issue 62 | 2024

# met

# GLOBAL TISSUE AND NONWOVENS OUTLOOK

MENA Tissue Producers

SENNING paper wrapping technology

BWCS partnerships redefine tissue manufacturing

# Tissue converting is now part of Valmet's offering

Valmet has acquired Körber's Business Area Tissue, a global supplier of tissue converting and packaging lines. We are happy to welcome the market leader in tissue converting and close to 1,200 dedicated new colleagues to Valmet.

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Editorial Office
**MET Magazine**

P.O.Box: 45-134
Hazmieh – Lebanon
info@metissue.com
www.metissue.com

**Editor- in-Chief**
Carol Dib
carol.dib@metissue.com

**Advertisement Enquiries**
Carine Villeneuve
carine.villeneuve@metissue.com

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# SAUDI ARABIA

## Crown Paper Mill expands tissue capacity

Crown Paper Mill is investing in a second Valmet's Advantage DCT tissue line including an extensive automation package, flow control valves and Industrial Internet solutions to its mill in Saudi Arabia. The target of the investment is to meet the consumers' increasing demand of high-quality tissue products with low environmental impact. The start-up is scheduled for the second half of 2025.

Valmet and Crown Paper Mill have a strong history of cooperation. In 2016, Crown Paper Mill purchased its first Valmet's tissue machine, which was installed in Abu Dhabi. The new Advantage DCT 200 is the first tissue machine installed at their new site in Dammam area in Saudi Arabia. Valmet's Advantage DCT 200 tissue machine is equipped with the latest technology to ensure highest product quality while reducing energy and water consumption and CO2 emissions.

"We appreciate Valmet for being an indispensable partner in Crown Paper Mill's success. The cutting-edge technology and unwavering support have elevated our operations, making Valmet an invaluable contributor to our industry leadership. We look forward to continued collaboration and shared success," says Abdullah Al Katheeb, Managing Director, Crown Paper Mill.

"It has been a pleasure to follow Crown Paper Mill from the start-up of the first Valmet machine. They pay attention to all details required to produce premium tissue with high efficiency, focusing on quality in all aspects. We are proud to be chosen again as their supplier and we look forward working together to make the new machine as successful as the previous one," says Kent Nika, Sales Director South America, Tissue Mills business unit, Paper business line, Valmet.

The new tissue line will have a design speed of 2,200 m/min and a width of 5,6 meters. The production line is optimized to save energy and deliver excellent paper properties. The line will have an annual production capacity of 70,000 tons. Headquartered in the Industrial City of Abu Dhabi (ICAD), Crown Paper Mill is a leading producer of jumbo tissue paper rolls in the region. The mill has an annual production capacity of 100,000 tons of tissue for facial, toilet, kitchen, towel, napkin, C-fold and carrier grades for the United Arab Emirates.

## PIF announces completion of investment in the Middle East Paper Company

The Public Investment Fund (PIF) has announced the completion of a deal to invest in the Middle East Paper Company (MEPCO), a leading manufacturer specialized in producing and recycling paper-based products in the Middle East and North Africa. PIF has acquired a 23.08% stake in MEPCO by way of a capital increase and subscription to new shares.

Through its investment, MEPCO will be able to expand its production, raise its operational efficiency, and support environmental sustainability, through recyclable products – including paper goods – in line with the sustainability goals of both Saudi Arabia and PIF.

Muhammad Aldawood, Head of Industrials and Mining Sector in MENA Investments at PIF, said: "PIF's investment in MEPCO reflects the attractive opportunities for growth in promising sectors such as recycling, retail and building materials. This investment enables MEPCO to expand its sustainable production activities while focusing on high value-added products and growing its export activities."

Eng. Sami Al Safran, CEO of MEPCO, commented: "PIF's investment further enables the implementation of our expansion strategy and captures significant growth potential, both locally and regionally. This will help create new opportunities, as MEPCO continues its journey to become a national champion in our industry. Our company strives for sustainable growth and a better future, thanks to its unique strategy which integrates paper products and waste management. MEPCO is investing in the sector through ambitious projects to support Saudi Arabia's goals of sustainability and transition to a circular economy by recycling, reducing waste and converting waste into energy sources to meet our business needs."


Freedonia Group

# Global Nonwovens

Industry Study

## About the Study

Global demand for nonwovens is forecast to increase 3.1% per year to 14.1 million metric tons in 2027. Improving standards of living will boost demand for nonwovens used in consumer and medical products, with expanding manufacturing activity further driving gains in a variety of durable goods applications.


## Learn About the Market

### Global Demographic Changes Altering Personal Hygiene Market

Personal hygiene products are the most significant individual market for nonwovens, and infant diapers and training pants represent the largest segment of that market.

### Meltblown Nonwovens Producers Facing Overcapacity

Meltblown nonwovens were the product segment most severely impacted by the COVID-19 pandemic, as booming demand for medical masks led to high levels of capacity investment in this relatively low-volume segment.

### Historical Market Trends

Demand for nonwovens is primarily driven by trends in manufacturing industries. For most of recent history, the market size in weight terms has steadily increased with expanding economic development globally.

## See Also


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# MOROCCO

## Eczacibasi expands operations into Moroccan market with key acquisition

Eczacibaşı, the Turkish conglomerate renowned for its production of hygiene paper, is expanding its operations in the Moroccan market through the acquisition of Jeesr Industries SARL, a prominent player in Morocco's hygiene sector. This strategic move comes just under a year after Eczacibaşı inaugurated its state-of-the-art manufacturing facility in Casablanca, representing a substantial investment of 25 million Euros.

The primary objective behind this acquisition is to position Eczacibaşı Consumer Products as the leading force in Morocco's tissue paper market. By finalizing negotiations to acquire Jeesr Industries SARL, Eczacibaşı aims to fortify the logistical and industrial infrastructure of its Moroccan subsidiary, "ECP Maroc," solidifying its stance within the global disposable hygiene market. Pending approval from the "Moroccan Competition Council," this acquisition will grant ECP Maroc a significant portion of the market share in Morocco's rapidly expanding hygiene sector.

Eczacibaşı Consumer Products, with its globally recognized tissue paper brands such as Selpak, Solo, Silen, and Servis, has a turnover of 1.9 billion euros and a presence in over twenty countries. Jeesr Industries SARL, currently operates a tissue mill with a capacity of of 30,000 tons per year, along with converting facilities consolidated under "Riaya Industries" (Novatis). The company produces tissue paper brands Dalaa Cotonia, Sany, and Pandoo, in addition to diaper brands Dalaa and Calin.

# IVORY COAST

## A newcomer to the African tissue market

Nano Srl has established a new tissue mill in Abidjan, Ivory Coast. Nano Tissue will operate a Recard-supplied tissue machine, equipped with advanced crescent former technology, with a trim width of 2,750 mm, a maximum operating speed of 1,300 m/min and a production capacity of 55 tons per day.

Nano Tissue will produce a diverse range of hygienic tissue paper in jumbo rolls across various grades, ranging from 12.5 gsm to 38 gsm towels, including facial tissues, toilet paper, napkins, and kitchen towels. Nano Srl has already a decade of experience in tissue paper converting and has successfully penetrated the market in Ivory Coast and neighboring nations.

Upon full operation, the plant is expected to produce 20,000 tons per year of premium-grade paper. The inauguration of the new plant is scheduled for April 2024, marking a significant development in the region's industrial landscape and potentially contributing to the local economy.

# UAE

## Al Mulla Group starts-up a new packaging machine

Al Mulla Converting Industries L.LC, part of Al Mulla Group, has recently started up a new packaging line at its production base in UAE.

The Microline-supplied AL80 horizontal wrapper, is one of the most popular machines in its product portfolio, along with a shrink-wrapping tunnel and an infeed sorter. From a design perspective, the AL80 was conceived for the paper industry and AFH-type rolls, with the specific purpose of preventing material waste during the packaging cycle while retaining the high performance the industry expects. With the specific equipment supplied to Al Mulla, it is possible to handle single, double or triple rolls at a production rate of 70 rolls per minute for individual packs and 120 rolls per minute for double packs, based on the size and number of the products.

The machine was installed at Al Mulla Industries premises last December 2023 and immediately demonstrated performance that was in line with expectations. Microline has developed technology that combines sturdiness with flexibility and efficiency. All Microline machines are designed with a modular concept, and they provide the possibility of using different feeding systems as well as working with different types of products. Microline solutions enable savings not only in terms of packaging material but also in terms of energy consumption.

Headquartered in Fujairah, UAE, Al Mulla group is a multi-disciplinary conglomerate, engaged in a wide spectrum of business activities, including Trading and Contracting, Automobiles, Marine Engineering, Tissue Paper Converting, Plastic Products, Logistics and Travel & Tourism. Al Mulla Industries L.LC is one of the leading tissue paper products converting companies in the Middle East.

Microline AL80 horizontal wrapper, Al Mulla Converting Industries, UAE

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# excellence in tissue

Pictures are shown for illustrative purposes only: actual products may vary due to A.Celli's R&D activities.

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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.

# PORTUGAL

## The Navigator Company orders new rewinder line

Toscotec will supply an OPTIMA 1800 slitter rewinder to the Navigator Company at their Cacia production base in Aveiro, Portugal. The start-up is planned for the second half of 2024.
The new OPTIMA 1800 slitter rewinder is equipped with tension and nip control for high quality winding, and it will process close to 2,800 mm width parent reels using two unwind stands. Toscotec will also supply the associated roll handling and trim removal system designed to feed the rewinder's trim paper back to the tissue machine to maximize fiber savings across the entire production line.
The service package includes full onsite erection, as well as erection supervision, training, commissioning, and start-up assistance.
The Navigator Company and Toscotec have been collaborating closely since 2015, when the Navigator Company acquired tissue producer AMS who operated two high-speed Toscotec AHEAD tissue machines at their Vila Velha De Ródão mill: PM1 and PM2, started up respectively in 2009 and 2015.
Paulo Santos, Mill Manager at The Navigator Company's Aveiro mill, says, "We are looking forward to continuing our partnership with Toscotec, who has proved in the past to be a reliable supplier for its state-of-the-art technology, flexibility, and expert services. This new rewinder line will support our growth in the international markets as a leading manufacturer of premium quality tissue."
Gabriele Romanini, Sales Manager at Toscotec, says: "We are happy to strengthen our cooperation with The Navigator Company on this new project. Their new OPTIMA rewinder will allow them to achieve a high level of efficiency while preserving paper qualities to fully capture the added value they wish to offer to their large customer base. The new line also meets the highest safety standards with a smart concept for easy operations."

Paulo Santos, Mill Manager at The Navigator Company's Aveiro tissue mill.

# FRANCE

## PAPECO increases efficiency with Yankee and steam plant replacement

French tissue manufacturer Papeteries du Cotentin (PAPECO), purchased a TT SYD Steel Yankee Dryer and a complete high-performance steam and condensate plant from Toscotec to fully replace their existing cast iron dryer and steam system on PM3 at their Orval sur Sienne mill in Normandy. The project includes modifications to the machine for the new steam system and it is planned for start-up in the third quarter of 2024.
Compared with the existing cast iron Yankee, the new TT SYD will significantly increase PM3's production capacity, guarantee higher operational safety, and deliver energy savings.
With more than 260 TT SYD sold globally, Toscotec holds a large majority of the market share of Steel Yankee Dryers. In the European tissue market, it has close to 95% of the market share, but it is present in more than 45 countries across 5 continents.

