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ANDRITZ presents the world's first nonwovens pilot line for wipes with integrated wetlaid pulp process

ANDRITZ has established a new inline Wetlace[™] CP pilot line with an original design at its center of competence in Montbonnot, France, offering its partners the opportunity to conduct trials and test all options available for wipes production – from carded staple fibers to pulp and various combinations thereof – thanks to the new inline Wetlace[™] CP line. Customers will benefit from the expertise of the ANDRITZ specialists with this fully engineered process, combining both spunlace and wetlaid technologies, so that they can move forward to more sustainable options while maintaining a high level of product quality, in particular by achieving high CD strength and good linting properties.

Over the past few decades, ANDRITZ has continued to innovate with various nonwoven processes, like spunlace, WetlaceTM and Wetlace™ CP, with the aim of optimizing the use of raw materials and focusing on sustainability by reducing the synthetic fiber content. Facing the growing demand for bio-wipes in parallel with enforcement of the EU's single-use plastics directive last year, ANDRITZ has decided to go one step ahead to help its customers make the right investments.

The Montbonnot pilot line has been rebuilt to integrate the new headbox inside the spunlace line. Pulp can be fed in directly and entangled with carded staple fibers to produce unique nonwoven fabrics designed for end uses as bio-wipes.

ITALY

ANDRITZ acquires Bonetti Group

ANDRITZ has signed an agreement to acquire the Bonetti Group, headquartered in Milan, Italy. Closing of the transaction took place on June 30, 2022.

Established in 1923, Bonetti is a global manufacturer and supplier of doctor, creping and coater blades, as well as blade holders, and also provides services for paper machines. This acquisition extends and strengthens ANDRITZ's aftermarket business and supplements the company's current Paper Machine Service portfolio.

Bonetti is a well-recognized brand in the global paper machine market and known for its high-quality technology products. The company, with around 150 employees, has annual revenue of approximately 25 million euros and operates five production facilities, there of two in Italy (Lainate, Milan and Cantalupo, Varraze), one location in Sturtevant, Wisconsin, USA, one in Hagen, Germany and one in St. Louis de France, Canada.

GERMANY

WEPA is producing hygiene paper from Miscanthus and recycled cardboard

WEPA Group is introducing two additional new raw material innovations: fibres can now also be made from recycled cardboard and Miscanthus, one of the most sustainable fresh fibres in the world and not yet used by any other manufacturer for the production of hygiene paper.

This contributes to the WEPA Group's central sustainability goals: by 2030, the company strives to increase the share of recycled fibres and alternative fresh fibres in the raw material mix to at least 60 percent, thus reducing the ecological footprint of the fibres used by at least 25 percent.

To be able to use recycled cardboard as a raw material, Wepa developed an innovative production technology which makes products such as toilet paper or kitchen towels extra soft. Since no fibre bleaching is used, the colouring of the tissue paper is natural, additionally emphasising the sustainability aspect.

Miscanthus is a renewable, natural raw material rich in cellulose. The plants are grown locally without fertilisation, irrigation or the use of pesticides and grow to their full size every year for about 20 years. Except for the annual harvest, the soil is not disturbed all year round and the soil structure improves over the years. The plant's demands on the soil are very low and the soil is not depleted. Due to the very high yield per unit area, Miscanthus has a smaller ecological footprint than wood-based fresh fibres. In the production process the unbleached Miscanthus cellulose fibres are combined with recycled office and hand towel paper, among other things.

FINLAND

ANDRITZ acquires J. Parpala Oy

ANDRITZ has acquired J. Parpala Oy, a major player in the maintenance and repair of environmental equipment for industrial production and power generation plants in Finland. The company was founded in 2011 and operates sites in Kokkola and Kaskinen.

This business transaction further strengthens ANDRITZ's air pollution control activities in Finland, making it the leading service provider for inspections, maintenance, mechanical upgrades, spare parts, and workshop repair activities related to filters, scrubbers, flue gas ducts, fans, conveyors, and other equipment in operation between the boiler and the stack. ANDRITZ will offer these services to various industries, such as pulp and paper, biomass, ferrous and non-ferrous metals, chemical/fertilizer and other segments.

INDIA

South Florida Tissue Paper expands its business in the retail sector

South Florida Tissue Paper, a third-generation company founded in Miami in 1997, is investing in a Perini Myline from Körber. "With the view of developing our business, we had two different requirements: to select a line that would increase our production capacity and to identify a trustworthy partner capable of providing careful and timely technical support. With Körber's Perini Myline we are convinced that we have found the reliable, efficient solution to help us consolidate not only our role in the AFH sector but also to be able to compete in the retail sector. In addition, with Körber Business Area Tissue's local assistance we can be sure of relying on an experienced partner who is available at any time to provide personal assistance for every need," comments Juan Corzo III, VP Operations at South Florida Tissue Paper.

This line has been designed to produce toilet and kitchen paper rolls up to 200 mm, or 8 inches, in diameter, and is capable of handling parent rolls up to 2500 mm, or 98 inches, in diameter at a speed maximum of 600m / min and a production of 40 logs / min. It is also equipped with a laminator-embosser with 409mm diameter steel rollers, and it is water lamination capable utilizing Körber's Aquabond technology which eliminates the use of glue, making it greener, more efficient, and less expensive.

CANADA

Paper Excellence Group acquires Resolute for \$2.7 billion

The Paper Excellence Group, Domtar's owner, has entered an agreement to purchase Resolute Forest Products through Domtar. Under the agreement, Domtar will acquire all outstanding shares of Resolute common stock. The transaction is expected to close in the first half of 2023. The deal is valued at \$2.7 billion.

With this addition to its family of companies, the Paper Excellence Group will further build out its portfolio in North America following the successful acquisition of Domtar last year.

According to Resolute, the acquisition will add to the Paper Excellence portfolio 1.1 million metric tons of pulp capacity, 116,000 metric tons of tissue capacity, seven paper mills totaling 1.5 million metric tons of capacity and 22 wood products facilities.

Domtar and Resolute will continue to operate independently under their own names. The transaction is expected to close in the first half of 2023.

A.Celli to provide spunmelt nonwoven treatment solutions to Manjushree Spntek

Manjushree Spntek chose A.Celli Nonwovens for the supply of a new medical spunmelt treatment line, rewinders and an automated packaging system for their Bangalore based greenfield plant.

The complete turnkey line for the treatment of nonwoven dedicated to the medical industry, included a non-stop shafted unwind stand and an E-WIND® STREAM IN-LINE automatic winder with in-line slitting. All this combined with an A.Celli E-WIND® RAPID-K rewinder and an R-WAY® automatic packaging line characterized by horizontal and vertical radial wrapping systems equipped with automatic foam application.

The medical treatment line, designed to process spunmelt fabric with a width of 3600 mm and basis weight from 20 to 80 gsm at 150 m/min, along with the other A.Celli solutions, will be delivered to the Indian plant at the end of October 2022. Mr.Rajat Kedia, Managing Director of Manjushree Spntek, says "We made the first contact with the A.Celli Group online through their website and we were immediately interested in their lamination and medical treatment line. After an exchange of emails with one of A.Celli's Sales Managers, we found out the best solution for our needs and did not hesitate to place such a large order over email. It is fortunate for us to have such a reliable partner for this new greenfield project and, with their immense knowledge and experience in the field of treatment and finishing, we will transform the Indian & global medical fabric market".

Manjushree Spntek is a newly founded company by Manjushree Ventures, former owner of Manjushree Technopack Ltd – South Asia's largest rigid plastic packaging provider. Manjushree Spntek will start production in October 2022, and aims to offer high-performance nonwoven fabrics for the hygiene and medical industry.

Zhoukou Xuwang successfully starts up two crosslapped spunlace lines

Zhoukou Xuwang Co., Ltd. has successfully started up two new ANDRITZ neXline spunlace lines at its facilities based in Henan province, China. Combining equipment from the aXcess and eXcelle ranges, both lines are dedicated to the production of spunlace fabrics of 30 to 120 gsm made out of viscose and polyester fibers. The ANDRITZ design will allow Zhoukou Xuwang to serve the premium product market, especially for premium hygiene and technical wipes, in China.

