluation

Looking forward, sulphuric acid could also be used in the production of chlorine dioxide and in separating lignin from black liquor. There is thus the potential to develop an industrial ecosystem based on sulphuric acid production.

Ilkka Poikolainen

VP, Mill Manager of Äänekoski bioproduct mill

A plant that makes a process chemical, sulphuric acid, out of the sulphuric compounds in odorous gases i.e. a side stream of pulp production, is a significant step towards a closed chemical cycle, says Ilkka Poikolainen, VP, Mill Manager of the Metsä Group's bioproduct mill. This improves our bioproduct mill's environmental performance and resource efficiency even further. Sulphuric acid is needed to make things including the important bioproduct tall oil, which is also produced in Äänekoski. A leading principle behind the bioproduct mill is to expand the product portfolio. The sulphuric acid plant complements the bioproduct concept.

Main Features:

CO₂ Emissions saved (tCO₂)
About 360 truckloads per year

Investment
€20 million

Partnerships
Other companies



Getting more out of each tree

How Lineo™ by Stora Enso helps the EU reach its circular bioeconomy goals

Project Description

Lignin is a complex organic polymer that makes up as much as one third of every tree, but traditionally its qualities, other than heating value, have been overlooked by the pulp industry. Stora Enso recognises the potential of versatile lignin, which we have been commercialising since 2013. It's a renewable alternative for a range of applications, e.g. as a replacement for oil-based phenolic materials, used in resins for plywood, paper lamination, insulation material, carbon fibres and energy storage. Compared with phenol and formaldehyde, lignin is a stable, safer alternative with a lower carbon footprint. Easy to handle, lignin also has stable pricing due to backward integration, making it an ideal bio-based, non-toxic alternative. As it is a new project, it will take time to test lignin throughout the value chain, but Stora Enso hopes brand owners will become increasingly aware of its potential. Stora Enso launched Lineo™ in March 2018 with a dedicated media campaign, and the company promotes the product through a range of communication channels. Stora Enso participates in high-level industry events to inform peers and potential customers of its benefits.

Lignin as a phenol replacement is already commercialised, and Stora Enso is researching how to use it for other applications to provide the market with an innovative wood-based product to replace fossil-based materials. The Lineo™'s launch has been positively received by our stakeholders, and we have a range of companies interested in using it as a bio-based alternative. Lineo™ helps the EU reach the targets set by the European Circular Bioeconomy Strategy and adds to the mix of new bio-based products helping the European economy decarbonise.

Lignin production began in 2015 at Stora Enso's Sunila Mill, which has a production capacity of 50,000 tonnes per year. Stora Enso invested €32 million in lignin separation technology for Sunila, and in principle other pulp mills could be suitable for similar projects.

David Almqvist

Product Manager Lignin,
Stora Enso

The Lineo™ concept is exceptional as we have invested in the world's largest lignin extraction plant. We have proven that Lineo™ can be used to replace fossil-based materials in several different end applications. Lignin is the second most abundant biopolymer in nature; it exists in all plants. Forests are growing all the time so our sustainable forestry operations increase the availability of raw material every year. The potential of lignin is significant and sustainable. Lineo™ can be used to decarbonise several fossil-based raw materials, and the carbon footprint of Lineo™ is up to 80% lower than that of phenol. There are many more opportunities for Lineo™ and with all of them we will significantly decarbonise the end market.

Main Features:

CO₂ Emissions saved (tCO₂)

The carbon footprint of Lineo™ is up to 80% lower than that of phenol

Investment

€32 million in lignin separation technology for Stora Enso's Sunila Mill



Stora Enso's Energy Hunters

Project Description

As an energy-intensive business, Stora Enso also has the potential to realise energy savings that reduce both CO₂ emissions and financial costs. In 2008, Stora Enso nominated a group of energy experts to identify efficiency improvements at our European mills. The project turned out successful, and soon expanded to a permanent global operation.

Project Purpose

The team, called Energy Hunters, is tasked with systematically challenging and supporting Stora Enso mills to use energy as efficiently as possible. This helps our facilities fulfil the requirements of the ISO 50001 energy management system, supports our commitment to combat global warming, and brings financial savings. Other tasks include reviewing energy-related projects, sharing best practices, running internal energy networks and energy saving campaigns, and conducting energy audits.

The Energy Hunters coordinate and assess investment proposals for Stora Enso's Energy Efficiency Investment Fund; the team receives 60-100 proposals annually for projects improving energy efficiency, of which 30-50 are selected. The typical payback time for energy efficiency investments is one to two years, making this a high-priority investment category at Stora Enso.

Project Evaluation

Energy efficiency investments are also a significant contributor to the decarbonisation of Stora Enso. The Energy Hunters recently received an internal award for their committed work, citing the value they have created for both the company and the environment.



Heinz Felder
SVP Investment's
and Energy

Stora Enso was the first in our industry to set a science-based target, committing us to reduce our greenhouse gas emissions. Improving energy efficiency is the most effective way to reduce these emissions sustainably. The Energy Hunters make it possible for Stora Enso employees to be an active part of this work because we can finance small projects in a flexible way. Risto Mänttari, Engineering Manager at Anjalankoski Mills in Finland: The team supports our mills' energy efficiency work with their expertise, by sharing knowledge between mills and helping mills find their best investment opportunities. As many of the easy fixes have now been done, improving energy efficiency will become more challenging. The Energy Hunters can provide the more specific expertise needed for these future projects.