Emmanuel Coulon, General Manager of PAPECO, says "The installation of this TT SYD is aimed at increasing the energy efficiency of our production, in line with our strong commitment to resource efficiency of which the use of locally sourced recycled fibers is also a big part. The steel Yankee will increase reliability and operational safety at our mill."

Riccardo Gennai, Toscotec Sales Manager, says, "We are happy to begin this new cooperation with PAPECO and are confident that they will gain the competitive advantage to support their growth in the market. Our third generation design Steel Yankee delivers the highest possible drying efficiency in the tissue industry, which is decisive factor for any tissue manufacturer."

PAPECO's mill at Orval sur Sienne in Normandy, France.

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# FINLAND

## Metsä Group invests EUR 100 million in its tissue paper mill in Mänttä

Metsä Group announces its plans for a significant investment program in its tissue paper business in the Mänttä mill to develop the sustainability of the operations and to modernize and extend the lifecycle of the mill. The investment plans are part of its tissue paper business' Future mill strategy program aiming at world-class efficiency and environmental performance in tissue production. The planned program amounts to approximately EUR 100 million euros and the related investments are to be carried out over the period of next five years.
The company aims to develop the mill's production and environmental efficiency by investing in paper machine and converting line modernizations as well as improving the energy and water efficiency. Their aim is long term continuation of the efficient local manufacturing operations in Mänttä and they support the company's target of all products and manufacturing sites to be fully fossil free by 2030.

"The investment program strengthens Finland's self-sufficiency in essential, locally produced hygiene products and enables modernizing our operations in Mänttä. The plans will strengthen our focus on high quality fresh fibre based hygiene products that originate from the sustainably managed Northern forests. Our Katrin, Lambi, and Serla products will deliver the benefits of the investments to the Finnish consumers", says Joonas Kukkonen, Vice President, Supply Chain, Metsä Tissue Finland and Baltics.

As part of the planned program, the company will first initiate an investment in a new hand towel line, which will produce fresh fibre based hand paper towels especially for the Finnish market. Preparations for the new  line are being started and the line is planned to be operational during 2025.

"Locally manufactured tissue products mean local jobs and build resilience in the society. The planned investment program in Mänttä mill  is a logical continuation to our on-going Future Mill investment in Mariestad, Sweden and our planned tissue paper mill investment in the UK, as well as several other investments in our international mill fleet. Now we will also modernize our operations in Finland", says Joonas Kukkonen

Metsä Group announced significant investment program in its tissue paper mill in Mänttä, Finland.

## Metsä Group and ANDRITZ are aiming for ambitious climate goals

Metsä Group and technology supplier ANDRITZ have agreed to work together to reduce Scope 3 greenhouse gas emissions. Scope 3 emissions refer to emissions from the company's value chain and purchases, such as emissions during the sourcing of production equipment and raw materials and the transportation and use of manufactured products.

The goal of the multi-year cooperation is to increase the effectiveness of emission reductions and to find completely new ways to reduce greenhouse gas emissions.
The companies have established a project group that will determine the most significant development targets, metrics and goals during 2024, with which the total emissions of the value chain can be reduced.

"The collaboration is a significant step for both companies. It shows how important part of our sustainability work is to reduce emissions from the value chain and sourcing. Together, we will find new ways to manage greenhouse emissions that would not necessarily be recognized if companies were operating independently," says Jari Voutilainen, SVP Sourcing and Logistics at Metsä Group.

# AUSTRIA

## ANDRITZ wins 2024 Microsoft Intelligent Manufacturing Award

ANDRITZ is the winner of the 2024 Microsoft Intelligent Manufacturing Award in the category "Disrupt!", which recognizes solutions that have the potential to fundamentally transform value chains. ANDRITZ received the award for its digital solutions enabling autonomous operation of pulp mills.

Having supported customers in further developing and optimizing their manufacturing operations for decades, ANDRITZ is now paving the way to make autonomous pulp mills a reality by leveraging its digital platform Metris.

ANDRITZ has defined a five-level journey towards autonomy, which has been implemented across 39 pulp mills at varying levels. One of these mills has achieved 97% autonomous operation as compared to the industry benchmark of 60% to 65%. This has led to an 18% increase in productivity.

The Metris digital platform, which forms the basis for the journey towards autonomy, provides full support for industrial plants throughout their entire lifecycle, addressing customers' main challenges such as operating costs, process stability, asset reliability, and sustainability.

# SWEDEN

## Metsä Group to install three new converting lines

Metsä Group's tissue and greaseproof paper business is investing in three new state-of-the-art converting lines for folded and rolled tissue paper to its mill in Mariestad, Sweden. The investment will enable large scale high quality hand towel production in Scandinavia. In addition it entails efficiency and energy savings as well as improved working environment and safety. The investments are part of the company´s expansion and modernisation investment in Mariestad and strategic Future Mill programme, aimed at world-class environmental and operational performance.

Metsä is investing SEK 4.2 billion (EUR 370 million) in the expansion and modernization of the Mariestad tissue paper mill, and the new converting lines are part of this extensive project. The expansion is focused on sustainable fresh fibre production, where the total share of fresh fibre-based products produced at the mill will be 80 % after the expansion is completed in the second half of 2025.

Valmet Tissue Converting S.p.A. has been commissioned to deliver two new converting lines to produce rolled tissue papers for the consumer market and C.G Bretting Manufacturing Co., Inc. to deliver one converting line for folded paper towels for professional use.

The new converting lines have a total capacity of 70,000 tons of tissue paper. "The state-of-the-art converting lines with high-efficiency components ensure optimal performance and productivity. Our converting lines feature highly automated and high-quality rewinding machines, fostering a safer and more efficient working environment. Additionally, the latest folding machine opens doors for us to explore and develop new exciting products, further enhancing our capabilities", says Esa Paavolainen, Vice President, Projects, Metsä Tissue. Metsä's mill in Mariestad produces tissue products sold under the Serla, Lambi and Katrin brands. After the expansion, the mill will have nine converting lines.

The new tissue lines are planned to be commissioned in the second and third quarter of 2025.

Metsä Group to install three new converting lines at its mill in Mariestad, Sweden.

# UK

## WEPA Professional acquires Star Tissue UK

WEPA Professional has announced the successful acquisition of Star Tissue UK, a prominent British hygiene paper provider based in Blackburn, Lancashire. The newly acquired entity will operate under the name 'WEPA Professional UK', signaling WEPA's strategic commitment to further growth in the UK's professional hygiene market. The Blackburn plant has a converting capacity of 27,000 tons per year.

Andreas Krengel, CEO Business Unit Professional of the WEPA Group, expressed enthusiasm about the acquisition, stating, 'WEPA stands for the production of high-quality tissue paper, and the UK market is strategically important for us. We are delighted to continue the impressive growth of Star Tissue with Managing Director Khalid Saifullah and his team as WEPA Professional UK.'

Under the leadership of Khalid Saifullah, who will remain as Managing Director, WEPA Professional UK aims to drive the integration process and foster continued growth. Khalid Saifullah stated, 'In WEPA Professional, we have found a partner that shares our values and stands for high-quality products and first-class customer service.'

Star Tissue has a significant market position with three state-of-the-art fully automated converting lines, a warehouse and modern office space. Thanks to the acquisition, customers will benefit from an expansion of the product portfolio and an international production network of the WEPA Group in the UK and at 12 other locations in Europe. Customers and partners can expect business as usual, with the same dedication to quality, service, and sustainability.

Khalid Saifullah, Managing Director, WEPA Professional UK (left), and Andreas Krengel, CEO Business Unit Professional, WEPA Group

# UK

## ANDRITZ to supply high-temperature Yankee hood and air system to Northwood Tissue

ANDRITZ has received a turn-key order from Northwood Tissue Ltd. to supply a new PrimeDry Hood and an air system for a tissue machine rebuild at the mill in Chesterfield, Derbyshire, England. Start-up is planned for the third quarter of 2024.

Installation of the new ANDRITZ gas-heated PrimeDry Hood HT (High-Temperature) will increase the drying capacity thanks to an impingement temperature of up to 530°C. It will also enable a higher heat transfer rate, resulting in considerable energy optimization per ton of tissue produced.

ANDRITZ's scope of supply includes installation work, supervision of mechanical installation, commissioning, and start-up. Guido Lenzi, Area Sales Manager at ANDRITZ Novimpianti, says, "The new drying equipment will support our customer on its path towards more sustainable and cost-efficient tissue production. This is the second order of that kind that Northwood Tissue has placed with us, and we are looking forward to continuing our partnership."

David Harries, Director at Northwood Tissue adds, "This investment is another milestone in improving carbon footprint and operational efficiencies. ANDRITZ is a reliable partner for projects of this kind, and I look forward to the successful completion."

Northwood Tissue (Chesterfield) Ltd. is a member of the Northwood Group, with over 50 years' experience in the tissue and paper business. The group has paper making capability in excess of 100,000 tons per year in the UK and Spain, which it all processes through internal converting plants.

PrimeDry Hood HT manufacturing at ANDRITZ Novimpianti. Photo: ANDRITZ

# TAIWAN

## Yuen Foong Yu New starts up new tissue production line

Taiwanese tissue producer Yuen Foong Yu Consumer Products Co., Ltd. has successfully started up a new ANDRITZ PrimeLineCOMPACT tissue production line at its mill in Chingshui.

Mr. Tang Mingfa, Vice General Manager, Yuen Foong Yu says: "The start-up went smoothly and precisely to schedule. This new line is of utmost importance to us as it increases both the quantity and quality of our household paper production and strengthens our competitiveness on the global market. It perfectly aligns with our vision of high quality and sustainable, low-emissions production."

The PrimeLineCOMPACT tissue machine, with a width of 3.65 m and a maximum operation speed of 1,650 m/min, produces high quality household grades, including toilet paper, napkins, handkerchiefs, and facial tissue. It is equipped with a series of innovative components such as: PrimeFlow 2-layer headbox that minimizes slice deflection to achieve best cross-profile quality, PrimePress XT Evo shoe press including Impulse shoe press sleeves to ensure top quality paper with excellent bulk and high post-press dryness, and PrimeDry Steel Yankee (18 ft. diameter) with canopy hood for energy-efficient drying and significant steam savings

Yuen Foong Yu is a leading supplier of household products in Taiwan with well-known brands such as "Mayflower", "Tender" and "Delight", and operates the largest production plant for consumer paper in Taiwan.


Successful start-up of ANDRITZ' tissue production line at Taiwan's largest consumer paper producer. Photo: ANDRITZ

CIDPEX

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Alice (Ms. Zhang Yuan) Mobile: +86-15108406885
Tel: 86-(0)10-64778184/8197
E-mail: cidpex@cnppri.com Http://cloud.cnhpia.org/


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**CIDPEX2024**

# CHINA

## A.Celli started up the slitter rewinder supplied to Allmed Medical Products

The start-up of the E-WIND® SONIC supplied to the Chinese producer took place on schedule and machine performance are in line with expectations.

Allmed Medical Products Co., Ltd. signed the acceptance of the equipment following the startup of the A.Celli slitter rewinder, with satisfying results.

A.Celli scope of supply includes: E-WIND® SONIC slitter rewinder with a width of 4600 mm and design speed of 1500 mpm, an automatic shaft handling system with robot and manual positioning of pre-cut cardboard cores
The slitter rewinder has been installed downstream of a Reicofil line dedicated to the production of 12-120 gsm spunbond which already provides for an A.Celli E-WIND® WAVE master roll winder.