This configuration will enable Zhoukou Xuwang to manufacture high-quality products while reducing raw materials consumption. These goals are further enabled by the installation of an ANDRITZ Asselin-Thibeau crosslapper PRO35-140, generating a uniform profile over the entire web width.

In spite of the difficult circumstances and supply chain disruptions related to the Covid crisis, both spunlace lines were installed smoothly and on time. They quickly went into commercial production, with a line speed of up to 100 m/min and high-performance MD/CD ratio.



ANDRITZ crosslapper PRO35-140. Photo: ANDRITZ

ANDRITZ to supply four stock preparation systems to Guangxi Sun Paper

ANDRITZ has received an order from Guangxi Sun Paper Co., Ltd. to supply four stock preparation systems for its tissue machines PM 9 to 12 in Beihai, Guangxi Province, China. Start-up is scheduled for the third or fourth quarter of 2022.

The state-of-the-art stock preparation systems have an aggregate design capacity of 360 tons per day and process NBKP (Needle Bleached Kraft Pulp) and LBKP (Leaf Bleached Kraft Pulp) to produce tissue. ANDRITZ will install the complete process technology from pulping to refining, including fiber recovery.

Since 2005, ANDRITZ has successfully supplied more than 100 stock preparation and paper machine approach flow systems for tissue production mills in China. The order once more confirms ANDRITZ's strong position in this sector.

Guangxi Sun Paper was established in 2019 to build an integrated pulp and paper mill in Beihai. The mill will be built in two phases over a period of approximately five years. When completed, it will have a total annual capacity of 3.5 million tons of pulp and paper.



ANDRITZ stock preparation system

BRAZIL

Suzano announces investment of R\$ 600 million in Espírito Santo

Suzano has announced plans to build a tissue mill and converting plant in Aracruz, Espírito Santo, Brazil, with an estimated investment of R\$ 600 million, in response to the country's growing market for sanitary paper products

It will have a capacity of 60,000 tonnes per year which will be converted into tissue and towel products. The project Implementation period is expected to be two years from the time of its approval. The project is subject to the approval of the company's internal governance bodies, including the Board of Directors, as well as the closing of contracts with suppliers.

Suzano has also acquired Caravelas Florestal, Brazil, for R\$336 million, as part of its efforts to reduce raw material. The deal "is in line with Suzano's strategy of being 'best-inclass' in the total cost of pulp", said Suzano in a statement.

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iT's Tissue 2022 - the review

iT's Tissue is, and always has been, all about technology: experienced in action and close up. The event this year attracted representatives of more than 300 companies from over 70 countries, and there were more than 2,000 open house visits.

iT's Tissue will return to Lucca in 2025, although many activities are planned for the next three years. What follows are some of the highlights which visitors experienced when they came to Lucca in June 2022.



A. Celli

With the acquisition of PMT (formerly Beloit) in 2020, A Celli extended its range of products and services to the specialty paper, graphic paper and packaging paper industries. During iT's Tissue 2022 A.Celli Paper opened the doors of its production plant in Tassignano, Lucca, where visitors experienced first-hand a turnkey tissue production line consisting of the iDEAL® tissue machine. In 2021 A. Celli made a huge step forward with its iDEAL® Evo-Lock, a new Yankee Dryer which combines the forged steel shell with an innovative head-to-shell connection system that doesn't require structural welds or bolts. This solution will ultimately lead to even higher operational safety, efficiency and a significant reduction of downtime dedicated to inspections. Other highlights were E-WIND® winders & rewinders, R-WAY® Integrated solutions for automatic product handling and plant logistics, ending with a focus on Digital Solutions developed to monitor and improve efficiency and effectiveness.

E80

E80 Group showed how its end-to-end solutions perfectly integrate all the processes within a tissue plant.

The Group has developed a project in collaboration with Gambini to supply a fully automatic converting line. The two companies will soon introduce a cutting-edge system that brings the parent reel to the rewinder and retrieves the spent core when the operation is finished. All the operations of loading and unloading the jumbo rolls and handling the spent cores inside the unwinder will be automatic, eliminating any hanging paper reels. This fully automated operation will increase line efficiency and operator safety, as it will avoid having reels suspended.

Futura

Since the last edition of iT's Tissue, Futura has acquired Plusline and at this year's event showed one result of that partnership: Together. This receives logs directly from the rewinder and generates packaged shelf-ready rolls. The compact layout saves up to 65 percent of space for each line and an provides an unprecedented level of process continuity. Another innovation was JOI Hydro-bond Futura which allows, even at high production speeds, the perfect adhesion of toilet paper plies with water alone, thanks to the exclusive "Zero Deflexion" steel marrying roll, which compresses fibers homogeneously over the entire surface and thus fully exploits the "adhesive power" of water. Further innovations included: a tail-sealing unit in the rewinder creating a convenient "easystart" roll; automatic logsaw blade change and grinding; and Camallo – the first automatic solution for loading, unwinding and exchanging coreboard reels. To these add new unwinders, a new gluing system for the rewinder and more.

Gambini

With 152 years of experience worldwide, Gambini now has 160 employees, divided between three factories, with a fourth to be completed in 2023. Among them is the TissueHub, an R&D center dedicated to the creation of unique tissue products, designed with customers and partners. In addition, in Wisconsin USA, there is Gambini America, a commercial office dedicated to assistance and spare parts for the North and South American markets.

In June at iT's Tissue 2022, a complete line was shown, including packaging, equipped with G1: a rewinder as simple as a mobile phone, and versatile TouchMax embosser. On the pilot line in TissueHub - the only full-width one in existence – it was also possible to see an AirMill, Gambini's patented hot roller technology, in operation.

The open house also featured TMC, Pulsar and E80, which have numerous projects in common with Gambini: one of which was unveiled during the event.



Körber Group

In the Körber ecosystem all machines making up the production line, from parent reel unwinding to palletization, including those developed by companies external to the Körber Group, are connected to each other and controlled by Sam Flow, a dedicated software that continually monitors the process and self-adjusts the main production parameters to deliver maximum production efficiency.

During iT's Tissue 2022, it was possible to view examples of this in action. In particular, Körber presented the new Perini Vega S8 lines for converting large diameter rolls typical of away-from-home products, MTC ITF Change for interfolded products featuring an easy cut-off format change, which is possible by simply replacing the cassette, and Casmatic Zephyrus for packaging roll and folded products with recycled cardboard boxes also in mixed format - a sustainable concept dedicated to the e-commerce channel, and the PA15 solution for innovative, fast and flexible palletizing.

OMET

Among the new technologies OMET presented at iT's Tissue were the new, high-speed, highly modular automatic interfolding ASV lines. Two lines shown: one configured for hand towels and interfolded toilet paper, while the other was for facial tissue. Then there was the revolutionary new MF line, that thanks to its innovative vacuum/mechanical folding head, it is suitable for the production of all types of napkins regardless of material, type of fold or embossing and including flexo and digital printing.

Another Pioneering new technology was the RED Line. Thanks to a new servo-controlled cutting unit, specifically developed by OMET to reduce waste and time, this machine doubles the usual production, reaching up to 10,000 napkins per minute. A real turning point was the new XV Line, designed to increase the production capacity and efficiency of the entire converting process. This high productivity line can reach up to 25,000 pieces per minute.



PCMC and STAX

At the airport terminal-themed GATE O.N.E. event, PCMC and STAX, now under the umbrella of BW Converting Solutions, presented numerous innovations. These included PARAGON, a new high-speed rewinder with a winding concept that employs a revolutionary new winding nest with center drives and a winding belt beneath the product. This affords exceptional control and support for the logs from winding start to finish, as well as superb caliper retention of the wound web. It is innovative yet easy to use thanks to SmartTOUCH, the clean and modern interface that offers enhanced smart features.

Also on show were the OMNIA embosser and laminator and the Xcut Log Saw featuring automatic blade change. Moving down the line, we saw the VALIDA new-generation roll wrapper, FORZA bundler, offering a wide range of bundling configurations, and a palletizing system for perfectly-shaped and packed products.