Main Features:

CO₂ Emissions saved (tCO₂)

Between 2015 and 2018, an accumulated reduction of 129,000 tonnes, corresponding to an average car driving around the earth 17,000 times, or the annual average driving distance of around 45,000 cars.

Between 2015 and 2018, we also reached an accumulated annual energy reduction of 1.5 TWh, corresponding to the annual energy use of around 50,000 private houses in the Nordic region.



Sari Mannonen
Vice President,
UPM Biofuels

UPM Biofuels is one of the few renewable naphtha producers in the world. We are very excited and proud of this collaboration, and the ability to offer a high-quality wood-based raw material to replace fossil raw materials in packaging, Mannonen concludes. Creating a 100% wood-based carton has been a great example of collaboration all along the value chain (UPM Biofuels, Dow and Elopak) to find sustainable solutions. It shows that wood-based raw materials can be used to replace fossil materials in everyday products. It is also a best-practice case of innovation in the forest industry. Furthermore, it shows how collaboration between new partners can create very interesting business opportunities. Finally, it shows how important it is to reduce the CO₂ footprint of all value chains.

Main Features:

CO₂ Emissions saved (tCO₂)

Every tonne of renewable naphtha used in bioplastics decreases the need for fossil raw materials, so the CO₂ emission saving is considerable.

Collaboration

Elopak and Dow

Replacing fossils in plastics

UPM Biofuels enters the bioplastics market with new partners

Project Description

This project shows how wood-based raw materials can be used to replace fossil materials in packaging. In addition to renewable diesel, the UPM Lappeenranta Biorefinery produces renewable naphtha, an excellent raw material for bioplastics. It can be transformed into the resins needed to create bioplastics, e.g. for the packaging industry.

Elopak, a Norway-based company supplying 15 billion cartons around the world each year, joined forces with UPM Biofuels and Dow to offer 100% renewable cartons that are both recyclable and responsibly sourced.

Choosing the right packaging solution can make a big difference. Beverage cartons have the lowest CO₂ footprint among liquid food packaging today, and now even the plastic coating of the cartons can be wood-based renewable polyethylene, further reducing the footprint.

Creating a 100% wood-based carton has been a great example of collaboration across the value chain to find sustainable solutions.

The project was widely promoted both internally and externally, via press releases, social media and interviews, e.g. via a video about the collaboration

Project Purpose

Using a wood-based plastic coating for cartons reduces their carbon footprint from its already low base relative to other liquid food packaging. Publicising this collaborative project was a great way for UPM to present our renewable naphtha production in the Lappeenranta Biorefinery known to a wider audience.



Revelation II project - our energy saving initiative

Project Description

Our industrial activity is the production and processing of paper, which is a high consumer of energy and the subject of fierce international competition. REVELATION II is a project developed by our team in the Villey St Etienne plant, contributing both to transforming the site's environmental footprint and to the energy efficiency of production equipment. One priority of the Kimberly-Clark group is to minimise the environmental impact of our production sites through the Sustainability 2022 program. Energy is the plant's third-highest cost item, so it represents a key challenge for competitiveness, as a number of global rivals are located in regions where energy is less expensive.

In 2015, the first phase of this project concluded with REVELATION I, constructed around three improvement areas aimed at energy savings for the plant, comprising: optimisation of the vacuum production required for paper drying; optimisation of the combustion required for paper drying and recovery and reuse of low-grade waste heat (64°C) from atmospheric emissions.

Project Purpose

REVELATION II is the continuation of REVELATION I and aims to extend the current recovery network to the heating of the processing buildings for folded and rolled products, the maintenance area and the site warehouse. It will include:

- Heat recovery extension: a new hot-water/air heat-exchanger with additional capacity of 1,300 KW and a heat pipe network linked to three new areas of the building.
- Upgrade of the HVAC (air conditioning) system in the production building: implementation of VSD and air recovery register.
- A new centralised control and management system covering the entire building heating network.

Project Evaluation

REVELATION II will provide:

- 8,000 Tonnes/year of steam consumption savings – that's 72% of the steam consumption for the heating building (gas only)
- 2,600 MWh/year of electricity savings, or 46% of the energy used for HVAC fans
- 1,600 Tonnes/year of CO₂ emission reduction, equivalent to 4% of the site's emissions.



Stephan Lemeer

Mill manager of Kimberly Clark Villey St Etienne site

Energy is an unavoidable issue for a paper manufacturer, since it represents the third-highest cost for a mill. This economic challenge fits with another priority of Kimberly-Clark, which is to minimise the environmental footprint of our production sites through the Sustainability 2022 program. In this context, Kimberly-Clark is investing in projects contributing to both the transformation of the site's environmental footprint and the energy efficiency of production equipment. Thus, in 2015, we launched an innovative project for the recovery of heat at low temperature (64° C) and, thanks to its success, we are now continuing the process with an extension of the recovery of this heat at our industrial site in Villey St Etienne.

Main Features:

CO₂ Emissions saved (tCO₂)

1,600 tCO₂

Investment

€900,000

Partnerships

French Energy Agency (ADEME)



Biomass Saica Paper France

Project Description

The project consists of the installation of a biomass steam generator which will provide the mill with thermal energy for the production of paper. Currently this energy is produced with natural gas. The new installation will be divided into two main areas:

- A biomass boiler of 43.8 MWth.
- A combustible preparation plant that will treat waste wood (about 70,000 tonnes per year) and paper mill rejects (about 20,000 tonnes per year). Annual net steam production will be approximately 450,000 tonnes.