“Every machine delivered by A.Celli so far has overcome our expectations, and this is no exception” said Mr. Chen Fei, General Manager of Allmed Medical Products. “performance were great from the start, the service delivered by the A.Celli team is exceptional and the reliability of this solutions is top-notch. We’re very happy to be their partners”.

Headquartered in Yichang City, Allmed Medical Products is the largest Chinese OEM manufacturer and exporter of wound care products for medical and personal use.

Allmed Medical Products headquarters in Yichang City, China.

## Hengan Group successfully starts up 14th and 15th tissue machine

Guangdong Hengan Paper Co., Ltd. has successfully started up the two new ANDRITZ PrimeLine tissue machines at its mill in Yunfu, Guangdong, China. Hengan has now 15 ANDRITZ tissue machines in operation.

The two machines of the type PrimeLineCOMPACT M 1600 have a design speed of 1,700 m/min and a working width of 3.65 m. They produce top-quality tissue for facial, toilet, handkerchief, and napkin grades from virgin market pulp.

Mr. Wang Xiangyang, Vice President, Hengan Group: “Hengan and ANDRITZ have been working together for more than 25 years. We have already had 13 ANDRITZ tissue machines in operation and are convinced that the two new ones will perform just as successfully, producing high-quality tissue while enabling environmentally friendly production.”

Mr. Xie Zhengba, Chief Engineer, Guangdong Hengan Paper Co., Ltd.: “From the very beginning of this project to the start-up, we have been deeply impressed by ANDRITZ’s professional team. Each time when needed, they responded very fast and in a perfect manner. We really appreciate our partnership.”

The Hengan Group, founded in 1985, is a leading Chinese manufacturer of household paper grades as well as feminine hygiene and baby care products.


Successful start-up of TM28 PrimeLineCOMPACT M 1600 at Hengan Paper. Photo: ANDRITZ

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# USA

## Drylock expands baby diaper production capacity

Global hygiene product manufacturer, Drylock Technologies is expanding its baby care product manufacturing capacity with a new facility in Reidsville, North Carolina. Occupying a 430,000-square-foot space, the facility will feature cutting-edge technology to produce baby diapers and pants.

“People often asked me when I would be establishing a baby products plant in the USA- and I’m very happy to say that the time is now,” says CEO, Bart Van Malderen. “In 2023, we reached in excess of €1.2 billion in sales, but we’re eager to keep growing. The next step we’re taking towards further growth is to open a baby care products plant in North Carolina. With a localized manufacturing presence, we can support faster product development for our USA customers and empower them with an unparalleled speed to market.”

Drylock Technologies’ efforts and achievements towards a green future are relentless: from being the first CO2-neutral hygiene product manufacturer to running its production on 100% green energy, continuously working to optimise product performance while minimising waste and utilising recyclable and recycled materials.


Drylock Technologies is expanding its baby care product manufacturing capacity with a new facility in Reidsville, North Carolina, USA.

## Sofidel acquires a new production plant

Sofidel has acquired from ST Paper a paper mill in Duluth, in Minnesota, in the Upper Midwest. The plant has a production capacity of 65 thousand metric tons per year and has eighty employees.

The new investment comes a few months after Sofidel made an organic growth investment to expand its integrated plant in Circleville, Ohio. The project, which has already been launched, involves the construction of a new building to house a new machine with a production capacity of 70,000 metric tons per year, which is scheduled to come into operation in the third quarter of 2025. By that time, with 200 thousand metric tons of annual capacity, Circleville will become Sofidel’s largest production site worldwide.

## Tesco transforming bog-standard cardboard into luxury toilet rolls

In a supermarket first, Tesco is rolling out a new range of toilet roll and kitchen towel made from recycled cardboard and recycled pulp. These new, 100% recycled paper products, far from being bog-standard, are soft and absorbent.

Tesco and its supplier, WEPA, have invested in innovative technology that makes it possible to turn thousands of tonnes of corrugated cardboard, in part from the rapid growth since the pandemic of home delivery services, into soft toilet roll and absorbent kitchen towel.

The recycled cardboard such as home delivery boxes and corrugated card from supermarkets is combined with other recycled paper sources, mixed with water to create a pulp and cleaned to create suitable fibres for use in paper production.

Household Category Director, Philip Banks, said: “The explosion of home deliveries since the pandemic has created an abundance of recyclable cardboard boxes right on our doorstep. The manufacturing process our supplier has developed, that turns them into incredibly soft toilet roll and kitchen towel, allows us to create a second, sustainable use for them that couldn’t be more different!”

The innovative pulp production process uses less water, chemicals and energy compared to using traditional tree fibre as the raw material. The paper is unbleached, giving the products their unusual beige colour.

The three new additions to Tesco’s own brand ranges of toilet roll and kitchen towel will hit shelves in 100 Tesco Extra stores across the country from the start of February with more to follow. They include: 100% recycled brown kitchen towel, luxury Soft 100% recycled brown toilet tissue 4 roll, luxury Soft 100% recycled brown toilet tissue 6 long roll. The recycled cardboard content accounts for a minimum of 70%, with the remainder of the pulp being from other recycled paper sources.


Tesco is rolling out a new range of toilet roll and kitchen towel made from recycled cardboard and recycled pulp.

# BRAZIL

## Suzano Papel e Celulose invests in a tissue paper making line, tissue converting equipment and a biomass boiler

Valmet will deliver a complete tissue line including a tissue making line and converting equipment to Suzano Papel e Celulose in Brazil. The order also includes a biomass boiler. This is Valmet's first combined order with tissue making and tissue converting lines after the acquisition of tissue converting business in late 2023. The value of the total order will not be disclosed, but such an order is typically worth around EUR 100 million.

The tissue making line, converting equipment and the biomass boiler will be installed at the Aracruz mill in Espírito Santo, Brazil. The target of the investment is to meet the Brazilian consumers' increasing demand of high-quality tissue products with low environmental impact. The start-up is scheduled for the first quarter of 2026.

The Advantage DCT 200 tissue machine will have an annual production capacity of 60,000 tons. The tissue making line and converting lines are optimized to save energy and deliver excellent paper properties.

"Valmet's state-of-the-art solutions will allow us to expand our tissue products capacity by a new production line in Aracruz mill. This meets our needs in terms of business strategy, production capacity, cost efficiency, and sustainability. Valmet's proven technology, combined with the ability to deliver a 100% integrated line from tissue machine to conversion, and consistent results in its solutions were important factors in the decision for these new investments and reinforce Suzano's vision of long-term continuity of the partnership with Valmet," says Jean Moraes, Suzano's Corporate Engineering Executive.

The new Valmet bubbling fluidized bed (BFB) boiler, which is scheduled to start operating in the last quarter of 2025, will use biomass to produce steam, which in turn is used in the cellulose process and in the generation of electrical energy. The new biomass boiler will increase the mill's energy efficiency, contributing to operational stability. It will also result in significant environmental benefits by reducing particle emissions.

Valmet will also deliver a biomass boiler that utilizes bubbling fluidized bed (BFB) technology and features very high efficiency. The main fuels for the Valmet BFB boiler are bark and other wood waste from the mill. The boiler is also designed to combust non-condensable gases and methanol from the pulp mill. Flue gases are cleaned with Valmet's electrostatic precipitator (ESP) technology.

# PERU

## First hybrid electric heating system for Yankee hood in tissue industry

ANDRITZ was selected by tissue producer Softys Peru as technology partner for a completey new kind of hybrid Yankee hood heating system. It is the industry's first system that allows for a flexible combination of electric and natural gas heating. Installation and start-up of this innovative technology at Softys's mill in Lima, was successfully completed in December 2023.

The system uses a patented air mixing plenum that allows to combine heat sources depending on the mill's specific needs. The customer can run the system either in 1) electric heating mode, using only the electric heater assembly, or 2) natural gas heating mode, using the burner, or 3) hybrid mode, with a freely adjustable portion of electric and natural gas heating. This provides Softys with maximum flexibility in choosing heat sources with a view to emissions reduction and energy cost optimization. The system has been installed in a tissue machine with a design speed up to 2,000 m/min and a paper width of 2.8 m. It is the result of a joint R&D project between Softys and ANDRITZ.

Reinaldo Uribe, Director of Processes and Corporate Projects at Softys, and inventor of the system, explains: "We invited ANDRITZ as a partner to develop this R&D project as part of our ESG strategy to reduce the greenhouse gas emissions from our tissue machines in Latin American, and we are happy to see that our efforts are now contributing to more sustainable mill operations. In George Nowakowski I found the perfect counterpart to implement this project – from conjoint R&D works, up to the successful patent application and start-up."George Nowakowski, Vice President Tissue Drying America, and inventor of the system from ANDRITZ side, adds: "Collaborating with a partner like Softys gives us the great opportunity to use our mutual know-how in order to swiftly develop, extensively test and efficiently implement valuable innovations that are beneficial both for the environment and operational efficiency."

Softys, part of the CMPC group, is one of South America's largest tissue producers. The mill in Lima has an annual production capacity of approx. 100,000 tons of tissue.

Photo on the left: George Nowakowski, Vice President Tissue Drying, ANDRITZ America. On the right: Reinaldo Uribe, Director of Processes and Corporate Projects, Softys. Photo: ANDRITZ

# GLOBAL TISSUE OUTLOOK

By Statista Market Insights

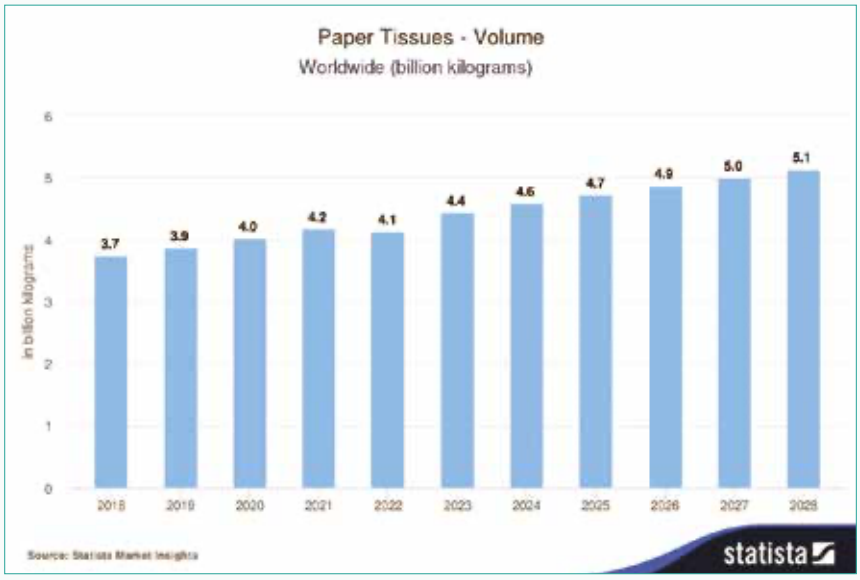
## PAPER TISSUES

Globally, there has been a significant surge in the demand for paper tissues, driven by heightened awareness of hygiene and the necessity for convenient, disposable products.

- In 2024, the revenue in the Paper Tissues* market worldwide is expected to reach US$19.36bn.
- When compared globally, the United States is expected to generate the highest revenue with US$3,727m in 2024.
- It is projected that the market will experience an annual growth rate of 5.85% (CAGR 2024-2028).
- Taking into account the total population, per person revenue is anticipated to be US$2.50 in 2024.
- By 2028, the volume in the Paper Tissues market is expected to reach 5.1bn kg units.
- Furthermore, the segment is anticipated to exhibit a volume growth of 3.2% in 2025.
- Lastly, the average volume per person in the Paper Tissues market is projected to be 2.5kg units in 2024.