Pulsa

At iT's Tissue, Pulsar Engineering unveiled Antares, a primary and secondary packaging system designed to change the technology paradigm in the sector. It is based on a sequence of modules, comprising fast, flexible manipulators, to create configurations and flexibility not possible with existing conventional systems. The use of robotic systems almost eliminates the time required to manage different formats in the same line. Pulsar Engineering also presented the latest developments and performance achieved with the PLS DYNAMIC platform, a Digital Twin line's generator, to virtually anticipate the real line's performance and behavior. The Quatis Rolls and Quatis Pack, quality and compliance checking machines for unwrapped and wrapped products, were also demonstrated, including the new Quatis Pocket: its small dimensions allow it to be installed on one line in just 20 minutes and to be easily transported in two wheel cases. Finally Pulsar brought visitors up to date with its augmented reality solution for remote support.

RECARD

Welcoming visitors to Palazzo Pfanner, a historic villa within Lucca's walls, Recard presented a new entry in its product range, the headbox HP, a high-performance headbox specially designed for very low basis weights (8.5-9.5 gsm uncreped). Recard has also recently introduced a steelshell Yankee to the market with a great thermal exchange efficiency and relatively low investment cost.

Also Recard announced that an unconventional shoe press now completes the Recard press section family, which is mainly composed of a single suction press or double press (suction followed by blind-drilled press). This is an application of the shoe press that differs somewhat from other solutions available on the market.





IMA TMC

IMA TMC took the opportunity of iT's Tissue to present WRAP250, for a wrapping-technology market that demands flexibility in terms of product range and overwrapping in poly or paper. WRAP250 also responds to the need for fast machines (250 ppm – up to a 25% increase in production speed), with a single wrapper able to process the production of a full-size rewinder, while maintaining ease of use and the ability to switch batches of production in minimum time. WRAP250 not only leads to increased production speed, with a smaller footprint, but also offers quick changeover and the never stop concept, to allow the wrapper to automatically check and discharge non-compliant roll configurations. In addition, the PUSH-PULL overhead trolley allows better and easier control of the pack while it moves to a different section of the wrapper.

TOSCOTEC

Toscotec's major technological breakthroughs at iT's Tissue included the INGENIA tissue line, a new concept to produce premium quality structured tissue. INGENIA produces quality substantially higher than textured tissue and close to TAD but using 35 percent less energy than TAD.

Also presented was a new generation TADVISION line, which offers substantial increases in energy efficiency for TAD tissue. Visitors were intrigued by Toscotec's new TT Induction SYD (Steel Yankee Dryer), which uses electrical induction instead of steam energy to dry the paper, cutting direct greenhouse gas emissions to zero. Also on a visionary theme was the TT Hydrogen Burner, a new generation of 100 percent hydrogen-powered burners for Yankee hoods which can operate in either carbon-free or carbon-reduction mode, depending on the mixture of hydrogen and natural gas.



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The net-zero transition in the wake of the war in Ukraine: A detour, a derailment, or a different path?

The troubling trend is spilling over into every corner of the global economy, with dramatic effects. McKinsey Global Publishing looks at the latest data.

Hamid Samandari, senior partner, McKinsey, New York Dickon Pinner, senior partner, McKinsey, San Francisco Olivia White, senior partner, McKinsey, San Francisco Harry Bowcott, senior partner, McKinsey, London The Russian invasion of Ukraine¹ has ushered in a humanitarian crisis of a scale not seen on European soil since the Second World War, a level of geopolitical tension not experienced since the Cuban Missile Crisis, and a set of rapidly evolving political, economic, and societal responses and counterresponses whose ramifications can scarcely be estimated at this point. Nor are there signs of an imminent resolution on the horizon.

As Russia is one of the world's largest producers of oil, gas, and commodities, one can naturally expect that the massive and universal effort required to address the world's looming climate crisis would also be swept up in the maelstrom. This raises the question of whether the war and its aftermath will prove to be a limited detour from the previous path of net-zero transition, or a true fork in the road and a far more consequential redirection.

It seems clear at this point the war will complicate the transition's path in the short term. In the longer term, however, the logic of energy security and economics could converge to kick net-zero transition efforts into higher gear. Bold moves would be needed at unprecedented speed to boost energy-efficiency measures and adopt renewable-energy alternatives to fossil fuels. If adopted, such actions could drive net-zero technologies down their respective cost curves and build a pathway to faster decarbonization in other regions.

Such outcomes would not be surprising in light of history; conflict has often accelerated energy transitions. The 19th century's naval wars accelerated a shift from wind-to-coal-powered vessels. World War I brought about a shift from coal to oil. World War II introduced nuclear energy as a major power source. In each of these cases, wartime innovations flowed directly to the civilian economy and ushered in a new era.² The war in Ukraine is different in that it is not prompting the energy innovation itself but making the need for it clearer. Still, the potential impact could be equally transformative.

In this article we attempt to offer a more granular view of what might be in store.

We examine the possible effects of the war and its ramifications on the key requirements for a more orderly netzero transition. We explore the war's potential effect on key sectors and how shifts in energy and finance markets could play out in the aggregate, both globally and within major regional blocs. Finally, we suggest steps that stakeholders could take as they navigate this turbulent period while continuing to drive toward as orderly a transition as possible. To do so, we start by considering the net-zero context at the time the conflict began.

A precarious moment

The invasion of Ukraine came at a time already marked by insufficient progress toward the net-zero transition. Challenging economic conditions threatened its acceleration, and accumulating physical risks made its necessity even more evident.

Even before the invasion, despite the rising tide of public- and private-sector commitments made in 2021, the world was not on a path to achieve net-zero greenhouse-gas emissions by 2050. Indeed, if all existing commitments were achieved, the world would still fail to stabilize global warming temperatures at 1.5°C.3 Moreover, most of these commitments were not yet backed by the required financial resources and execution plans.

As for the world economy, it was already suffering from several preexisting conditions. A once-in-acentury, multistage global pandemic has caused an estimated 25 million deaths,⁴ increased global public debt by 28 percent to 256 percent of GDP,5 shrunk global GDP by 3.3 percent,⁶ and given rise to rapidly increasing inflation across the globe.⁷ Supply chains were under significant strain, energy markets were already tight, and global commodity prices had risen to ten-year highs.8 The war in Ukraine has exacerbated all these trends, affecting lives and livelihoods both locally and globally and threatening the most vulnerable with the potential for a marked decline in energy and food security and affordability.

At the same time, the manifestations of climate change—among them

unprecedented heat waves in India and worsening drought in the American West-continued to multiply. In that context, the Sixth assessment report,9 published by the United Nation's Intergovernmental Panel on Climate Change, issued a few days after the invasion provided a stark warning that climate change was already exerting substantial effects on human and natural systems, that these effects would scale in nonlinear fashion in the face of continued warming, and that the window for avoiding the most catastrophic effects of climate change was fast closing. As we examine the potential impact of the current conflict on climate action, it may also be worth noting that the absence of climate action could well increase by itself the risks of future conflicts, within and across nations, as a result of contention over scarcer resources such as food and water.

The war's impact on the key requirements for the net-zero transition

In earlier research we described the nine key requirements that we believe must be met to bring about the netzero transition. These fall into three broad categories: necessary physical building blocks; economic and societal adjustments; and governance, institutions, and commitments, including public support for progress toward cutting greenhouse gases. Understanding the war's potential impact on each of these could help leaders better assess the prospects for the net-zero transition.

In the near term, the availability of necessary physical building blocks could be reduced in the aggregate The transition requires three main physical building blocks: technology innovation, the creation of the supply chains that enable the deployment of new technologies, and the availability of the key natural resources needed. These three factors are subject to developments such as the interruption of production centers in Ukraine, economic sanctions against Russia, and reduced economic cooperation between nations. In the near term, technological innovation would likely speed up as stakeholders affected by rising energy or commodity inputs look for more economical substitutes

or further see the importance of compensating measures such as carbon capture and sequestration. Indeed, since the war began a substantial influx of capital into renewable energy funds has taken place, reversing a multimonth downward trend.¹⁰ On the other hand, while in the short-term desire to expand net-zero infrastructure may increase, its execution may be challenged by the logistical stresses of market reorganization (due to sanctions) and rising energy prices, which could stress the often complex, multinational (and therefore transport-intensive) supply chains for net-zero technology.