The new plant will permit the installation of one steam turbine. Recycled wood will represent more than 80% of the heat of the boiler, and wood from local sources will be used as the main boiler fuel, complemented with rejected material from paper production. The only raw material in the site's paper manufacturing is recycled paper; these rejects are separated at various points of the process.

This project is supported by the French Environment and Energy Management Agency (ADEME) and the Regional Council of Hauts-de-France (FREME).

Project Purpose

There are various reasons for the project, but all of them are related to the environmental, economic and competitiveness benefits that the new installation is going to provide. Some of these benefits are:

- A reduction in the use of fossil fuels, and thus of CO₂ emissions
- A substitution of biomass for natural gas
- A reduction of thermal energy costs by introducing residual wood and paper mill rejects as the primary fuel instead of natural gas
- A reduction of landfill costs, as some paper mill rejects will be used as fuel.

Project Evaluation

The goals of the project are related to the environmental, economic and competitiveness benefits as mentioned above. Future similar projects at other Saica Paper sites could be considered after evaluation of our achievements here.



Renaud Guilianelli

Mill Manager
of Saica Paper Venizel

The biomass project enables the Venizel greenfield mill to reach a new milestone in its push to develop a sustainable circular economy. Internal and external biomass rejects, mostly consisting of wood for recycling from the area, will represent close to 100% of the boiler fuel, leading the mill to be close to fossil energy independence.

On top of combining environmental benefits, competitiveness gains and local enhancement of the recycled biomass sector, this project represents a breath of fresh air for the area, with a direct CAPEX envelope of €45 million, and demonstrates once again SAICA's commitment to promote a virtuous cycle of secondary material upcycling in Europe.

Main Features:

CO₂ Emissions saved (tCO₂)

46,500 tonnes per year

Investment

€45 million



Sofidel Suppliers Sustainability Award

Project Description

To promote ethical and responsible management of the supply chain, the Group presents the “Sofidel Suppliers Sustainability Award” (3SA) to the most sustainable suppliers among our fundamental business partners. The award is focused on the “TenP – Sustainable Supply Chain Self-Assessment Platform” project, created and promoted by the Global Compact Network Italy Foundation (GCNI Foundation), of which the Group is a founding member.

The “Sofidel SSA” awards two prizes: Best Supplier, according to the score achieved on the TenP platform, and Best Sustainable Project, for a particularly important environmental and social responsibility initiative to improve sustainability, including decarbonisation.

Project Purpose

Sofidel Suppliers Sustainability Award, supported by the Italian Ministry for the Environment and Protection of Land and Sea, was created to encourage, propagate and capitalise on best practices and improvements carried out by our suppliers each year in the area of environmental and social sustainability.

Sofidel expects to inspire positive competition for better environmental and social performance all along

its supply chain, aimed at reducing emissions of carbon and other pollutants in the air and water, reducing consumption of water and raw materials, increasing energy efficiency and boosting social inclusion and safety.

Project Evaluation

A jury comprising representatives of SGS, WWF Italy, the UN Global Compact Italian Network and Foundation Sodalitas selects the best Sustainable Project. The winners of the 2017 edition were: **Skymark Packaging International Ltd**, for a project of reducing plastic waste through an innovative recycling system. **LKW WALTER Internationale Transportorganisation AG**, for a project of CO₂ reduction by developing Intermodal Transport Solutions and Optimised Transport Routing. In 2016, LKW WALTER saved 260,800 tonnes of CO₂. **Fibria International Trade GmbH**: for a social action called the Rural Land Development Program (PDRT).



Andrea Piazzolla
Chief Purchasing Office

Why did Sofidel create the Sofidel Suppliers Sustainability Award?

We place strategic importance on sustainability for growth and development, and are willing to contribute to some of the United Nations Sustainable Development Goals that are closest to our operations. In 2016, in order to promote the ethical and responsible management of the supply chain, we launched the first edition of the Suppliers Sustainability Award, or 3S Award, which saw the attendance of more than 300 companies from several countries.

How does Sofidel employ sustainability as a strategic lever for development and growth?

Sofidel implements policies to limit environmental impact and maximize social benefits throughout the value creation chain, from sourcing to production processes, from products to logistics.

Main Features:

CO₂ Emissions saved (tCO₂)

The target for the reduction of Scope 3 specific emissions for Sofidel has been set at 13% by 2020, compared with 2010 levels.

Investment

Around €400,000 for each edition



Integration of steam systems between paper machines

Project Description

Smurfit Kappa Roermond Papier runs three paper machines to produce recycled paper for corrugated packaging: two large machines (PM1 & PM3) and one small one (PM2). In a conventional configuration the steam systems are optimised for each machine. As PM2 uses lower steam pressures, similar to the residual pressures at PM1 & PM3, the project aimed to feed that steam to PM2, saving natural gas and reducing CO₂.

In the old configuration the residual steam of paper machines PM1 & PM3 was only partially reused via thermo-compressors; the energy of the excess steam, with low temperature and pressure, was converted into condensate. PM2 has no excess steam because all the steam can be fully used in this machine due to a cascade steam system (lowest steam pressure 0.5 bar). After drying, only condensate leaves this machine; all condensate is sent back to our power plant and turned into steam again in a boiler. With this configuration the steam systems are optimised for each paper machine, not as a single total mill system.

In the new configuration we have fully integrated the steam systems of all three paper machines, with the excess steam from PM1 & PM3 reused in PM2. Our smallest paper machine needs less fresh steam to

dry the paper web, meaning less natural gas consumption in the steam boiler, which reduces the mill's CO₂ emissions.