**The Paper Tissues market includes tissues made from pulp, facial tissues, and wet wipes.*

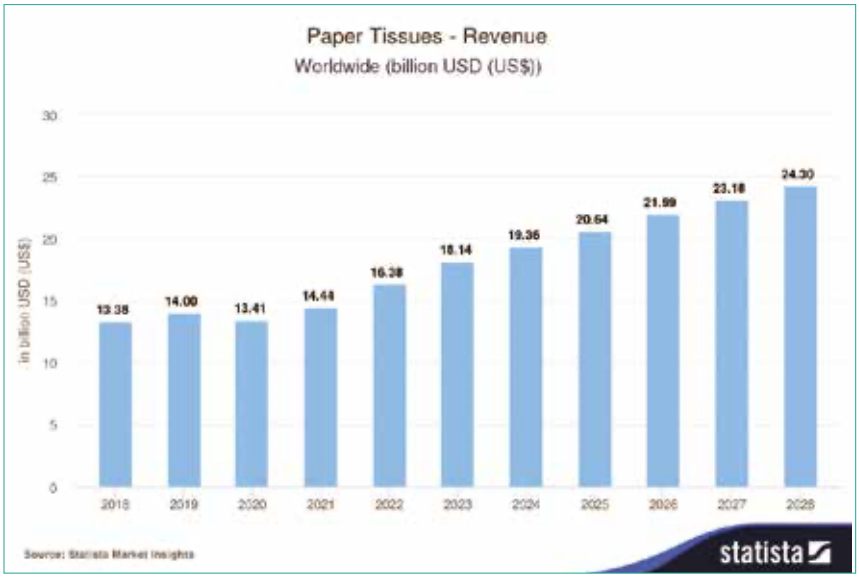
> By 2028, the volume in the Paper Tissues market is expected to reach 5.1bn kg.

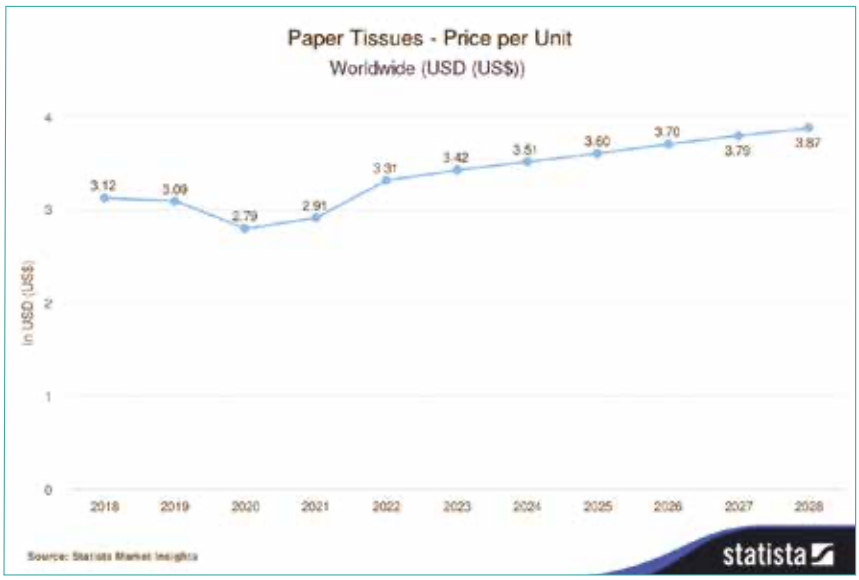


The paper tissue market has experienced steady growth in recent years, fueled by an increasing demand for paper products worldwide. Factors such as growing populations, rising standards of living, and improved disposable incomes in various regions have been key drivers of this growth. However, despite these positive trends, the market faces several challenges that could potentially limit its growth.

One major challenge facing the paper tissue market is the growing competition from alternative materials like cloth and reusable products. With a rising number of consumers prioritizing environmental sustainability, many are opting for reusable cloth towels and washable napkins over disposable paper tissues. This shift in consumer behavior could lead to a decline in demand for paper products over time. Additionally, the market is also grappling with the upward trend in raw material costs, such as pulp and energy. These increased expenses may result in higher prices for paper products, potentially reducing their affordability and hindering market growth. Furthermore, the industry faces mounting pressure to mitigate its environmental impact, which could lead to stricter regulations and higher production costs for manufacturers, consequently less profitability.

Nevertheless, amidst these challenges, the paper tissue market presents several opportunities for growth. One significant opportunity lies in catering to the growing demand for premium, high-end products. Manufacturers capable of delivering such products at competitive prices stand to benefit from increased sales and market share. Additionally, there is a rising demand for eco-friendly and sustainable paper tissue products. Consumers are increasingly seeking out items made from recycled materials or produced using environmentally friendly processes, presenting an avenue for market expansion and innovation.




> Globally, the United States is expected to generate the highest revenue with US$3,727 millions in 2024.

# GLOBAL COMPARISON

## AMERICAS

The demand for eco-friendly paper tissues is on the rise in the Americas as consumers increasingly prioritize sustainability and environmental consciousness.

- In 2024, the Paper Tissues market in the Americas is expected to generate a revenue of US$5.43bn: US$83.65m in Central America, US$4.40bn in North America, US$0.87bn in South America.
- It is projected to experience an annual growth rate of 2.9% (CAGR 2024-2028): 3.3% in Central America, 7.29% in North America, 5.31% in South America.
- When considering the total population, the per person revenue in the Americas is estimated to be US$5.43 in 2024: US$1.58 in Central America, US$8.62 North America, US$2.10 in South America.
- Looking ahead to 2028, the volume in the Paper Tissues market is forecasted to reach 1.1bn kg units: 29.7m kg units in Central America, 0.7bn kg units in North America, 286.7m kg units in South America.
- In 2025, the segment's volume growth is anticipated to be 2.9%: 3.3% in Central America, 2.9% in North America, 2.9% in South America.
- Additionally, the average volume per person in the Paper Tissues market is projected to be 5.3kg units in 2024: 1.6 kg units in Central America, 8.6 kg units in North America, 2.1 kg units in South America.

## AUSTRALIA AND OCEANIA

Amidst the rising concern for sustainability, Australia's paper tissue market is witnessing a shift towards eco-friendly and recycled products.

- In 2024, the revenue in the Paper Tissues market in Australia & Oceania is expected to reach US$195.50m.
- It is projected that this market will grow annually by 4.87% (CAGR 2024-2028).
- In terms of per capita figures, the revenue per person is estimated at US$4.50 in 2024.
- Looking ahead, the volume in the Paper Tissues market is expected to reach 59.5m kg units by 2028.
- In 2025, there is an anticipated volume growth of 2.1%.
- The average volume per person in the Paper Tissues market is expected to be 4.5 kg units in 2024.

## EUROPE

The demand for paper tissues in Eastern Europe has seen a notable increase, driven by growing hygiene awareness among consumers in the region. Similarly, in Northern Europe, there is a rising demand for eco-friendly paper tissues as consumers prioritize sustainability and environmental consciousness. Moving to Southern Europe, countries like Spain and Italy stand out, where consumers have a strong preference for premium paper tissue brands due to their emphasis on quality and softness. Meanwhile, in Central & Western Europe, specifically Germany, there's a growing demand for eco-friendly paper tissues made from recycled materials.

- The revenue generated in the Paper Tissues market in Europe is projected to reach US$3.76bn in 2024: US$0.61bn in Easter Europe, US$203.50m in Northern Europe, US$0.93bn in Southern Europe, US$2.01bn in Central & Western Europe.
- It is forecasted that the market will experience an annual growth rate of 4.24% (CAGR 2024-2028): 4.59% in Eastern Europe, 4.64% In Northern Europe, 4.52% in Southern Europe, 4.09% in Central & Western Europe.
- In terms of per capita revenue, each person in Europe is estimated to contribute 4.24% to the Paper Tissues market in 2024: US$2.58 in Eastern Europe, US$6.01 in Northern Europe, US$3.94 in Southern Europe, US$5.99 in Central & Western Europe.
- By 2028, the volume of the Paper Tissues market is expected to reach 1.1bn kg units: 163.6m kg units in Eastern Europe, 57.0m kg units in Northern Europe, 282.4m kg units in Southern Europe, 0.6bn kg units in Central & Western Europe.
- Additionally, there will be a volume growth of 1.9% in 2025: 2.1% in Eastern Europe, 1.5% in Northern Europe, 2.4% in Southern Europe, 1.6% in Central & Western Europe.
- On average, each person in Europe is expected to consume 4.5kg units of Paper Tissues market in 2024: 2.6 kg units in Eastern Europe, 6.0kg units in Northern Europe, 3.9kg units in Southern Europe, 6.0kg units in Central & Western Europe.

PAPER T

## ASIA

The demand for paper tissue in Asia is on the rise, fueled by increasing hygiene awareness and bolstered by rising disposable incomes in Central Asia, an expanding middle class in Southern Asia, and a growing population in Southeast Asia.

- In 2024, the revenue generated in the Toilet Paper market in Asia is expected to reach US$55.99bn: US$539.90m in Central Asia, US$13.46bn in Southern Asia, US$29.46bn in Eastern Asia, US$8.88bn in Southeast Asia, US$3.65bn in Western Asia.
- This market is projected to experience an annual growth rate of 6.55% (CAGR 2024-2028): 6.31% in Central Asia, 5.52% in Southern Asia, 7.80% in Eastern Asia, 4.82% in Southeast Asia, 4.06% in Western Asia.
- In terms of per person revenue, each individual in Asia is forecated to generate US$12.32 in the Toilet Paper market in 2024: US$6.81 in Central Asia, US$7.03 in Southern Asia, US$18.03 in Eastern Asia, US$12.82 in Southeast Asia, US$16.39 in Western Asia.
- Looking ahead to 2028, the volume of the Toilet Paper market is anticipated to reach 32.1bn kg: 410.3m kg in Central Asia, 7.8bn kg in Southern Asia, 18.0bn kg in Eastern Asia, 4.3bn kg in Southeast Asia, 1,623.0m kg in Western Asia.
- Furthermore, the segment is expected to exhibit a volume growth rate of 4.9% in 2025: 3.2% in Central Asia, 4.4% in Southern Asia, 6.0% in Eastern Asia, 2.9% in Southeast Asia, 1.5% in Western Asia.
- On an individual level, the average volume per person in Asia's Toilet Paper market is projected to be 12.3kg units in 2024: 6.8kg units in Central Asia, 7.0kg units in Southern Asia, 18.0kg units in Eastern Asia, 12.8kg units in Southeast Asia, 16.4kg units in Western Asia.

## CARIBBEAN

The demand for paper tissues in the Caribbean is rapidly increasing due to the region's high humidity levels and the need for personal hygiene products.

- In 2024, the revenue generated in the Paper Tissues market in the Caribbean is expected to reach US$77.84m.
- It is projected that this market will experience an annual growth rate of -0.79% (CAGR 2024-2028).
- In terms of per person revenue, the Paper Tissues market will generate US$1.92 in 2024, taking into account the total population figures.
- By 2028, the volume in the Paper Tissues market is expected to reach 17.6m kg units.
- Additionally, it is anticipated that there will be a volume growth of 2.1% in 2025.
- The average volume per person in the Paper Tissues market is expected to be 1.9 kg units in 2024.