In our view, however, the dominant nearterm impact on the physical building blocks would be negative and come from reduced access to key natural resources. For example, Russia's strong position in natural resources, including key minerals such as copper, nickel, and silicon,¹¹ has already delivered a significant supplyside shock (Exhibit 1). These materials are essential inputs to four of the most important net-zero technologies: onshore and offshore wind turbines, solar panels, electric vehicles, and battery storage. Shortages driven by the war in Ukraine would overlay an already stressed renewables supply chain, which drove long-term contracts for wind and solar generation up 19 and 12 percent, respectively, over the past year.12

That said, the impact of shortages on the attractiveness of net-zero technologies is not straightforward. For example, renewable-generation assets require one-time capital expenditures but minimal operating costs. As a result, input cost increases may impact the power sector less than sustained increases in fossil-fuel prices. Resource supply shocks may be felt less in Europe (which is more susceptible to sustained fossil-fuel price increases) than in the United States, where energy prices would provide less of a counterbalance to input costs. Furthermore, some large net-zero technology- producing countries are not participating in sanctions against Russia and could retain access to supplies, potentially leading to uncertainty in cost impacts for their trading partners. Likewise, the prospect of the ongoing shortages is already spurring a wave of prospecting for alternative sources, which would likely have a positive impact in the medium term.

Finally, it is important to note the nearterm impact on a critical but often overlooked natural resource for the net-zero transition: land. In addition to their role in exporting a wide range of minerals, Ukraine and Russia are important producers of key agricultural commodities. Shortages resulting from sanctions and destruction of Ukrainian production centers are likely to reduce

Exhibit 1



the availability of key agricultural commodities including wheat and fertilizer. Additionally, climate forecasts for 2022 indicate it could be a belowaverage period for breadbaskets globally,¹³ resulting in an additional reduction in supply. Supply shortages and price increases in agricultural markets could lead to conversion of additional land to agricultural production across the globe, which would increase deforestation rates and agricultural emissions.

In the near term, the impact on effective economic and societal adjustments would vary across geographies

The economic and social adjustments needed to reach net zero in a more orderly manner depend on management of demand shifts and unit costs, compensating mechanisms to address the socioeconomic impacts of transition, and effective capital allocation and financing structures. In the near term, management of demand shifts and unit costs could be positively affected, as increased energy costs move forward the break-even point for decarbonization solutions for many hard-to-abate industries, and commodity shortages boost movement toward increased recycling. However, the war in Ukraine has introduced new domestic priorities in many countriesincluding increasing defense spending, blunting the regressive impacts of rising energy prices-and providing humanitarian aid. This could negatively affect compensating mechanisms. particularly with respect to the flow of capital from the Global North to Global South. Even before the war, the flow of capital to developing nations was already almost 20 percent below the developed nations' pledge of \$100 billion in annual aid by 2020.14

Overall, we believe that the dominant near-term impact on economic and social adjustments would be a shift in capital allocation and financing structures toward increased fossil-fuel production in response to rising prices.

In Europe, rising energy prices would drive an increase in short-term capital allocation to fossil-fuel production and consumption, particularly from existing or recently decommissioned The rise in energy and commodity prices gives leaders an unprecedented opportunity to accelerate the deployment of netzero technology.

assets. This is not because renewable alternatives are not economical or available or cannot be deployed. Rather, these alternatives would take time to deploy, and the rise in energy prices poses an immediate economic and political crisis that must be addressed. Furthermore, a move to diversify sources of fossil-fuel imports is likely, in the interest of both price and energy security, although diversifying away from Russian gas would require time to overcome logistical hurdles, contract negotiation, pipeline- capacity restrictions, and import-facility development, as demonstrated by Europe's purchase of more than \$46 billion in Russian gas since the invasion of Ukraine.¹⁵ Finally. where lowering price is not possible via increased domestic production or source diversification, a shift back toward cheaper but more emissive fuels, such as coal, is likely, and already being observed in, for example, Germany.¹⁶ As for parallel investments in accelerating the deployment of net-zero technologies, there may be a contention for resources with other immediate needs such as defense. mitigation of the most regressive impacts of energy price increases, and humanitarian action.

In the United States, the near-term trend is also likely toward increasing fossil-fuel production to address domestic price rises and to support the diversification of European supply.

The medium- to long-term trend is less certain. Given abundant domestic fossil- fuel reserves, the United States is less susceptible to energy price increases, but equally exposed to shortages of key net-zero materials. The economics of transition may not improve as much in the United States as they could in Europe, nor would the concerns about energy security be as severe. One potential impact on the medium-term energy landscape in the United States could be an acceleration of the displacement of more expensive and more carbon-intensive oil on the global market with Permian oil from the US Southwest, which is a key step for a successful net-zero transition, given that some level of oil demand will remain through to the late stages of the transition. We would also note that the United States also faces a unique opportunity to reduce its fossil-fuel consumption through the implementation of broad energyefficiency policy, discussed in more detail below, which could lower costs for consumers, improve energy security, and make progress toward its climate goals.

Finally, in Asia there is a risk of a shift back to coal in the near term. If sanctions reduce access to the pipelines Russia primarily uses to transport oil and gas to Europe, it will take time for Russia to build alternative pipelines to tap the Asian market. With the market for natural gas likely to tighten substantially, the resulting price rise could push less economically robust consumers in Asia out of the market and back toward coal, which is abundant, cheap, and more lightly regulated.

Governance, institutions, and commitments could weaken at the international level but strengthen in regional and private spheres in the near term

The success of governance, institutions, and commitments depends on three conditions: having the necessary standards, market mechanisms, and effective institutions in place; commitment by and collaboration among public-, private-, and social-sector leaders; and support from citizens and consumers. In the near-term, the invasion of Ukraine could weaken all these requirements globally, but also strengthen a subset of them in regional and private spheres.

The war could negatively affect international cooperation and jeopardize the creation of the international standards, agreements, and institutions that a more orderly transition requires. Furthermore, the introduction of competing priorities at all levels could deprioritize decarbonization and transition for decision makers. For example, survey data support a short-term weakening of attention on climate across the public.¹⁷

While a move toward increased national rivalries and the introduction of competing priorities could negatively affect international cooperation on many fronts, many major economies, including China, have entrenched incentives to continue to support global action on the net-zero transition, given their large and continued investment in producing green technologies and components. For example, China produces a third of global wind turbines, 70 percent of global solar photovoltaics, and is home to threefourths of the world's global capacity for lithium-ion battery manufacturing.18 Importantly, commitment by and among private- and social-sector leaders could also be strengthened in response to diminished international cooperation. Most corporate and social-sector entities are multinational, benefit from coordination, and thus have incentives to maintain strong international ties.

A short-term detour or a long-term deviation?

Considering these new forces and differing effects, we believe that the war would overall have a negative impact on the key requirements in the short term and cause a detour on the path of a more orderly transition. The long-term impact, however, could still prove a positive turning point if leaders act with farsightedness and courage and if they are supported by a growing popular mandate in doing so.

This future hinges on two things. The first is that the scope of the war in Ukraine remains contained and does not widen. The net-zero transition would very likely be derailed by an expanding

conflict, and a derailed transition could in turn multiply, by orders of magnitude, its catastrophic impact. The second is that an acceleration of the transition postconflict would only be possible given sufficient commitment from public-, private-, and social-sector leaders to recognize that investments in renewables, energy efficiency, and decarbonization are not causes of energy price increases and insecurity but solutions to those problems. Forward-looking leadership will require leveraging the awareness of the moment to seek a broad public mandate and to leverage that mandate to make substantial, thoughtful, nearterm investments in these solutions and their supporting supply chains.