Project Purpose

Decarbonisation of our heat supply is essential for the future of the mill: reducing, re-using, increasing efficiency and increasing non-fossil fuels are the main energy challenges. By re-using residual heat from the two large machines in the small machine, we need less fresh steam and therefore less natural gas.

Project Evaluation

Thus far the project has been carried out in two steps: first, residual heat from PM1 was sent to PM2. Based on this experience PM3 now also delivers residual heat to PM2. These two steps resulted in a 3,000 tonne reduction in the CO₂ footprint in 2017. We are still optimizing the system to save even more natural gas, and expect an additional 3,400 tonne reduction in annual CO₂ emissions resulting in a total of 6,400 CO₂ reduction per year as from 2020. So although within the European paper industry we are already the benchmark regarding specific energy consumption for the recycled papers we produce, we are finding ways to reduce our consumption even more and contribute to a low(er) carbon society.



Wim Janssen
Production Technologist

We consider sustainability to be a key driver for innovation, and we believe new ideas come from collaboration, creativity and an open mind. What started as a pilot project resulted in an innovative way of optimising the total mill steam system. This may sound like an easy solution, but we produce paper with different weights at different machine speeds, with maintenance stops and paper breaks. We constantly need different steam quantities. The volume, temperature and pressure of the residual steam vary continuously, which makes re-using it very complex. To guarantee a stable production process, we had to design and implement a sophisticated control system. Looking at the results, it has more than paid off.

Main Features:

CO₂ Emissions saved (tCO₂)

Total savings per year: 4,500 ton lower CO₂ footprint (being 3% of our total emission) in 2018 and further reduction to 6,400 ton lower CO₂ footprint (being 4% of our total emission) in 2020



Improving efficiency of the evaporation process to reduce greenhouse gas emissions at the Kwidzyn mill

Project Description

Modernisation of the evaporator plant at International Paper's Kwidzyn mill in Poland began in 2015 and was completed in March 2018. The project originated as an internal cost reduction initiative, combined with International Paper's continuous commitment to reduce greenhouse gas emissions.

The project aims to reduce steam consumption in the evaporation process, and increase the overall efficiency of the process.

The upgraded and newly designed equipment allowed us to achieve better steam economics, as well as higher dry solids capacity of black liquor – the main fuel in the recovery boiler. An innovative concept assumed that we would remove more water at the evaporator stage, rather than doing it directly in the recovery boiler. A reduced feed of water mixed with fuel into the recovery boiler significantly improves the overall efficiency of the process, and increases heat generation from carbon-neutral fuel (black liquor), allowing us to replace corresponding volumes of coal.

The project team faced three major challenges. The first was design, where an error was only spotted during start-up. The second arose

from the very short time for the implementation, and lack of space for configuration changes within the massive number of pipelines. The last challenge was to optimise and stabilise the new process to reach the target parameters, which took more than two months.

Project Purpose

The main purpose of the project was to decrease fossil fuel consumption and subsequently CO₂ emissions at the Kwidzyn mill. To reach this goal two major changes were introduced to the evaporation process:

- Debottlenecking of vapour line
- A brand new concentrator to boost dry solids of black liquor

Project Evaluation

The annual savings come from:

- Less heat used in the evaporation process – about 300,000 GJ per year
- Additional thermal green energy from the recovery boiler – about 190,000 GJ per year;

Together this allows a reduction in coal consumption of 25,000 tonnes a year.



Martin Figacz
Energy Plant Manager

At International Paper we continuously work to reduce our environmental footprint. At the power plant, we focus on how to reduce our manufacturing emissions and improve air quality. We go beyond what EU regulations require, and look for continuous improvements in operations, upgraded equipment and fuel substitution. Reducing the volume of fossil fuel at our facility has an immediate positive effect on operating costs and emissions of greenhouse gases and other air pollutants. Our strategy and the thinking behind it led us to evaluate improvement projects like the one we completed in March. We have worked on this idea for the past three years, and in the end the modernisation of the evaporator allowed us to make a step change related to black liquor dry solids used in the recovery boiler. Combined with improved efficiency and economics of the evaporation process, this resulted in another significant reduction of coal consumption and GHG emissions at our mill. Personally, I am very proud of this achievement.

Main Features:

CO₂ Emissions saved (tCO₂)
52,000 tonnes per year

Investment
\$6.5 million



Developing OnePly®: the greenest tissue paper in the world

Project Description

The OnePly® project has been executed within the framework of the European Union's Horizon 2020 programme. The aim was to create a tissue product with softness equivalent to other structured tissue manufacturing techniques despite having a 63% reduction in energy usage and reduction of water consumption by more than one half.

Project Purpose

In order to reach those numbers, the product should consist of a single ply, unlike conventional tissue papers with two or three layers. As a result, the main challenge of the project was to rethink both the product and the manufacturing process, so that the tissue rolls would still be competitive in terms of quality. Reducing the energy usage of traditional manufacturing processes, without rethinking the product and the process, would severely affect the paper's characteristics. As this was an industry-first approach there was no state-of-the-

art technology available, so it was necessary to develop key aspects of the machine engineering in-house, and have very receptive partners to integrate existing machinery with the internally developed elements. LC Paper partnered with the machine industry company MTorres, starting a relationship of cooperation in the design of a disruptive tissue manufacturing technique that ultimately resulted in a product with the lowest CO₂ footprint of its class.

Project Evaluation

LC Paper has transitioned from the classical 34 g/m² tissue products to a new toilet product portfolio of 28 g/m². While a conventional toilet paper with 34 g/m² has a manufacturing energy consumption of 0.102 kWh/m², the new OnePly® paper achieves consumption of 0.038 kWh/m², a reduction of 63%. That of course means our new tissue manufacturing process also has substantially lower carbon dioxide emissions.