## AFRICA

The demand for paper tissues has seen a significant increase across Africa, driven by growing hygiene awareness and a rising middle-class population. Central Africa's expanding middle class is fueling increased demand for premium paper tissues in the region. Similarly, Eastern Africa is experiencing a surge in demand due to heightened hygiene awareness and urbanization. Northern Africa is also witnessing a rise in demand for paper tissues, influenced by increased hygiene awareness and changing consumer preferences. In Western Africa, demand is steadily increasing, supported by growing hygiene awareness and rising disposable incomes. However, Southern Africa still lags behind in paper tissue consumption, despite its high population and growing economy.

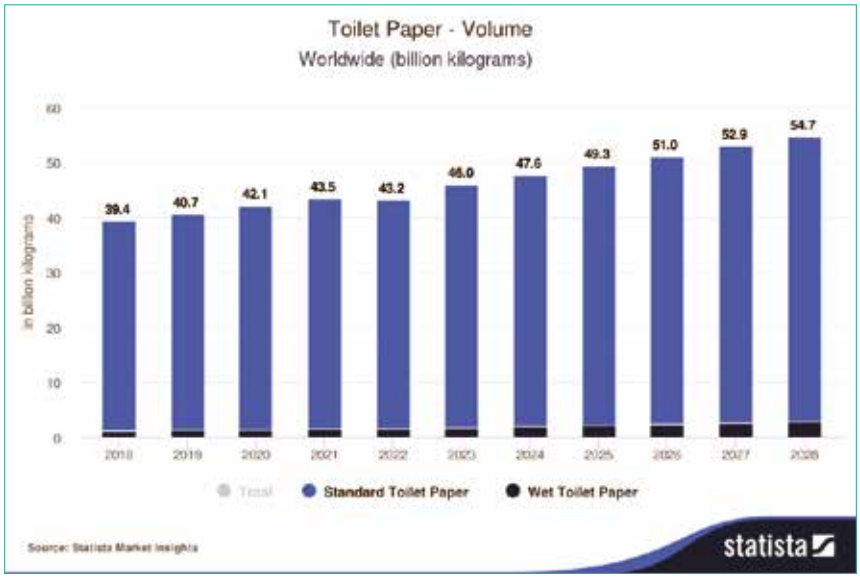
- In 2024, the revenue generated in the Paper Tissues market in Africa is expected to reach US$1.34bn: US$87.02m in Central Africa, US$275.20m in Eastern Africa, US$127.70m in Southern Africa, US$275.80m in Northern Africa, US$0.57bn in Western Africa.
- This market is forecasted to experience an annual growth rate of 8.83% (CAGR 2024-2028): 7.01% in Central Africa, 6.63% in Eastern Africa, 7.32% in Southern Africa, 5.91% in Northern Africa, 11.78% in Western Africa.
- Taking into account the total population, per person revenue in Africa is anticipated to reach US$1.03 in 2024: US$0.90 in in Central Africa, US$0.60 in Eastern Africa, US$1.82 in Southern Africa, US$1.06 in Northern Africa, US$1.39 in Western Africa.
- Looking ahead, the volume of the Paper Tissues market is expected to reach 0.4bn kg units by 2028: 36.4m kg in Central Africa, 112.1m kg units in Eastern Africa, 31.9m kg units in Southern Africa, 107.7m kg units in Northern Africa, 125.9m kg units in Western Africa.
- Additionally, a volume growth of 4.1% is anticipated in 2025: 4.6% in Central Africa, 5.2% in Eastern Africa, 1.3% in Southern Africa, 1.3% in Southern Africa, 3.5% in Northern Africa, 4.2% in Western Africa.
- The average volume per person in the Paper Tissues market is projected to be 1.0 kg units in 2024: 0.9 kg units in Central Africa, 0.6 kg units in Eastern Asia, 1.8kg units in Southern Africa, 1.1 kg units in Northern Africa, 1.4 kg units in Western Africa.

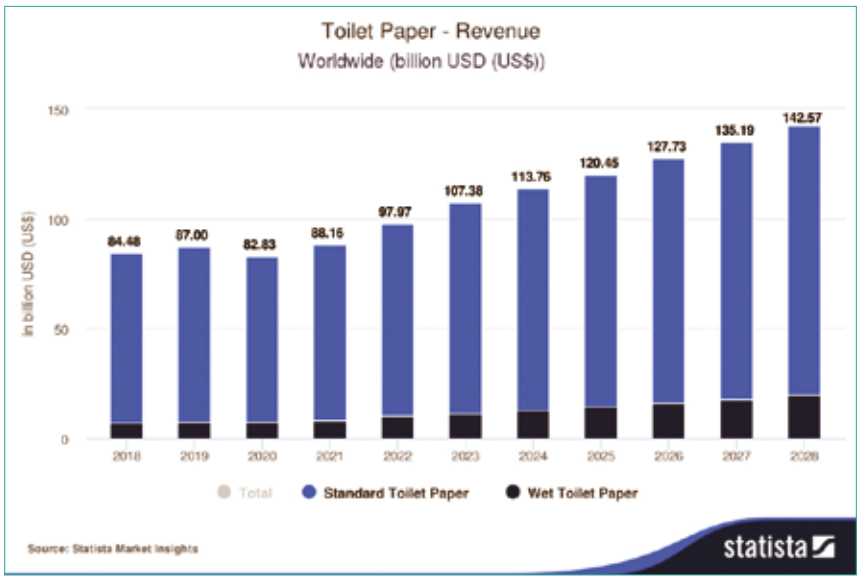
TISSUES

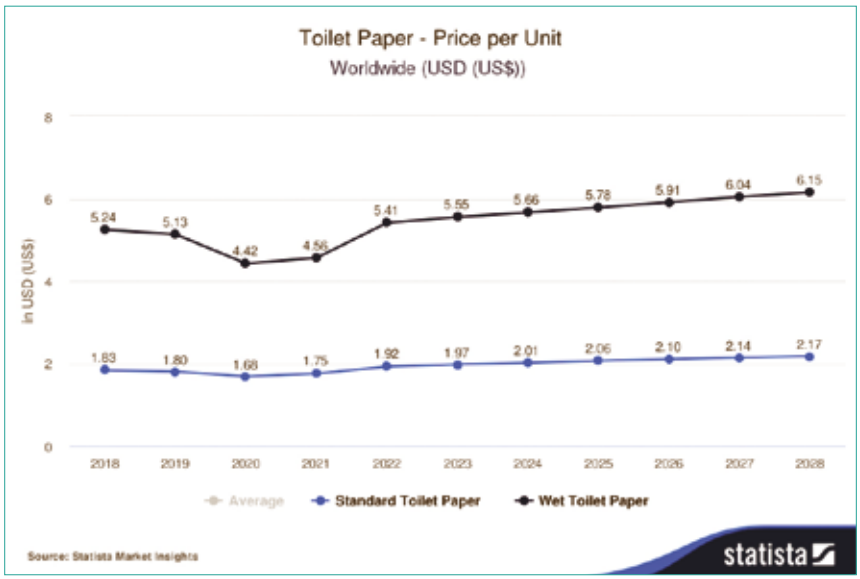
# TOILET PAPER

- In 2024, the revenue in the Toilet Paper* market worldwide is expected to reach an impressive US$113.80bn.
- Looking ahead, the market is projected to experience an annual growth rate of 5.80% (CAGR 2024-2028).
- When comparing global figures, it is notable that China is expected to generate the highest revenue, reaching US$24,300m in 2024.
- On a per person basis, the revenue generated in the Toilet Paper market is anticipated to be US$14.68 in 2024, taking into account worldwide population.
- Looking at the volume of the Toilet Paper market, it is forecasted to reach 54.7bn kg units by 2028.
- Furthermore, the segment is projected to show a volume growth of 3.5% in 2025.
- On average, each person is expected to consume 14.7kg units of toilet paper in 2024.
- Despite worldwide demand for toilet paper, developing countries like India and Nigeria face challenges in meeting the needs of their large populations.

In the coming years, the toilet paper market is expected to grow at a moderate pace, driven by rising populations and urbanization in developing countries. The increasing demand for environmentally friendly and sustainable products is expected to drive the demand for recycled toilet paper, which is a relatively untapped market. Additionally, the growing popularity of e-commerce platforms for grocery shopping is expected to increase the sales of toilet paper through online channels. Moreover, the increasing focus on hygiene and cleanliness is expected to drive the demand for high-quality toilet paper, which has a soft texture, high absorbency, and is free from harsh chemicals. This trend presents opportunities for premium toilet paper brands to gain market share from budget-oriented brands.




**The Toilet Paper market includes both wet and dry toilet paper.*

# INNOVATION AT WORK

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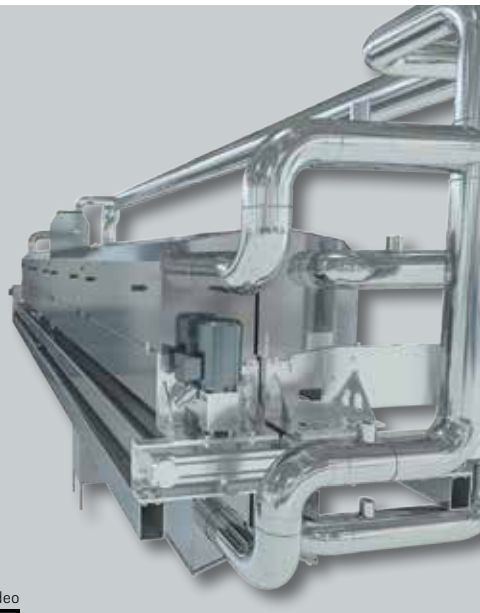

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# GLOBAL COMPARISON

## AMERICAS

In North America, the toilet paper market has seen a surge in demand due to increased hygiene awareness and panic buying during the pandemic. Similarly, in Central America, there's been a significant increase in demand for toilet paper due to heightened hygiene awareness and the necessity of stockpiling essential supplies during uncertain times. Meanwhile, South America continues to exhibit a strong demand for high-quality and environmentally friendly toilet paper, despite economic challenges.

- In 2024, the Toilet Paper market in the Americas is projected to generate a revenue of US$27.52bn: US$513.90m in Central America, US$20.87bn in North America, US$5.66bn in South America.
- This market is anticipated to experience an annual growth rate of 4.72% (CAGR 2024-2028): 4.84% in Central America, 4.84% in North America, 4.66% in South America.
- In terms of per capita figures, the revenue generated per person in the Americas is estimated to be US$27.06 in 2024: US$9.72 in Central America, US$40.89 in North America,
- Looking ahead, the volume of the Toilet Paper market is forecasted to reach 9.5bn kg units by 2028: 328.3m kg units in Central America, 5.4bn kg in North America, 3.5bn kg in South America.
- Additionally, a volume growth of 1.5% is projected for the year 2025: 2.1% in Central America, 1.2% in North America, 1.9% in South America.
- On average, individuals in the Americas are expected to consume 27.1kg units of Toilet Paper market in 2024: 9.7kg units in Central America, 40.9 kg units in North America, 13.7 kg units in South America.

## AUSTRALIA AND OCEANIA

The demand for eco-friendly toilet paper made from recycled materials is rapidly increasing in Australia & Oceania.

- In 2024, the revenue in the Toilet Paper market in Australia & Oceania is expected to reach US$1.21bn.
- It is forecasted to experience an annual growth rate of 4.26% (CAGR 2024-2028).
- In terms of per person revenues in 2024, it is anticipated to be US$27.79.
- By 2028, the volume in the Toilet Paper market is expected to reach 406.5m kg units.
- Additionally, there is an anticipated volume growth of 1.8% in 2025.
- The average volume per person in the Toilet Paper market is projected to be 27.8 kg units in 2024.