For example, while commodity shortages and price increase may exhibit a negative impact on the transition in the near term, supply chain chokepoints, like lithium production in battery components, have long been identified as limiting factors to transition speed.¹⁹ The present supply shock highlights a clear need and opportunity to make investments in expanding and securing supply of key minerals, which will not only have benefits for future transition speed, but also for lowering the costs of other common consumer goods, particularly electronics, that require the same inputs.

While near-term energy price rises could result in an increase in fossil-fuel production and a revival of recently decommissioned generation assets. in the long term, energy- security concerns could drive investment into energy efficiency and renewable energy as a key tool for energy independence and price management. For example, the latest proposed RePowerEU plan put forth by the EU Commission on May 18 includes plans to almost double European biomethane production and triple capacity of green hydrogen via production increases and imports by 2030, a massive deployment of 510 gigawatts of installed wind and 600 gigawatts of installed solar photovoltaic power by 2030, the installation of about 30 million heat pumps, the enhancement of domestic manufacturing capability, and a substantial simplification of approval and permitting processes for

renewable generation and infrastructure development projects, all over the next eight years. Such policies could be further accelerated by the fact that despite input price rises, construction of net-new solar and wind capacity remains faster and more economical than coal or natural gas.²⁰

Energy-efficiency measures have long been economically viable,²¹ but have often failed to attract sufficient public mandate for deployment.²² Survey data now suggest 80 percent of European citizens support government subsidies for improving home energy efficiency. Similar levels of support are also seen in the United States, where 89 percent of respondents to a March 2022 Gallup poll demonstrated support for tax credits for home renewableenergy systems, 71 percent setting fuel-efficiency standards for cars, trucks, and buses, and 61 percent tax incentives for the purchase of electric vehicles, among other policies.23 Some of these tax incentive splits show majority bipartisan support.

In addition to driving the uptake of renewable energy and energy efficiency, current utility prices could make the business case for hard-toabate industry decarbonization more attractive. Putting forward high-impact, ready-to-deploy cases could secure up to 40 percent energy-cost reductions and deliver significant additional earnings (Exhibit 2). Finally, the current situation further underscores the importance and urgency of adaptation. Even a shortterm detour is still a detour and a further accumulation of physical risk. Actions and investments in adaptation were already inadequate before the war and are even more so at this juncture.

Navigating the moment, driving toward transition

Our earlier research catalogued the actions that key stakeholders could take with respect to the net-zero transition. We will not reiterate them here but focus on the key actions that we believe have become more timely and critical in light of the conflict.

Governments can't accomplish the net-zero transition alone. Private-sector leaders have an opportunity to assume more prominent roles in advancing this critical goal. Success, however, requires visionary and forward-looking leadership at both individual and institutional levels. In that connection, companies could consider three actions:

 Strengthen the risk identification and response muscle. One consequence of the war is a clear increase in global volatility. Now more than ever, it is important to develop a robust capability for managing under uncertainty. A key requirement is to be able to identify and respond in real-time to rapidly evolving circumstances, whether they be related to supply chain function or acceleration of transition risks. The

Exhibit 2

Energy efficiency is imperative to tame total production costs that rose by 50 percent in recent months.



need is certainly not new, but its intensity and the magnitude of the effort required even for the most mature corporations are.

- Accelerate decarbonization of core operations. Companies would benefit from focusing on levers most directly under their control (such as their production process) or those that provide strategic advantage by hedging against energy price volatility or future transition risk. This would be particularly true for commodity firms experiencing cash windfalls with high prices. This also means building a strong green procurement muscle, with respect to both raw materials and components, reflecting new risks and realities. Industry associations and publicprivate collaboration would likely also be required to address supply constraints.
- Support multinational cooperation. International sustainability agreements, commitments, standards, and practices can also be championed and driven by industry associations and ecosystems. Corporations could and should endeavor to increase the momentum through their commitments and actions at this juncture. This means taking a leadership role at the company level, at the industry level, and within ecosystems as users can help influence providers and their practices. This leadership could indeed prove a critical factor in determining the impact of the war on the prospects of the net-zero transition.

For government leaders, a more active role in energy markets seems natural in light of conflict. The rise in energy and commodity prices, as well as in concerns about energy security, gives leaders an unprecedented opportunity to accelerate the deployment of netzero technology. Governments could consider three sets of actions in particular:

 Develop an integrated economic and national resource strategy. This could include working closely across departments and with industries to develop a roadmap identifying and coordinating the policy, innovation, infrastructure, and financial inputs necessary to achieve decarbonization and energy security commitments. This would also include developing plans for facilitating the retirement, and minimizing the impact, of stranded assets (and very carefully optimizing and guiding the deployment of the new high-emissions assets that may be required in the short term in certain geographies). Finally, this would mean accelerating efforts to project future mineral resource requirements under various scenarios and defining as resilient and diversified an approach as possible to securing those resources.

- Establish clear demand signals. ٠ This could entail putting in place or enhancing a range of incentives and requirements for the deployment of key net-zero transition technologies, accelerating emissions-reduction (and therefore energy security) commitment timelines, and deploying regulation to price or phase out emissive assets over time. However, it is critical that demand signals be coordinated with a supply strategy in the spirit of the previous two points. And all of this is of course in the context of managing the short-term risks that energy systems face.
- Deploy (further) financial incentives/ guarantees and enhance guardrails. This could mean deploying public funds and creating financial incentives to accelerate deployment of proven net-zero technology, particularly across energy efficiency and renewable generation. This would also mean reforming permit and approval processes to deploy net-zero technologies and infrastructure faster, for example the installation of wind and solar farms. In parallel, this could mean tightening the permit and approval processes for the development of emissive assets that would be "stranded on arrival."

Finally, the role of finance will continue to be critical. Financial institutions would benefit from three sets of actions:

• Develop a more robust approach to reducing financed emissions. In a world where emissions could well increase in the short term, strategies that were designed to see a linear and constant decrease in financed emissions are likely to be untenable. Financial institutions need to think through—at least initially—more complex decarbonization paths for companies and provide the right support and incentives to companies on these paths.²⁴ They also should continue to refine their ability to understand their financed emissions and work closely with clients on an orderly and gradual path of decarbonization.

- Build capability to identify and capitalize on new decarbonization opportunities. As fossil-fuel prices rise and renewable prices continue to fall, new decarbonization solutions along the marginal-abatement cost curve become economical. Financial institutions could build at greater scale the capability to identify and capitalize on the opportunity to finance these emerging opportunities.
- Develop and scale new financial ٠ products and structures to help companies wind down legacy assets. Solutions could include specialpurpose vehicles that would enable companies to ring-fence legacyemitting assets and retire them in line with a science-based, net-zero pathway; financing structures such as long-term purchase agreements from renewables plants (with lower total life-cycle costs) to replace coal-generation assets; and new financial instruments (for example, for negative emissions or for naturebased solutions).

The war in Ukraine has not only unleashed a humanitarian tragedy but has also dealt the effort to achieve net-zero greenhouse-gas emissions a powerful supply-side shock. Yet for public- and private-sector leaders willing to take the necessary bold steps, the new logic of energy security and economics holds the promise of making this a turning point in seizing the opportunity to address the globe's unfolding climate crisis.

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ANDRITZ CIRCLETOZERO:

Technologies to reduce carbon emissions in tissue production

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Figure 7: PrimeLineTEX tissue machine to produce textured tissue of a quality being superior to dry crepe and very close to structured (TAD) tissue, while at the same time achieving significant energy savings.

Even though pulp and paper mills are energy-intensive, our industry is one of least CO2-intensive due to the wide use of bio-based and renewable fuels. The tissue and towel sector, however, emits more carbon per tonne of paper than most other paper grades, primarily due to purchased electricity from fossil-fuel sources. ANDRITZ is contributing in many ways to reduce the carbon footprint for tissue production through its "CircleToZero" initiative.

LIORIT

Pulp & Paper production plays an essential role in many countries' economies. While there are industries that emit considerably more Greenhouse Gas (GHG) emissions than Pulp & Paper, the industry's GHG output (estimated to be about 9% globally) is large enough to attract the attention of governments and consumers.