Joan Vila
LC Paper's CEO

Is single-layer tissue really that innovative? There have been budget single-layer tissue offerings for a while. Our goal was different because we wanted to break the association where a premium product implies high energy usage, and low energy usage is only suitable for budget products. Ultimately we demonstrated that this is not the case.

Do you think single-layer tissue products will be a market trend, or is this a one-off project? The great thing about the OnePly project is that, apart from being a challenging sustainability goal, it makes a lot of sense in terms of business strategy and market positioning. Using less energy means lowering costs, thus having a more competitive product. Also, deciding to have a single-layer offering reduces raw material consumption, which is key in an industry where input prices are steadily increasing.

Main Features:

CO₂ Emissions saved (tCO₂)

The OnePly® Toilet product has a footprint of 0.014 tCO₂/m², while competing products have a footprint of 0.044 tCO₂/m² (a decrease of 69%)

Investment

€2.76 million

Partnerships

EU Horizon 2020 grant, MTorres



Carbon capture and storage through the use of lodgepole pine

Project Description

In the early 1970s, SCA introduced the lodgepole pine (*Pinus contorta*), a North American tree species, into its forest management programme. Since then SCA has planted 300,000 hectares with the species and been able to verify that, in practice, the lodgepole pine has 40% higher wood production than Swedish species. That means it sequesters the corresponding amount of carbon dioxide from the atmosphere, turning it into a renewable raw material that can be used as a substitute for products with a higher climate footprint.

Today 300,000 hectares, of 15% of SCA's forest land is planted with lodgepole pine. As the trees are still relatively young, they make up a minor share of the standing volume, at 11%. They do, however, contribute to more than 20% of the growth.

In the early 2000s SCA made a broad study of the best possible use of lodgepole pine in various production processes. The species was tested in chemical and mechanical pulp production; in the production of paper for print and packaging; and as raw material for sawmills; and the sawn products were tested for various forms of use. The outcome of these tests was that lodgepole pine

provides good raw material for kraft pulp and for chemically pre-treated mechanical pulp.

Project Purpose

Lodgepole pine provides good raw material for sawn products for visible use. The high growth makes it less useful for construction wood and other applications where strength is needed, but for carpentry products, panelling and similar use, lodgepole pine has characteristics that are as good as or even better than the Swedish alternative species.

Project Evaluation

The balance between growth and harvesting in SCA's own forests, 2.0 million hectares of productive forest land, is a net increase in the standing volume of 3 million cubic metres per year, a volume that corresponds to the net sequestration of 4 million tonnes of carbon dioxide from the atmosphere. Of this net growth, lodgepole pine provides a substantial and important share.



Björn Lyngfelt,
Senior Vice President

Since the Second World War, we have put great effort into restoring the forests of northern Sweden, after a century of exposition and high-grading, says Björn Lyngfelt, Senior Vice President for communications at SCA. We have since then increased the standing volume in our forests by 50% and the long-term sustainable yield by 100%.

The pioneer in the introduction of lodgepole pine in SCA and in Sweden was former Chief Forester Stig Hagner.

Hagner believed strongly that lodgepole pine would provide substantial economic and environmental benefits to the forests of northern Sweden and contribute to the prosperity of the region. He claimed that lodgepole pine was the most important biological innovation in northern Sweden since the introduction of the potato in the 18th century.

Main Features:

Net increase in the standing volume of 3 million cubic metres per annum, in SCA's own forests

A volume that corresponds to the net sequestration of 4 million tonnes of carbon dioxide from the atmosphere



The expanded Östrand pulp mill:

Boosting the production of renewable energy

Project Description

In 2016-2018, SCA invested SEK 7.8 billion in its Östrand kraft pulp mill. The mill will increase production of bleached softwood kraft pulp, becoming the world's largest NBSK (northern bleached softwood kraft) production line.

Through this investment, the Östrand pulp mill will also increase both energy output and energy efficiency, with electricity consumption reduced by 28% and heat consumption by 31% per tonne of pulp. At the same time, electricity production is increased by 23% per tonne of pulp. The result of this is a net supply of green electricity from the mill to the grid of 0.6 TWh per year.

Project Purpose

Östrand pulp mill is already a supplier of thermal energy to the district heating grids of the communities Timrå (0.1 TWh) and Sundsvall (0.1 TWh).

The purpose of the project has been to increase the production of kraft pulp from 430,000 tonnes to 900,000 tonnes per year. The expanded mill has been designed to deliver excellent quality and environmental performance, and at the same time optimise energy efficiency and output of green energy.

Project Evaluation

The expanded mill started in June 2018 and will be adjusted in 2019, reaching full capacity in 2020. The expansion project at the Östrand pulp mill has set a whole range of records. It is one of the greatest industrial investments in northern Sweden ever. It was carried out on budget and on schedule, and the new mill was built inside the existing mill, while it was running.



Ingela Ekebro
Project Director

It has been a fantastic project, says Project Director Ingela Ekebro. Safety has been our top priority and I'm happy to say that we have managed the project without any serious accidents, even though at times there were 2,000 of us working with the project on the site, while some 200 of the regular staff continued operating the mill. We have strived to maximize the opportunities for energy efficiency and energy production, and I think we have succeeded quite well. And with the new mill we have created infrastructure and options for further development. We have applied for environmental permits for a biorefinery. We're looking into the production of liquid biofuels and green chemicals from black liquor, a by-product from the pulp mill, and production of liquid biofuels from solid biomass, such as sawdust.