## EUROPE

The demand for eco-friendly toilet paper has surged in Europe, with consumers increasingly opting for biodegradable and recycled options.

- In 2024, the revenue in the Toilet Paper market in Europe is expected to reach US$20.85bn, US$3.93bn in Eastern Europe, US$1.15bn in Northern Europe, US$4.83bn in Southern Europe, US$10.94bn in Central & Western Europe.
- It is projected that the market will experience an annual growth rate of 4.35% (CAGR 2024-2028): 3.84% in Eastern Europe, 1.7% in Northern Europe, 4.23% in Southern Europe, 4.57% in Central & Western Europe.
- Considering the total population figures, in terms of per person revenue, it is anticipated to reach US$24.70 in 2024: US$16.52 in Eastern Europe, US$33.88 in Northern Europe, US$20.41 in Southern Europe, US$32.61 in Central & Western Europe.
- Looking ahead, the volume in the Toilet Paper market is estimated to reach 8.0bn kg units by 2028: 1,881.0m kg units in Eastern Europe, 393.9m kg units in Northern Europe, 2.0bn kg units in Southern Europe, 3.8bn kg units in Central & Western Europe.
- There will be a slight volume growth of 1.5% in 2025: 1.6% in Eastern Europe, 1.7% in Northern Europe, 1.3% in Southern Europe, 1.6% in Central & Western Europe.
- The average volume per person in Europe's Toilet Paper market is projected to be 24.7kg in 2024: 16.5kg units in Eastern Europe, US$1.15bn units in Northern Europe, 20.4kg in Southern Europe, 32.6kg units in Central & Western Europe.

## CARIBBEAN

The demand for eco-friendly toilet paper in the Caribbean has been steadily increasing, reflecting consumers' prioritization of sustainability and environmental consciousness.

- In 2024, the revenue generated in the Toilet Paper market in the Caribbean is expected to reach US$479.10m.
- It is projected that this market will experience an annual growth rate of -0.80% (CAGR 2024-2028).
- In terms of per capita figures, the revenue generated per person in 2024 is anticipated to be US$11.81.
- Looking ahead to 2028, it is expected that the volume of the Toilet Paper market will reach 214.9m kg units.
- Additionally, there is a projected volume growth of 1.4% in 2025.
- On average, each person in the Caribbean is expected to consume 11.8kg units of Toilet Paper market in 2024.

TOILET

## ASIA

In Japan, the demand for high-quality, eco-friendly toilet paper made from recycled materials is on the rise. Similarly, amidst growing concerns over hygiene and sanitation in Central Asia, there's an increasing demand for high-quality toilet paper. In Southern Asia, rapid growth is observed in the demand for eco-friendly toilet paper as consumers become more conscious about sustainability. Eastern Asia also witnesses a surge in demand for eco-friendly and biodegradable toilet paper, reflecting the region's growing emphasis on sustainability. Meanwhile, in Southeast Asia, the demand for toilet paper has significantly surged due to increasing population and urbanization. Conversely, in Western Asia, the demand for luxurious, scented toilet paper is on the rise as consumers seek to elevate their bathroom experience.

- In 2024, the revenue generated in the Toilet Paper market in Asia is expected to reach US$55.99bn: US$539.90m in Central Asia, US$13.46bn in Southern Asia, US$29.46bn in Eastern Asia, US$8.88bn in Southeast Asia, US$3.65bn in Western Asia.
- This market is projected to experience an annual growth rate of 6.55% (CAGR 2024-2028): 6.31% in Central Asia, 5.52% in Southern Asia, 7.80% in Eastern Asia, 4.82% in Southeast Asia, 4.06% in Western Asia.
- In terms of per person revenue, each individual in Asia is forecated to generate US$12.32 in the Toilet Paper market in 2024: US$6.81 in Central Asia, US$7.03 in Southern Asia, US$18.03 in Eastern Asia, US$12.82 in Southeast Asia, US$16.39 in Western Asia.
- Looking ahead to 2028, the volume of the Toilet Paper market is anticipated to reach 32.1bn kg units: 410.3m kg units in Central Asia, 7.8bn kg in Southern Asia, 18.0bn kg units in Eastern Asia, 4.3bn kg units in Southeast Asia, 1,623.0m kg units in Western Asia.
- Furthermore, the segment is expected to exhibit a volume growth rate of 4.9% in 2025: 3.2% in Central Asia, 4.4% in Southern Asia, 6.0% in Eastern Asia, 2.9% in Southeast Asia, 1.5% in Western Asia.
- On an individual level, the average volume per person in Asia's Toilet Paper market is projected to be 12.3 kg units in 2024: 6.8 kg units in Central Asia, 7.0 kg units in Southern Asia, 18.0 kg units in Eastern Asia, 12.8 kg units in Southeast Asia, 16.4 kg units in Western Asia.

## AFRICA

The demand for toilet paper in Africa has been steadily increasing due to the growing urban population and improved hygiene practices. Particularly in Central Africa, there has been a significant increase in demand for toilet paper due to improved sanitation facilities and growing awareness about hygiene practices. Similarly, Eastern Africa's toilet paper market is experiencing a surge in demand driven by increased urbanization and improving standards of living in the region. Despite the increasing popularity of bidets in many parts of the world, Southern Africa still heavily relies on traditional toilet paper for personal hygiene. In contrast, toilet paper sales in Western Africa have surged due to increased hygiene awareness and improved access to sanitation facilities.

- In 2024, the revenue in the Toilet Paper market in Africa is expected to reach US$8.20bn: US$537.20m in Central Africa, $1,689.00m in Eastern Africa, US$812.30m in Southern Africa, US$1.70bn in Northern Africa, US$3.46bn in Western Africa.
- The market is projected to grow annually by 8.08% (CAGR 2024-2028): 6.45% in Central Africa, 6.37% in Eastern Africa, 6.70% in Southern Africa, 5.17% in Northern Africa, 10.72% in Western Africa.
- In terms of per person revenue, each individual in Africa is expected to generate US$6.31 in 2024: US$5.57 in Central Africa, US$3.68 in Eastern Africa, US$11.60 in Southern Africa, US$6.53 in Northern Africa, US$8.36 in Western Africa.
- Looking ahead to 2028, it is anticipated that the volume of the Toilet Paper market in Africa will reach 4.6bn kg units: 427.2m kg units in Central Africa, 1,225.0m kg in Eastern Africa, 385.1m kg in Southern Africa, 1,232.0m kg units in Northern Africa, 1,373.0m kg units in Western Africa.
- There is an anticipated volume growth of 3.1% in 2025: 3.8% in Central Africa, 4.4% in Eastern Africa, 0.1% in Southern Africa, 2.6%. in Northern Africa, 3.1% in Western Africa.
- The average volume per person in the Toilet Paper market is forecasted to be 6.3 kg units in 2024: 5.6 kg units in Central Africa, 3.7 kg units in Eastern Africa, 11.6 kg units in Southern Africa, 6.5 kg units in Northern Africa, 8.4 kg units in Western Africa.

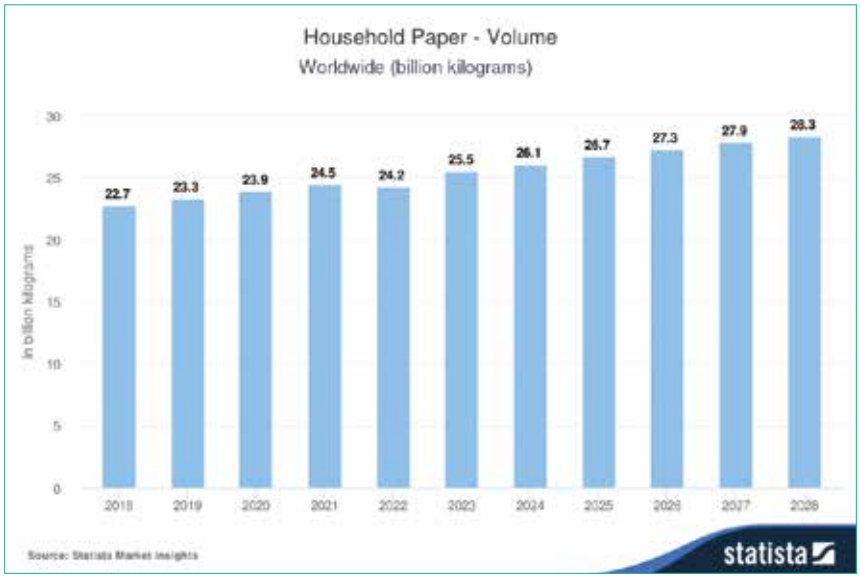
PAPER

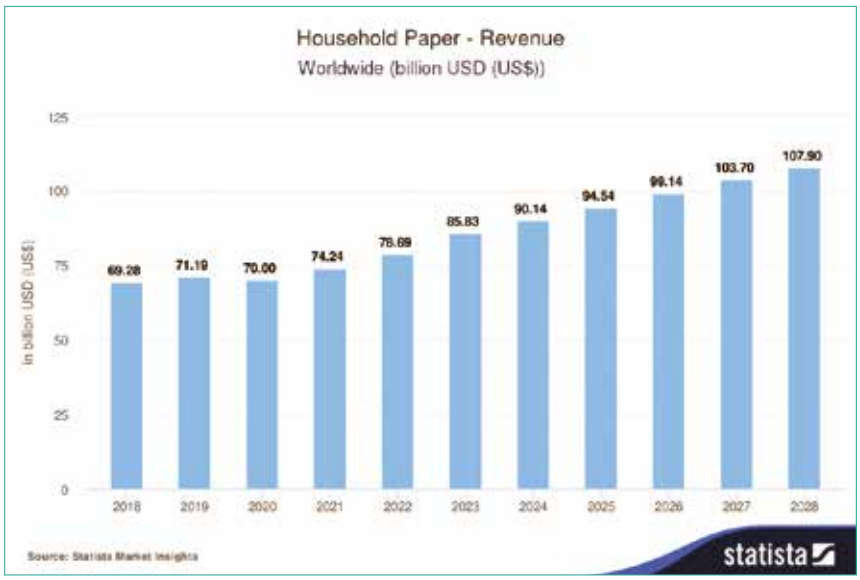
# HOUSEHOLD PAPER

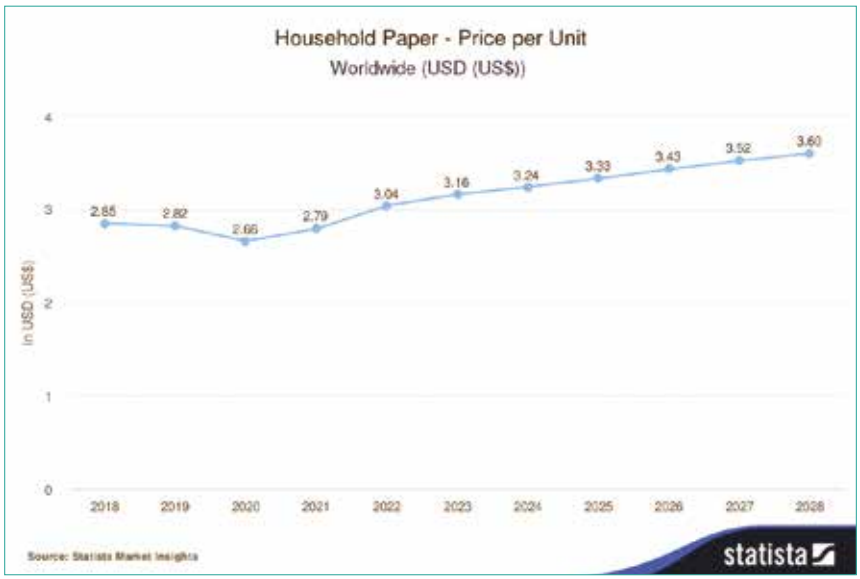
The global demand for household paper products is steadily rising, with countries like China and the United States leading the market.