The GHG most relevant to the paper industry is Carbon Dioxide (CO2), with smaller amounts of methane and nitrous oxide. These emissions are generally reported as mass of Carbon Dioxide Equivalent (CO2eq).

Twelve countries account for 80% of worldwide tissue and toweling production. Carbon emissions from the European Union's (EU) paper industry have reduced by 48% per tonne during the period from 1990 to 2019. The EU has defined a set of ambitious targets to limit the increase in average global temperatures. These include reducing GHG emissions by 40% by 2030 and by 80–95% before 2050 (compared to 1990 levels).

Specific energy consumption for tissue is highest of the standard grades, primarily due to the drying process. In a study of USA mills, tissue production was second highest in total GHG Intensity (behind specialty paper grades) at 1720 kg of CO2eq per metric tonne of product from fuel, purchased electricity, fiber, chemicals, and transportation.

There are clearly opportunities and challenges for tissue and toweling producers with regards to reducing GHG emissions and strengthening the relationship with consumers who increasingly prefer carbon-neutral products.

Practical ways to reduce tissue's carbon footprint

At a mill site, the actual production of tissue/toweling emits a relatively small amount of GHG, especially if the electricity and steam energy is derived from non-fossil fuel sources. However, in addition to combustion of on-site fuels, the tissue industry is also measured on its use of indirect emissions of GHG due to off-site generation of heat, steam, and electricity that are purchased by or transferred to the mill.

Our challenge as a technology partner with the tissue industry is to not only offer solutions for conserving energy and raw materials within the mill complex – but also to offer solutions that help mitigate or replace GHG emissions from "upstream" sources of fiber, electricity, water and chemicals.

This work is part of our global "CircleToZero" initiative, an initiative to achieve zero emissions and zero waste. Emissions of all sorts can be thought of as losses or waste. Recovering, reusing, and recirculating these potential losses offer clear environmental and financial benefits for customers.

Step-by-step to carbon footprint reduction

Our observation, based on decades of personal experience serving tissue customers around the world, is that each mill site is unique. Sure, there are product solutions and technology modules that are "building blocks" for a lot of machines and mills. But generally, these building blocks require our design and engineering expertise, working closely with each mill, to achieve the best results.

ANDRITZ offers solutions to reduce a tissue mill's carbon footprint in the categories of energy, fiber, water, biochemicals, and digitalization.

By our calculations (Figure 1) we estimate that a "typical" tissue machine using conventional technologies (e.g. suction press rolls and cast Yankee) and producing 200 t/d emits just over 47,000 tons per year of CO2eq. This is for the stock preparation system and the machine itself, and not for other upstream or downstream processes.

Some of our technology modules which reduce kW/t, and therefore CO2eq/t, are shown in Figure 2. Implementing these modules, each of which has its own ROI benefits, makes it possible to reduce kW/t by up to 17% and CO2eq/t by about 15%. These are significant reductions.

- Modifying the approach flow system (double dilution) to reduce the energy consumed by the fan pump and screen by about 10%.
- Insulating the heads of the Yankee to reduce energy losses and to reduce steam consumption by about 5%.
- Utilizing vacuum blowers instead of water ring pumps to save about 25% energy in the main motors. The exhaust from the blowers is hot enough to be used in different heating systems and less fresh water is required to operate them.
- 4. Installing a Rebel high-performance roll cover (Figure 3) on the tissue suction roll can improve sheet dryness after the press of 1% and more, allowing a machine speed increase or energy savings in the drying section between 50-100 kWh/t of paper produced. The Rebel can operate without water cooling, permitting energy savings up to 25% of the initial roll driving power requirement.
- Installing a PrimePress XT Evo shoe press (Figure 4) to reduce fiber consumption and/or save energy. The shoe press is loaded by two pressurized hoses, allowing a mill to fine-tune the nip profile for maximum dryness, or maximum bulk, or somewhere in-between. If the goal is high dryness, the

Utilities	Average consumption	Equivalent CO ₂ emission (*)	
Gas	~ 600 kWh/t	~ 132 kg CO ₂ /t	
Steam consumption	~ 750 kWh/t	~ 165 kg CO ₂ /t	
Electrical consumption	~ 890 kWh/t	~ 356 kg kg CO2/t	
TOTAL	~ 2240 kWh/t	~ 653 kg CO ₂ /t	
Total per year for production of 200 t/d		~ 47,081 t CO ₂ /a	

Figure 1: Typical consumption data for a dry-crepe tissue machine





Figure 3: Rebel: Premium polyurethane cover for tissue pressure roll positions, delivers improved dewatering

Figure 2: Potential for energy-reduction with ANDRITZ technologies



Figure 4: The PrimePress XT Evo shoe press allows fine tuning the nip profile to reduce thermal energy requirements and/or reduce basis weight while preserving bulk.



Figure 5: PrimeDry YES heat recovery steam generator system

PrimePress XT Evo offers about a 6% after-press dryness gain compared to a conventional suction roll – meaning thermal energy savings of up to 24%. If the goal is high bulk at a target same dryness, basis weight or fibers can be reduced up to 10% – reducing the corresponding CO2eq emissions. In combination with the PrimePress XT Evo shoe press, ANDRITZ supplies shoe press belts and press felts to achieve maximum postpress consistency for the lowest possible energy consumption.

 Installing a PrimeDry YES heat recovery steam generator system (Figure 5). Our solution is to use exhaust air from a gas-fired Yankee hood and condensate from the Yankee with a steam generator (heat exchanger) to produce 15% of the steam required for the Yankee, saving up to 5% in thermal energy consumption.

- Installing a larger diameter PrimeDry Steel Yankee in combination with a steam-heated PrimeDry Hood. Steam generated with biomass is used in both systems resulting in a drying system with zero CO2eq emissions.
- 8. Another possibility is to use biomass to generate renewable bio-syngas to replace fossil fuels when firing the Yankee burners. Sofidel, a major European tissue producer, entered into a long-term collaboration with Meva Energy to build and operate a syngas generation plant at Sofidel's Kisa, Sweden mill, utilizing biomass as the feedstock. This will enable the mill to reduce CO2eq emissions by 8500 t/a. ANDRITZ Novimpianti air and energy and ANDRITZ burner experts are collaborating in the project, which also involves the Department of Energy of Pisa University.
- 9. Some tissue producers are considering on-site cogeneration of electricity, especially when there are no fossil-free sources for purchased electricity. ANDRITZ offers the option to use hot air from the turbine exhaust to heat the Yankee hood, allowing conventional hood burners to be switched off (Figure 6). The hot exhaust air can also be used to generate steam for the Yankee. With cogeneration in place, a mill can be self-sufficient

from an electrical view and may be able to sell excess kW to the grid to generate revenue.

10. Hydrogen (either purchased or produced on-site via electrolysis) can replace natural gas and significantly reduce CO2eq emissions. Hydrogen can be used to replace 100% of the fuel used to heat the Yankee hood while also partially replacing the fuel used in a cogeneration system. Combustion of hydrogen provides a direct reduction of CO2eq and CO emissions by about 15%.

For mills located in regions where CO2eq emissions are restricted, but there is increasing consumer interest in higher quality products, a new technology PrimeLineTEX machine (Figure 7) may be worthy of consideration. The PrimeLineTEX produces a "textured" sheet with quality much better than dry-crepe and close to TAD. The required energy is slightly higher than dry-crepe, but about one-half that of TAD. The higher quality of the TEX products, opens the possibility to substantially reduce (up to 30%) the fiber input compared to dry-crepe.

While the reduction in water consumption is not directly related to CO2eq emissions reduction, the transport and treatment of water in a tissue mill requires energy and chemicals. We have a portfolio of product solutions to close the water loop in the mill, as well as the ability to recover evaporated water from the Yankee/Hood systems and recirculate it for tissue production. Current lab trials at the ANDRITZ Tissue Innovation and Application Center ("PrimeLineTIAC") in collaboration with a global leader in chemical supply to develop sustainable and state-of-the-art bio-chemicals for tissue production. These biorenewable products will contribute to overall carbon emissions reductions.