Main Features:

Electricity consumption reduced by 28% per tonne of pulp

Heat consumption reduced by 31% per tonne of pulp

Investment
SEK 7.8 billion



A Fossil-free Södra

Project Description

Södra launched a project in 2017 that will make us fossil-free in production by 2020, and in all transport, globally, by 2030. Our pulp production is already close to fossil-free due to earlier investments, and Södra Cell is a net producer of green electricity, but we need to take out the last remaining fossil CO₂. We can do this by using our residues more efficiently and we need to combine technical steps with creating both supply and demand. We also need to get the right policy decisions to be able to achieve our goals. One production-related challenge is moving goods at the plant: our lift trucks, cranes and wheel loaders are certified to run on fossil diesel. After we engaged in dialogue with the manufacturers, all of them have allowed us to run the machines on biodiesel instead, and for future solutions we will perform trials with other internal energy sources, such as electricity, green methanol and biogas. The project is heavily promoted, both internally and externally, and all employees are dedicated to its success. The programme is being communicated to suppliers and customers as well as shareholders and governments.

Project Purpose

The purpose of the project is to show that it is possible to run an energy-intensive processing industry without any use of fossil energy: moving trees from the forest, and pulp to customers all over the world, without any use of fossil energy. We believe that when Södra succeeds, the world will follow. In Sweden we have seen a government initiative in which several industries want to follow, and have created a roadmap on how to be fossil-free.

Project Evaluation

The longer time frame of the project is to make sure that it is possible to succeed in a cost-effective and rational way. The project is mainly measured by how much fossil CO₂ we use per tonne of sold pulp. When we offer our customers fossil-free pulp, our ambition is that they will offer a fossil-free product to their end customers, and that we will drive future demand for fossil-free production.

Henrik Brodin

Project Manager for
'A Fossil-free Södra'

What is exceptional about the project?

The scale of the project is the most exceptional: the time frame, and our ambition to achieve something no one has ever done before. We need to work in so many dimensions at the same time, and we need to have a clear strategy in every decision we make. Not all of the solutions we will need to succeed have been invented yet so we have to work with that at the same time as we conduct our operations.

Can this project be a successful model for the future?

It must be. The world will not be a much better place if just one company reduces its emissions. It can only be by being a role model for other companies to follow, and only then can the world be decarbonised. If we can produce pulp without use of fossil energy, others can too. And if trees can be transported without the use of fossil energy, all goods can be.

Main Features:

Södra will be fossil-free in production by 2020, and in all transport, globally, by 2030



Grow Your Income

Project Description

Iggesund Paperboard, part of the Holmen forest industry group, invested £108 million in a biomass CPH plant at its mill in Workington, Cumbria, UK to eliminate annual emissions of 190,000 tonnes of fossil CO₂. “Grow Your Income” increases the mill’s supply of locally-produced biomass by encouraging local farmers to grow energy crops.

Project Purpose

The main aim was to secure the mill’s supply of biomass, with a target set at 5% of the mill’s total need of 500,000 tonnes per year. A secondary aim was to offer an additional source of income to local farmers in a region of marginally productive land. Iggesund’s offer of advice plus help with planting and harvesting was attractive to an ageing rural population that is seeking less labour-intensive ways to make a living.

Project Evaluation

A great external communication effort was required to convince farmers to switch from traditional farming to something new. Iggesund now has

contracts with growers who – when crops are fully established – will supply more than 25,000 tonnes of biomass per year, i.e. more than the original project target. The project’s interaction with the local community has helped to raise Iggesund’s local profile. The project has also created a new and stable source of income for local farmers. The farmers, many of whom are ageing and have no family members interested in taking over, have welcomed this.

Cumbria is regularly impacted by severe flooding. Evaluations of the project have repeatedly shown that energy crops have helped to limit flood damage, while remaining undamaged themselves. Iggesund is supporting ongoing trials to further increase productivity by grazing sheep among the energy crops and by plant breeding to optimise the crop plants.

This project could easily be replicated elsewhere given similar conditions.



Ulf Löfgren

Mill Director

Grow Your Income lets us give back more to the local community while stabilising our fossil-free energy supply, says Mill Director Ulf Löfgren. It has greatly helped us to promote Iggesund to one of the most important local industries, farming. Farmers are in a difficult situation and we have offered them a way to diversify, which has been welcomed, adds Alternative Fuels Manager Neil Watkins. Previous energy crop projects in the region failed because farmers had to harvest and transport their crop to a delivery point themselves, so their profit was zero. We have offered long-term, index-linked contracts and we handle the harvest and transport using our existing knowledge and pre-established infrastructure for round wood.

Main Features:

CO₂ Emissions saved (tCO₂)

The biomass boiler in Workington eliminated 190,000 tonnes per year of fossil CO₂ emissions.

Investment

£900,000

Partnerships

Partnerships with local agricultural contractors (e.g. Rickerby Estates and Metcalfe Farms) plus hundreds of local farmers.



CupCycling™ - turning coffee cups into beautiful paper

Project Description

An estimated 2.5 billion paper cups are used in the UK annually, and the nation's love of takeaway coffee shows no signs of diminishing. CupCycling™ by James Cropper is a timely solution that reduces the environmental impact of disposable cups, which has been high on the agenda for both government and industry. Until recently, disposable cups have been unable to be recycled due to their polyethylene lining; however, James Cropper has developed the unique CupCycling™ facility which possesses the technology to separate the two components. The paper fibre is rescued and turned into fine papers, and the polyethylene is recycled by a re-processor.