- In 2024, the revenue in the Household Paper market* worldwide is expected to reach a staggering US$90.14bn.
- This market is projected to experience an annual growth rate of 4.60% (CAGR 2024-2028).
- When compared globally, the highest revenue is generated in China, reaching US$17,050m in 2024.
- Taking into account the total population figures, the per person revenue in 2024 is anticipated to be US$11.63.
- Looking ahead, by 2028, the volume in the Household Paper market is forecasted to reach 28.3bn kg units.
- Additionally, the segment is projected to demonstrate a volume growth of 2.3% in 2025.
- On average, each person is expected to consume 11.6kg units of Household Paper market in 2024.

The household paper market is shifting towards premium offerings as consumers increasingly prioritize high-quality, eco-friendly options due to mounting environmental concerns and a heightened preference for sustainability. Companies can capitalize on this trend by investing in eco-friendly alternatives, including products made from recycled materials and those manufactured using environmentally conscious processes. Another lucrative opportunity lies in innovating products to meet evolving consumer preferences, such as kitchen rolls with dispensers or more durable and absorbent table napkins. The growing emphasis on comfort and convenience is expected to drive demand for premium household paper products, positioning the market for steady growth fueled by the rising interest in convenient, hygienic, and sustainable solutions, as well as the expanding presence of e-commerce platforms.

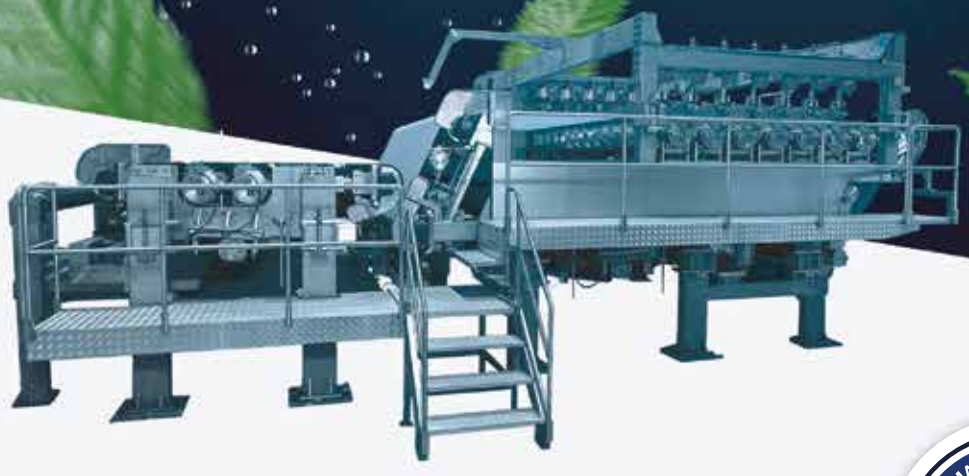



**The Household Paper market covers all kinds of tissue paper which are used for household care, including paper towels, table napkins, kitchen rolls, and tablecloths.*

# Remarkable Fiber Recovery



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GLOBAL COMPARISON

## AMERICAS

In the Americas, there is a rapid increase in demand for eco-friendly household paper products, fueled by growing consumer awareness of environmental sustainability and supported by government initiatives promoting sustainability. Additionally, the South American market holds significant importance in the Household Paper market, contributing significantly to its overall revenue and volume growth.

- In 2024, the revenue in the Household Paper market in Americas is expected to reach US$19.06bn: US$0.45bn in Central America, US$13.37bn in North America, US$4.83bn in South America.
- It is projected that the market will experience an annual growth rate of 4.18% (CAGR 2024-2028): 5.14% in Central America, 4.20% in North America, 4.36% in South America.
- Taking into account the total population figures, in 2024, each person in Americas is expected to generate US$18.74 in revenue in the Household Paper market: US$8.59 in Central America, US$26.20 in North America, US$11.68 in South America,
- By 2028, the volume in the Household Paper market is forecated to reach 5.8bn kg units: 184.4m kg units in Central America, 3.5bn kg units in North America, 1.9bn kg units in South America,
- Furthermore, a volume growth of 1.3% is anticipated in 2025: 2.2% in Central America, 1.0% in North America, 1.9% in South America,
- The average volume per person in the Household Paper market is projected to be 18.7 kg units in 2024 in Americas: 8.6 kg units in Central America, 26.2 kg units in North America, 11.7 kg units in South America.

## AUSTRALIA AND OCEANIA

The demand for eco-friendly household paper products is on the rise in Australia, driven by increased awareness of sustainability and environmental concerns.

- In 2024, the revenue in the Household Paper market in Australia & Oceania is expected to reach US$0.85bn.
- It is projected that the market will experience an annual growth rate of 4.15% (CAGR 2024-2028).
- In terms of per capita figures, the revenue generated per person is projected to be US$19.59 in 2024.
- By 2028, the volume in the Household Paper market is forecasted to reach 233.4m kg units.
- Additionally, a volume growth of 1.3% is anticipated in 2025.
- On average, each person in Australia & Oceania is expected to consume 19.6 kg units of Household Paper market in 2024.

## EUROPE

The European household paper market is witnessing a notable rise in demand for eco-friendly and sustainable products, driven by heightened environmental consciousness. Leading this trend is Germany, which offers a diverse array of such products.

- In 2024, the revenue generated in the Household Paper market in Europe is expected to reach US$16.60bn: US$3.24bn in Eastern Europe, US$0.81bn in Northern Europe, US$4.27bn in Southern Europe, US$8.28bn in Central & Western Europe,
- It is projected that the market will experience an annual growth rate of 3.61% (CAGR 2024-2028): 3.30% in Eastern Europe, 3.51% in Northern Europe, 3.92% in Southern Europe, 3.55% in Central & Western Europe.
- Taking into account the total population figures, per person revenue in Europe is anticipated to be US$19.67 in 2024: US$13.61 in Eastern Europe, US$23.88 in Northern Europe, US$18.05 in Southern Europe, US$24.69 in Central & Western Europe.
- By 2028, the volume of the Household Paper market is forecated to reach 4.1bn kg units: 1.0bn kg units in Eastern Europe, 194.6m kg units in Northern Europe, 1.1bn kg units in Southern Europe, 1.8bn kg units in Central & Western Europe.
- There will be a slight volume growth of 0.6% in 2025: 1.1% in Eastern Europe, 0.8% in Northern Europe, 0.7% in Southern Europe, 0.3% in Central & Western Europe.
- On average, each person is expected to consume 19.7kg units of household paper in Europe in 2024: 13.6 kg units in Eastern Europe, 23.9 kg units in Northern Europe, 18.1 kg units in Southern Europe, 24.7 kg units in Central & Western Europe.

## CARIBBEAN

The demand for household paper products in the Caribbean is increasing due to the rising disposable income and growing tourism industry.

- In the Caribbean, the revenue generated in the Household Paper market is projected to reach US$0.41bn in 2024.
- This market is expected to experience an annual growth rate of -0.62% (CAGR 2024-2028).
- In relation to the total population, the per person revenue is anticipated to be US$10.01 in 2024.
- Looking ahead, the volume in the Household Paper market is forecasted to reach 119.0m kg units by 2028.
- Moreover, there is a projected volume growth of 1.3% expected in 2025.
- In terms of average volume per person, it is expected to amount to 10.0 kg units in 2024 in the Household Paper market.

HOUSEHO

## ASIA

In Japan, there's a notable surge in demand for eco-friendly and sustainable household paper products. Central Asia is witnessing a rise in demand for premium-quality items, influenced by growing disposable income and evolving consumer preferences. Southern Asia, particularly in countries like India and Bangladesh, is experiencing a rapid growth in demand for eco-friendly options, reflecting strong consumer preferences for sustainability. Moreover, in Eastern, Western, and Southeast Asia, the demand for environmentally friendly household paper products is steadily increasing, propelled by a growing awareness of environmental issues among consumers.

- The revenue in the Household Paper market in Asia is projected to reach US$46.40bn in 2024: US$0.48bn in Central Asia, US$13.63bn in Southern Asia, US$21.66bn in Eastern Asia, US$7.54bn in Southeast Asia, US$3.09bn in Western Asia.
- This market is expected to experience an annual growth rate of 4.59% (CAGR 2024-2028): 6.17% in Central Asia, 4.19% in Southern Asia, 4.94% in Eastern Asia, 4.58% in Southeast Asia, 2.6% in Southeast Asia, 3.60% in Western Asia.
- In terms of per person revenues, the Household Paper market in Asia is estimated to generate US$10.21 per individual in 2024: US$6.00 in Central Asia, US$7.11 in Southern Asia, US$13.25 in Eastern Asia, US$10.89 in Southeast Asia, US$13.88 in Western Asia.
- Looking ahead, the volume in the Household Paper market is anticipated to reach 15.6bn kg by 2028: 229.4m kg units in Central Asia, 4.6bn kg units in Southern Asia, 7.5bn kg units in Eastern Asia, 2.4bn kg units in Southeast Asia, 0.9bn kg units in Western Asia.
- Additionally, the segment is expected to exhibit a volume growth of 3.0% in 2025: 3.2% in Central Asia, 3.0% in Southern Asia, 3.3% in Eastern Asia, 2.6% in Southeast Asia, 1.3% in Western Asia.
- On average, each person in Asia is projected to consume 10.2kg units of Household Paper market in 2024: 6.0kg units in Central Asia, 7.1kg units in Southern Asia, 13.2kg units in Eastern Asia, 10.9kg units in Southeast Asia, 13.9kg units in Western Asia.

## AFRICA

The demand for household paper products in South Africa is experiencing steady growth, attributed to the expanding middle-class population and shifting consumer preferences. Similarly, in Central and Southern Africa, increasing urbanization and improving living standards are driving up the demand for household paper products. Eastern Africa has seen a consistent rise in the demand for eco-friendly options, particularly in countries like Kenya and Tanzania, where consumers strongly favor sustainable choices. Northern Africa is also witnessing a steady increase in demand, propelled by population growth and rising disposable incomes. Furthermore, Western Africa is experiencing a similar trend, with a growing middle class and urbanization contributing to the rising demand for household paper products.

- In 2024, the revenue in the Household Paper market in Africa is expected to reach US$7.24bn: US$0.47bn in Central Africa, US$1.47bn in Eastern Africa, US$0.71bn in Southern Africa, US$1.50bn in Northern Africa, US$3.07bn in Western Africa.
- It is projected that the market will experience an annual growth rate of 7.95% from 2024 to 2028 (CAGR 2024-2028): 6.30% in Central Africa, 5.92% in Eastern Africa, 6.40% in Southern Africa, 5.10% in Northern Africa, 10.82% in Western Africa.
- In terms of per capita income, the revenue generated per person in Africa's Household Paper market is anticipated to be US$5.57 in 2024: US$4.92 in Central Africa, US$3.21 in Eastern Africa, US$10.20 in Southern Africa, US$5.76 in Northern Africa, US$7.42 in Western Africa.
- Looking ahead to 2028, the volume in the Household Paper market is forecasted to reach 2.6bn kg units: 237.2m kg units in Central Africa, 0.7bn kg units in Eastern Africa, 217.1m kg units in Southern Africa, 0.7bn kg units in Northern Africa, 0.8bn kg units in Western Africa.
- Furthermore, a volume growth of 3.0% units is projected for 2025: 3.8% in Central Africa, 4.1% in Eastern Africa, 0.3% in Southern Africa, 2.5% in Northern Africa, 3.1% in Western Africa.
- On average, each person in Africa is expected to consume 5.6kg units of Household Paper market in 2024: 4.9kg units in Central Africa, 3.2kg in Eastern Africa, 10.2kg units in Southern Africa, 5.8kg units in Northern Africa, 7.4kg units in Western Africa.