Any tissue mill can benefit from digitalization to improve efficiencies and repeatability. Digital solutions such as ANDRITZ Metris are well suited to optimize production while minimizing a tissue mill's total GHG emissions. Since there are very few integrated tissue mills existing today that have access to steam generated by nonfossil fuel sources such as black liquor or wood waste boilers. The Metris APC Tissue Energy Balance solution would be beneficial in minimizing steam and electricity requirements. The result is less of a demand on the mill's main steam requirements, allowing for a reduction in fossil fuel usage (and the corresponding reduction in GHG emissions). Other Metris solutions include advanced dryer controls to save considerable energy with excellent payback. Metris APC solutions enhance the standard regulatory or DCS-level controls found in a typical mill and are specifically focused on optimization of throughput, guality, and cost. A major advantage to tissue producers is the use of integrated Artificial Intelligence (AI) and Machine Learning (ML) in these digital systems which can duplicate the decisions of the very best operators to avoid sheet breaks and other downtime. These systems also "remember" start-up and shutdown sequences to minimize waste or disruptions and can handle changing conditions and adjust accordingly.



Figure 6: CoGeneration



PULP & PAPER

REDUCTION OF CO, EMISSIONS

WITH PrimeLine TISSUE ECHNOLOGIES AND SERVICES

Our challenge as a technology partner to the tissue industry is not only to offer solutions for conserving energy and raw materials within the mill complex, but also to offer solutions that help mitigate or replace GHG emissions from "upstream" sources of fiber, electricity, water and chemicals. Modifying the approach flow system, high-performance roll covers, shoe presses, insulating the heads of the Yankee, and heat-recovery steam generator systems are just some examples of our broad portfolio.

For further information, please contact us at tissue@andritz.com





ENGINEERED SUCCESS ANDRITZ AG/Stattegger Strasse 18/8045 Graz/Austria/andritz.com

EMBRACING SUSTAINABILITY:

Matching consumers and producers' needs

Conscious consumption goes mainstream

Consumer awareness of sustainability is taking roots over the years, strongly engraving purchasing habits and behaviours.

Slowly then suddenly, natural and organic personal care products have morphed from niche solutions for green-conscious consumers into a fastspreading, almost viral phenomenon. From 2022 to 2028, the global market is expected to hit 19.26 billion US dollars, with a CAGR of 7.2%[1]. Similarly, natural personal hygiene products, market-adjacent to the natural personal care trend, are coming to the fore and, depending on the segment, even rising at double digits. According to industry experts and brands, natural period care products are showing a stunning 40% year-over-year growth[2].

Among the main drivers, a big one is, undoubtedly, the steady pace of investments in the sector from established corporations, together with anti-plastic regulation[3] and the rising environmental awareness[4] in the general public.

More and more consumers of Disposable Hygiene solutions are switching to natural and organic products — and companies are not standing by. Indeed, disposable hygiene manufacturers are making natural personal hygiene a cornerstone of their sustainable agenda, cutting down on plastics from fossil fuels in favor of plant-based raw materials and waste reduction efforts.

Sustainability consumer awareness does not impact only the product, but also the packaging: consumer demand for eco friendly and sustainable products packaging stayed remarkably stable and robust throughout the societal changes that have occurred in the last years. 70% of global consumers consistently identify as environmentally aware, and 50% translate their values into behaviours looking for recycling and sustainability information on packaging[5]. 66% of consumers want to choose packaging that they consider to be environmentally friendly and are actively seeking information to help them make decisions based on their values[6].

86% of Younger generations strengthened their commitment to sustainable packaging and continue to lead the way in rewarding brands for moving to ecofriendly packaging[7].

74% of consumers want products in recyclable packaging, but they also recognize the value of extending the life of packaging. Almost three quarters expressed interest in refillable packaging[8].

GDM commitment to sustainability

By deeply investigating customers' needs, GDM has developed a machine "Green concept" that puts together all their solutions, propelling sustainability in every step of the manufacturing supply chain.

RAW MATERIALS Less material, better core performances

GDM Extra Thin Core allows to save up to 800K€ per year: a 40% saving on core materials (fluff & SAP, compared to previous core formation process), thanks to an optimized mix and allocation featuring permanent channels construction, for an outstanding wetness distribution. Alternatives for core and topsheet Bamboo, eucalyptus, banana and cotton are driving the raw materials global trend in sustainability: GDM's converting solutions are set-up to handle fibers other than form softwoods, more sustainable and with a lower environmental impact.

Waste reduction: Option Zero is your option

Option Zero is GDM's cutting-edge program aiming to minimize any sort of waste in the converting process and to maximize its related savings. According to customers' needs, the focus is on: **ZERO WASTE:** enabling the elimination of trims, thanks to the "zero waste" product design, you can save up to 30% on nonwovens material used in Rear Wings process **ZERO DEFECTS:** matching market needs for premium quality products, reducing defects costs and boosting sales and earnings

ZERO GLUE: reducing the total amount of construction glue up to 10%, through ultrasonic bonding technology, GDM can also minimize glue contamination in the final product

ZERO TIME: you can cut by half your size changeover time, thanks to GDM patented Linear Motion technology, eliminating hardware replacement and set-up

Energy saving: Extra Thin Cores saves up to 40% of power consumption

Extra Thin Core formation process has been designed to minimize the use of air for fluff and SAP convey. The resizing of the suction fan of the forming wheel and the mill redesign have further contributed to the reduction of energy consumption up to 40% compared to the traditional version.

SPACE MANAGEMENT Thinner products, lighter shipping

expenses

Thanks to Extra Thin Core, diapers are thinner compared to those with a standard core formation, thus reducing the package size: 25% more space available on the shelf and in your stockroom is the result you can achieve!

Spare parts management reducing vehicles' emissions

GDM has created a central warehouse and local stocks to reduce customers' on-site inventory stock value and fixed working capital investment up to 30% per year, while optimizing maintenance planning. The result is twofold: delivery time within 48 hours and polluting gas emissions reduction associated to spare parts logistics.

PACKAGING GOES GREEN

As in the converting technology, GDM is bringing sustainability into the packaging one, thanks to its capability to offer complete turnkey solutions. Over the years, GDM has introduced a wealth of green packaging alternatives, driving innovation in both materials and technology.



The focus is on Polyethylene (PE) and Polyphenylene Ether (PPE) alternatives. In line with these expectations, GDM solutions are set-up to handle bags made of bio-based or paper materials, minimizing carbon footprint and reducing therefore the impact on the environment.

Paper based material

GDM packaging machines are able to handle different kinds of bag material: the last initiative led by GDM, in order to reduce the use of plastic and meet the Gen. Z demand, is the option for mono material solutions, such as paper bags, enabling an even easier and faster recycling.

This solution consists of using only monomaterial structures instead of material mix, enabling an easier and more efficient recycling process, as there is no need to separate the materials from each other.

Recycled plastic and Low-Density Polyethylene

GDM is exploring the use of Low-Density Polyethylene (LDPE) and recycled plastic. In the first case, GDM realizes bags for disposable hygiene products with a lower thickness compared to the standard - 35 microns versus 50 microns.

This has powerful implications as far as saving is concerned:

- Reduction of virgin PE used: up to -30% grams per bag
- Reduction in the material cost: up to -25% [9]

Recycled plastic, on the other hand, goes in the direction of a low-carbon circular economy, where waste is eliminated through the continual reuse of resources. This option is very promising for its potential to turn the traditional linear economy of plastic into a zero-waste business model, all without impacting quality.

Green polymers

To move away from plastic, GDM is testing new packaging options built on 100% non-oil-based green polymers, with only renewable resources deployed in its manufacturing phase. One example is starch, a polymeric carbohydrate consisting of numerous glucose units joined by glycosidic bonds. GDM is supported along the path to sustainability by considerable investments programmed by Coesia Group. In December 2018, it has been established the Centre of Expertise Sustainability, supporting "green strategy setting" and accelerating existing initiatives.

> Would you like to have more details on how to be more eco-friendly while saving your money?