The lack of a supply chain for the collection of disposable cups has been the main challenge for the initiative. Therefore, collaboration has been key for success. Together with key partners such as Costa, Selfridges and Veolia, James Cropper has been able to develop the infrastructure and supply chain required to recycle coffee cups on a commercial scale, rescuing millions from landfill and incineration.

Project Purpose

Coffee cups provide a rich source of high quality material; however, until now the majority of them have been unrecyclable. Seeing this waste on a huge scale is what led to investment in and development of the unique CupCycling™ technology by James Cropper. Disposable cups can now be upcycled into a wide range of useful paper products and packaging.

Project Evaluation

CupCycling™ is a working example of the circular economy in action, and shows how collaboration between businesses can lead to successful outcomes for both industry and the environment.

In a truly closed loop collaboration with retailer Selfridges, over 200,000 cups are being saved from landfill per year. The final product contains 20% cup fibre, meaning one large bag will contain the equivalent of one 8oz cup. The bag can then be recycled with household paper waste, giving it a new lease of life.



Phil Wild

James Cropper CEO

The challenge for James Cropper has been the lack of a supply chain for the collection of disposable coffee cups. Our CupCycling™ facility can upcycle 500 million cups per year, but at the moment we're using a fraction of its capacity. The collection schemes we've helped to initiate with a number of retailers have started to generate a considerable volume of material. The secret to a more sustainable future for coffee cups lies in a collective commitment across society – from consumers, retailers, waste management companies, local authorities, to the government and beyond. Investment in improved infrastructure will ensure a more joined-up approach, leading to a greater number of cups being disposed of correctly and given another life.

Main Features:

By 2020, James Cropper has the potential to have rescued around 1 billion used cups.

Partnerships

Selfridges, G.J.F. Smith, Costa, McDonalds UK, Gatwick Airport / DHL, Veolia, Grundons, BPR Group and Metcalfe Farms plus hundreds of local farmers.



Solar success for UPM Shotton

Project Description

A new solar park, covering 220 acres, was constructed by British Solar Renewables in conjunction with WeLink Group, a specialised renewable energy company. Using 250,000 of the latest photo-voltaic panels and cutting edge conversion technology, the plant can produce on average 64,646 MWh/year. A direct link into the UPM Shotton site means that the paper mill can now operate on 100% renewable energy during daylight hours. Working closely with the local power distribution company, UPM's existing power export connection was used to facilitate the project.

Project Purpose

Renewable energy has played an important role in the responsibility success story for UPM Shotton paper mill over the past decade. The transition to use 100% renewable energy started in 2006 with the start-up of our biomass combined heat power plant (CHP). With a focus on energy efficiency, the mill has continued to reduce its use of fossil-based electricity from the national grid. The solar park development means the mill will reduce purchases of power to just under half the current level.

The further addition of UPM Shotton's second steam turbine, utilising excess steam from its CHP, in December 2016, means the mill is on track to meet its energy efficiency targets and significantly contribute to UPM Group's 2030 sustainability targets.

Project Evaluation

Since the successful start-up of the project UPM Shotton has operated on 100% green energy during the day, together with 60% during the night. It was delivered exactly on time and met a deadline set by the UK power regulator.

Andrew Bronnert

Head of Energy & Operational Support for UPM Shotton

This latest development means we now have one of the most sophisticated energy provision systems in manufacturing and adds to our strong environmental credentials, says Andrew Bronnert, Head of Energy & Operational Support for UPM Shotton. It is a great model for working in partnership with third party developers to achieve mutually beneficial goals.

It takes a significant step forward towards us achieving our decarbonisation goals.

Main Features:

CO₂ Emissions saved (tCO₂)

12,000 tonnes per year CO₂ savings for the mill

100% green energy use by the mill during daylight hours

Participating companies



Essity

Essity is a leading global hygiene and health company that develops, produces and sells Personal Care, Consumer Tissue and Professional Hygiene products and solutions. Our vision is: Dedicated to improving well-being through leading hygiene and health solutions. Sales are conducted in approximately 150 countries under many strong brands, including the leading global brands TENA and Tork. The company has its headquarters in Stockholm.



Iggesund

Iggesund Paperboard is a paperboard manufacturer that is part of the forest industry group Holmen. Iggesund has invested heavily to switch its energy supply to bioenergy. The company's two mills, at Iggesund, Sweden and Workington, UK, operate on self-produced bioenergy and thereby have extremely low fossil CO2 emissions. Its paperboard products, Invercote and Incada, are used mainly for packaging but also for graphical applications.



International Paper

International Paper (a global leader in packaging and paper) has been operational in Poland since 1992, where we have a portfolio of assets and investments employing 2,700 people across the country. Our largest facility is a paper mill situated in Kwidzyn. We also have a fluff pulp mill in Gdansk, a sales office in Warsaw and a large shared services operation in Krakow providing customer and IT systems support, not just for our Polish operations but for International Paper's business around the world. Our contribution in Poland has been recognized through many varied awards over the years.



James Cropper

James Cropper is a prestige paper innovator based in the English Lake District, supplying distinct, custom-made paper products to many of the world's leading luxury brands, art galleries and designers. Throughout 173 years of high quality paper production, the business has been carefully stewarded and nurtured by six generations of the Cropper family and is renowned globally for individual expertise in colour, dedicated responses to the most challenging custom projects and award-winning commitment to the highest standards of sustainability.



Kimberly-Clark

Kimberly Clark Corporation is an American company founded in 1872 specialising in the manufacture of cellulose pulp based products, with 45,000 employees, 150 production units in 43 countries, and products sold in over 175 countries. In France, Kimberly Clark SAS has two production sites, in Rouen (Seine Maritime) since 1976 and in Villey St Etienne - VSE - (Meurthe-et-Moselle) since 1990. For over 20 years, Kimberly-Clark and the Villey-Saint-Etienne factory have been actively engaged in efforts to reduce the environmental impact of their activities.



LC Paper

LC Paper is a family business located in the Catalonia region of Spain. Its origins date from the 19th century. It currently has two machines: the MP2, a hybrid machine with a flat table capable of manufacturing both kraft and tissue papers; and the MP3, a crescent-former machine for tissue paper, as well as a converting plant dedicated to the manufacture of single ply tissue papers, with neutral carbon emissions from end to end. LC Paper's infrastructure has combined production capacity of 65,000 tonnes a year, and exports to more than 30 countries, employing around 100 people and reporting income of around €45 million per year.



Metsä

Metsä Group is a leader in sustainable bioeconomy utilising renewable wood from sustainably managed northern forests. Metsä Group focuses on wood supply and forest services, wood products, pulp, fresh fibre paperboards and tissue and cooking papers. Metsä Group's sales totalled €5.0 billion in 2017, and it employs approximately 9,100 people in nearly 30 countries. Metsäliitto Cooperative is the parent company of Metsä Group and is owned by approximately 104,000 Finnish forest owners.



Mondi Group

Mondi is a global leader in packaging and paper, delighting its customers and consumers with innovative and sustainable packaging and paper solutions. Mondi is fully integrated across the packaging and paper value chain – from managing forests and producing pulp, paper and plastic films, to developing and manufacturing effective industrial and consumer packaging solutions. Sustainability is embedded in everything Mondi does. In 2017, we had revenues of €7.10 billion and underlying EBITDA of €1.44 billion.



Saica

Saica is one of the largest European players in the development and production of recycled paper for corrugated cardboard, with production of 3.3 million tonnes of paper. With more than 10,000 employees across Spain, France, Italy, Portugal, the UK, Ireland, Turkey, Luxembourg and the Netherlands, Saica Group has four business areas: recycled paper production for corrugated cardboard (PAPER), recyclable materials recovery (NATUR), production of corrugated packaging (PACK) and flexible packaging (Flex). The multinational's 2017 consolidated turnover was €2.73 billion.



SCA

The core of SCA's business is the forest, 2.6 million hectares in northern Sweden. Around this unique resource we have built a well-developed value chain based on renewable raw material from our own and others' forests. We offer paper for packaging and print; pulp; wood products; renewable energy; services for forest owners and efficient transport solutions. In 2017, the forest products company SCA had approximately 4,000 employees, and sales amounted to approximately SEK 16.7 billion. SCA was founded in 1929 and has its headquarters in Sundsvall, Sweden.



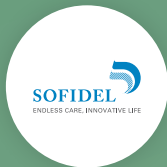
Smurfit Kappa

Smurfit Kappa is one of the leading providers of paper-based packaging solutions in the world, with 45,000 employees in 350 production sites and revenue of €8.6 billion in 2017. We are located in 21 countries in Europe, and 12 in the Americas; we are the only large-scale pan-regional player in Latin America. Our products are biodegradable, renewable and recyclable. Smurfit Kappa Roermond Papier is our largest recycled-paper mill in the Netherlands.



Södra

Södra was founded in 1938 and is the largest forest-owner association in Sweden, with a membership of more than 51,000. We engage in modern and responsible forestry, and operate state-of-the-art mills in which we process our raw material. Net sales in 2017 were SEK 20.5 billion and there were 3,400 employees. Through value-generating relationships and a long-term approach, Södra is leading the way for the future of sustainable forestry.



Sofidel

The Sofidel Group is one of the leading manufacturers of paper for hygienic and domestic use worldwide. Established in 1966, the Group has subsidiaries in 13 countries – Italy, Spain, the UK, France, Belgium, Germany, Sweden, Poland, Hungary, Greece, Romania, Turkey and the USA – with more than 6,000 employees, net sales of €1.72 billion (2017) and production capacity of more than one million tonnes per year (1.1 million tonnes in 2017).



Stora Enso

Stora Enso provides renewable solutions in packaging, biomaterials, wooden construction elements and paper. We believe everything made from fossil-based materials today can be made from a tree tomorrow. Our materials are renewable, reusable, recyclable and help replace products based on non-renewable materials. We strive to use 100% of every tree for our products, promote sustainable forestry and work to ensure more trees are planted than harvested.



UPM

UPM plans to become a major player in high-quality, advanced biofuels for transport. Biofuels are an essential part of the Biofore strategy. The innovative wood-based biofuels developed by the company and their production technologies are part of a sustainable future. UPM's biofuels are frontrunners in quality, usability and sustainability. They will significantly decrease greenhouse gas and tailpipe emissions compared to fossil fuels.

www.upmbiofuels.com



Zellstoff Pöls AG

Zellstoff Pöls AG, one of the biggest producers of elemental chlorine-free (ECF) bleached softwood sulphate pulp in Central and Eastern Europe, is based in the federal province of Styria in Austria. An integrated paper machine produces bleached kraft paper. Pöls pulp is mainly used to manufacture high-quality printing and writing paper, as well as for magazines, hygiene products, packaging and speciality papers. Our STARKRAFT kraft paper is mainly used in packaging and special papers.



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