Contact GDM at info.it@gdm-spa.it

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- 9 Assuming a bag capacity of 10 Baby products and a production of 500,000 bags



MET MAGAZINE





MACHINERY AND PLANTS FOR THE PRODUCTION OF PAPER AND PAPERBOARD AND FOR THE CONVERTING OF TISSUE PAPER

> 12.13.14 остовея 2022 LUCCA - ITALY



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How to maintain the softness and bulkiness of tissue during rewinding thanks to A.Celli solutions



Irene D'Olivo, Sales Application Officer, A.Celli Paper

Tissue paper is a material that requires special precautions both during production and in the operations carried out in the so-called end of line. During rewinding it is in fact essential to maintain the creping and density of the Tissue obtained in the upstream process in order to preserve its distinctive softness and bulkiness.

To achieve this goal, a series of specific measures must be implemented, such as avoiding excessive pressure on the reel, precisely controlling the elongation of the sheet to maintain its creping as much as possible or using adequate values of nip load.

Solutions for the iDEAL® tissue winders

The pope reels in the iDEAL® product range offered by A.Celli are equipped with solutions specially developed to preserve the properties of tissue, including:

ROLL WINDING CONTROL A system that is applied on the secondary arms of the pope reel to keep the nip load between the roll and the reel drum at the minimum value necessary for correct winding as the diameter of the roll varies, thus preserving the softness of the tissue paper.

The secondary arms are equipped with specific linear position transducers and are operated by hydraulic or pneumatic cylinders, controlled in turn by servo valves and pressure transducers.

A control system regulates the thrust applied by the arms to the winding shaft, automatically modulating it during the winding process. At the same time, the system controls the shape of the roll being wound, keeping it perfectly cylindrical and free of defects. CENTER WIND ASSIST (CWA) SYSTEM

This system consists of a motor, managed by the sectional machine control and mounted on the end of the shaft, capable of transferring drive torque directly to the roll being wound. In this way the torque that must be transmitted through the nip is reduced, eliminating the need for a high nip load value which would lead to a crushing of the sheet, with obvious consequences on its softness and bulkiness.

Like the previous one, the CWA system is also typically applied to the secondary arms of the pope reel, where most of the roll formation takes place, but it can also be applied to the primary arms to optimize the winding quality from the first turns. Solutions for the E-WIND® tissue rewinders

The range of A.Celli E-WIND® rewinders dedicated to the processing of Tissue paper includes machines with proven quality and reliability equipped with solutions specifically developed to preserve the bulk and softness of tissue even during this delicate phase. Let's see them in detail, dividing them by section of the machine on which they are installed.



Unwinder

TENSION CONTROL DURING ROLL UNWINDING

A control that allows automatic adjustment of the sheet tension, keeping it at the minimum values necessary for the process requirements and thus avoiding transmitting excessive stresses to the reel that can affect the creping. The tension is measured continuously by means of a pair of load cells mounted on a specially designed and positioned guide rollers.

In case of multiple unwinders, it is advisable to install the control unit on each of them in order to individually control the response of each reel, thus maximizing the final result.

AXIAL CONTROL

In the unwinders, the rotary unwinding motion imparted by the driven belts to the outermost coil of the reels is harmful to the properties of the tissue paper, which is by its nature not very resistant to mechanical stress.

The axial control consists in mounting an electric motor at the end of the shaft. This motor is controlled by the sectional control through the continuous measurement of the reel diameter, with optical sensors capable of determining the correct instantaneous angular velocity. By doing so, it will be possible to impart motion to the reel by acting directly on the shaft, without affecting the paper with any mechanical interaction capable of altering its characteristics.

Rewinder heads CHUCKS RELIEVING

This solution involves the expandable shaft and allows to relieve the reel being wound of a part of its own weight, in order to avoid the crushing of the product and thus preserving its bulk.

For this purpose, the load on the shaft determined by the aforementioned reel is constantly measured by a pair of load cells located on the spindles. The data collected are then transmitted to the control system, which regulates the lightening pressure according to a curve determined by the operator.

RIDER ROLL RELIEVING

The rider roll has the task of stabilizing the finished reel in position during its winding. In order to preserve the softness of the product and avoid its crushing during the process, we install two load cells on the two ends of the rider roll. These load cells have the purpose of sending a signal to a special control system which, consequently, regulates the value of the load that the rider roll exerts on the reel during the rewinding phase, thus preserving the characteristics of the product.

LARGER DIAMETER SHAFTS

Thanks to the use of larger and more robust diameter shafts, it is possible to increase the lightening force towards the finished reel during rewinding, thus improving the effectiveness of the shafts themselves in terms of maintaining bulk and softness of the tissue paper.

A consultative approach to offer you the best solution

In addition to the solutions listed above, to obtain optimal results during tissue paper processing it is advisable to use machinery built according to the specific needs of each company. This is why A.Celli is able to offer you customized solutions for an optimal management of bulky tissue paper with high crepe ratios, whatever your production needs are.



100% CARBON-FIBER EXPANDING SHAFT ALLOWS BOTH FASTER MAX SPEEDS AND ACCELERATION/DECELERATION



New expanding, multi-bladder shaft for counter-roller tissue rewinding machines delivers better energy efficiency, tissue production and operator control precision

The Italian technology company Svecom-P.E. has introduced a new patented expanding shaft made entirely of carbon fiber, CF. The new multibladder expanding shaft has three ledges and offers mechanical properties which are unique in the market. A major benefit of the new CF shaft is that it now lets operators exceed the usual speed limits for 3" core diameters on tissue rewinders, thus allowing them to run at mechanical speeds of over 1200 m/min.

echnical solutions

Reach operating speeds four times faster

The new 100% CF multi-bladder expanding shaft has been specifically designed to meet today's higher technical requirements on counterroller rewinding machines. This makes it possible to get very fast acceleration and deceleration times and also reach the operating speed much earlier than traditional shafts. Operating speeds are reached four times faster compared to traditional shafts, consequently increasing the overall productivity.

The light nature of carbon fiber also allows much higher maximum operating and peak speeds, with no vibrations from the shaft while achieving them. Critical speeds increase significantly: +98% compared to steel shaft, +119% compared to aluminium shaft, +35% compared to aluminium shaft with carbon inserts (Fig. 1).

Lower weight gives benefits too

As a further benefit, carbon fiber shafts have a lower specific weight, thus reducing the energy required to operate them in the machine. The specific weight is 65% lower than steel shaft, 20% lower than aluminum shaft and 32% lower than a carbon shaft with aluminium inserts (Fig. 2)

A higher elastic module also gives greater stiffness and consequently, upon application of a high load, it will undergo minimal deformations.

The 100% CF expanding shaft represents a real revolution for such expandable systems and is an innovation based upon Svecom's lengthy experience with these materials, as well as close collaboration with a leading company in the carbon sector for military and sports applications. The 100% CF solution allows a wide range concerning the geometry of shafts, and therefore the ability to satisfy the customer's needs.

2° Critical Speed (RPM) 7000 4465 6000 5000 2995 3325 4000 3000 **New Carbon Fiber** 2000 Aluminium + Carbon Fiber 1000 Aluminium Steel 0

Figure 1: Carbon fiber offers much higher critical speeds, compared to traditional and hybrid shafts



Figure 2: Weight is greatly reduced as well, giving numerous benefits.

Material	Bearing Ø	Expansion	UTS (N/mm2)	E.M. (GPa)	Inertia (cm4)
Solid steel (Fe510)	74 mm	3 centering ledges + 3 gripping ledges	510	210	88.87
Aluminium	74 mm	3 centering ledges + 3 gripping ledges	310	70	88.87
Aluminium + carbon	75 mm	3 gripping ledges	310	165	110.84
New carbon	75,2 mm	3 gripping ledges	1521	250	90.66

Figure 3: Specs and mechanical advantages of 100% carbon fiber shaft compared to the other types. In particular, CF has a better UTS (Ultimate tensile strength) and a higher EM (elastic module).

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A.Celli has long-standing, proven expertise in the construction of complete tissue plants. Basic and detail engineering, electrification and automation are performed by internal engineer teams to optimise the overall plant performances. All activities are oriented to offer proven and granted solutions through extensive research and development activities that, since the foundation, have been of strategic importance for the company.