LD PAPER

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# TISSUE PRODUCERS IN THE MIDDLE EAST AND NORTH AFRICA 2024

| Country | Company | Tissue Machine | Operating Speed (m/min) | Width (m) | Production Capacity (tons/year) | Supplier | Startup Year |
|---|---|---|---|---|---|---|---|
| **Lebanon** | Unipak Tissue Mill | PM1 | 1,500 | 2.7 | 22,000 | Beloit | 1995 |
| | Sanitary Paper Co - Mimosa | PM4<br>PM5 | 700<br>850 | 2.3<br>2.1 | 7,000<br>8,000 | Toscotec<br>Toscotec | 1992<br>1995 |
| **Jordan** | Al Keena Hygienic Paper Mill | PM2 | 1,650 | 3.67 | 30,000 | Voith | 1995 |
| | Al Snobar Hygienic Paper Mill | PM4 | 2,000 | 5.4 | 54,000 | Valmet | 2007 |
| **Syria** | Oriental Paper Manufacturing | PM1 | 600 | 2.7 | 9,000 | Recard | 1995 |
| | Lanatex | PM2 | 1,100 | 2.72 | 17,000 | Over Meccanica | 2000 |
| | Dinatex Paper Manufacturing | PM3 | 1,800 | 2.72 | 28,000 | Over Meccanica | 2007 |
| **UAE** | Abu Dhabi National Paper Mill | PM1 | 1,900 | 2.77 | 28,000 | Over Meccanica | 2002 |
| | | PM2 | 2,000 | 3.62 | 35,000 | Over Meccanica | 2007 |
| | | PM3 | 2,000 | 2.8 | 27,000 | Valmet | 2015 |
| | Crown Paper Mill Ltd FZC | PM1 | 1,100 | 1.86 | 11,000 | Beloit | 2000 |
| | | PM2 | 1,700 | 2.75 | 24,000 | PMT | 2007 |
| | | PM3 | 2,000 | 5.6 | 60,000 | Valmet | 2019 |
| | Emirates Fine Tissue Industry | PM1 | 700 | 2.7 | 8,000 | Over Meccanica | 2016 |
| | Queenex Hygiene Paper Mfg. | PM1 | 1,800 | 2.85 | 28,000 | Over Meccanica | 2012 |
| | Star Paper Mill | PM1 | 1,700 | 2.85 | 30,000 | Recard | 2019 |
| | Al Nakheel Paper Mill | PM5 | 2,000 | 5.4 | 54,000 | Valmet | 2018 |
| **Kuwait** | Gulf Paper Manufacturing Co. | PM2 | 1200 | 2.25 | 12,500 | Carcano | 1982 |

| Country | Company | Tissue Machine | Operating Speed (m/min) | Width (m) | Production Capacity (tons/year) | Supplier | Startup Year |
|---|---|---|---|---|---|---|---|
| **Iraq** | Alsindyian | PM1 | 1,200 | 2.7 | 20,000 | Toscotec | 2023 |
| **Qatar** | Zain Paper Industry | PM1 | 2,000 | 2.7 | 30,000 | Overmade | 2023 |
| **Bahrain** | Olayan Kimberly Clark | PM1 | 1,250 | 2.6 | 14,000 | Y.K. | 1990 |
| | | PM2 | 2,000 | 2.8 | 28,000 | Voith | 2011 |
| **Iran** | Pars Hayat Saglik Urunleri S.H | PM1 | 2,200 | 5.6 | 70,000 | Valmet | 2013 |
| | Zarrin Barge Persia Paper Industry | PM1 | 2,000 | 5.6 | 60,000 | Valmet | 2014 |
| | | PM2 | 2,000 | 5.6 | 60,000 | Valmet | 2018 |
| | Harir Khuzestan Co. | PM1 | 1,000 | 2.7 | 15,000 | Voith | 1995 |
| | Latif Paper Co. | PM2 | 1,400 | 2.7 | 18,000 | Andritz | 2010 |
| | Aryan Cellulose Sanat Co. | PM1 | 500 | 2.8 | 10,000 | - | 2014 |
| | Golpoune Pars Industrial Co. | PM1 | 1,400 | 2.75 | 18,000 | Over Meccanica | 2014 |
| **Tunisia** | Tunisie Ouate | PM2 | 1,100 | 2.7 | 16,500 | PMT | 2002 |
| | | PM3 | 1,600 | 2.76 | 26,000 | GapCon | 2014 |
| | Azur Papier | PM1 | 1,500 | 2.75 | 22,000 | Recard | 2013 |
| | | PM2 | 1,800 | 2.75 | 28,000 | Recard | 2018 |
| **Morocco** | SIPAT | PM1 | 600 | 1.8 | 5,000 | Toscotec | 1978 |
| | | PM2 | 1,300 | 2.75 | 16,000 | Toscotec | 1995 |
| | Jeesr Industries | PM1 | 2,000 | 2.8 | 30,000 | Valmet | 2013 |
| **Algeria** | Tonic Emballage Industrie | PM1 | 1,500 | 2.7 | 20,000 | Valmet | 2006 |
| | Faderco SPA | PM1 | 2,000 | 2.8 | 30,000 | Valmet | 2015 |
| | | PM2 | 2,000 | 2.8 | 30,000 | Valmet | 2020 |
| | Africaine Paper Mills | PM1 | 2,000 | 2.85 | 30,000 | Andritz | 2019 |
| **Egypt** | Al-Sindian Paper Mill | PM1 | 1,600 | 2.25 | 17,000 | Valmet | 1991 |
| | | PM3 | 2,000 | 5.4 | 54,000 | Valmet | 2005 |
| | Al Zeina Tissue Mill | PM1 | 2,000 | 2.75 | 30,000 | PMT | 2008 |
| | Alex Converta Company | PM1 | 1,500 | 2.85 | 24,000 | Recard | 2018 |
| | Carmen Tissues | PM1 | 800 | 1.7 | 6,000 | ACelli | 1995 |
| | Interstate Paper Industries | PM1 | 1,800 | 2.86 | 25,500 | ACelli | 2008 |
| | | PM2 | 1,800 | 2.86 | 25,500 | ACelli | 2010 |
| | | PM3 | 1,000 | 2.7 | 12,500 | Recard | 2012 |
| | Hayat Kimya Group | PM6 | 2,200 | 5.6 | 70,000 | Valmet | 2017 |
| | Mediterranean Tissue Mill | PM1 | 1,500 | 1.8 | 15,000 | Beloit | 2011 |
| | | PM2 | 1,400 | 2.75 | 25,000 | Over Meccanica | 2014 |

| Country | Company | Tissue Machine | Operating Speed (m/min) | Width (m) | Production Capacity (tons/year) | Supplier | Startup Year |
|---|---|---|---|---|---|---|---|
| **Turkey** | Aktül Kagit Uretim Pazarlama A.S. | PM1 | 2,200 | 5.6 | 60,000 | Valmet | 2011 |
| | | PM2 | 2,200 | 5.6 | 60,000 | Valmet | 2016 |
| | | PM3 | 2,200 | 5.6 | 70,000 | Valmet | 2022 |
| | Hayat Kimya San ve Tic. A.S. | PM1 | 2,200 | 5.55 | 70,000 | PMT & Valmet | 2006 |
| | | PM2 | 2,200 | 5.6 | 70,000 | Valmet | 2010 |
| | | PM5 | 2,200 | 5.6 | 70,000 | Valmet | 2015 |
| | | PM8 | 2,200 | 5.6 | 70,000 | Valmet | 2021 |
| | Lila Kagit San. ve Ti. A.S. | PM1 | 2,200 | 5.64 | 70,000 | Valmet | 2007 |
| | | PM2 | 2,200 | 5.64 | 70,000 | Valmet | 2012 |
| | | PM3 | 2,200 | 5.64 | 70,000 | Valmet | 2020 |
| | | PM4 | 2,200 | 5.64 | 70,000 | Valmet | 2021 |
| | Ipek Kagit Tissue / Eczacibasi | PM1 | 900 | 2.2 | 15,000 | ER-WE-PA | 1970 |
| | | PM2 | 1,600 | 2.7 | 35,000 | Beloit | 1991 |
| | | PM3 | 2,000 | 5.4 | 60,000 | Beloit | 2000 |
| | | PM4 | 2,200 | 5.6 | 70,000 | Valmet | 2015 |
| | | PM5 | 2,200 | 5.6 | 70,000 | Valmet | 2022 |
| | Levent Kagit San. ve Tic. A.S. | PM2 | 1,400 | 4.40 | 24,000 | Voith | 2002 |
| | Parteks Kagit | PM2 | 900 | 2.75 | 6,000 | Beloit | 1996 |
| | | PM3 | 1,600 | 2.85 | 26,000 | Toscotec | 2014 |
| | Europap Tezol Kagit San ve Tic | PM1 | 1,600 | 2.85 | 25,000 | Recard | 2016 |
| | | PM2 | 1,800 | 2.85 | 30,000 | Recard | 2009 |
| | | PM3 | 2,000 | 2.85 | 30,000 | Valmet | 2015 |
| | | PM4 | 2,100 | 2.92 | 40,000 | Toscotec | 2023 |
| | Viking Kagit ve Seluloz A.S. | PM1 | 550 | 4.5 | 15,000 | ER-WE-PA | 1971 |
| | | PM2 | 1,500 | 2.76 | 27,000 | Valmet | 1999 |
| | Essel Kagit | PM1 | 1,600 | 2.8 | 25,000 | ACelli | 2006 |
| | | PM2 | 1,800 | 3.1 | 32,000 | Recard | 2015 |
| | | PM3 | 2,000 | 5.7 | 90,000 | Toscotec | 2021 |
| | Eka Kagit | PM2 | 1,500 | 2.85 | 25,000 | Over/ABK | 2014 |
| | | PM3 | 2,000 | 2.85 | 30,000 | Over | 2016 |
| **KSA** | Saudi Paper Manufacturing | PM1 | 1,700 | 2.75 | 21,000 | Recard | 1992 |
| | | PM2 | 2,100 | 2.85 | 30,000 | Toscotec | 2023 |
| | | PM3 | 1,600 | 3.6 | 24,000 | Recard | 2001 |
| | | PM4 | 2,200 | 5.4 | 55,000 | Valmet | 2008 |
| | | PM5 | 2,200 | 5.6 | 60,000 | Toscotec | 2024 |
| | Al Faris Paper Mill | PM1 | 2,000 | 2.85 | 28,000 | Papcel | 2019 |
| | Juthor Paper Manufacturing | PM1 | 2,200 | 5.6 | 60,000 | Toscotec | 2023 |

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ANDRITZ

# GLOBAL NONWOVENS OUTLOOK

Global demand for nonwovens is forecast to increase 3.1% per year to 14.1 million metric tons in 2027. Improving standards of living will boost demand for nonwovens used in consumer and medical products, with expanding manufacturing activity further driving gains in a variety of durable goods applications.

**Elliott Woo**,
Global Industry Analyst,
Freedonia Group

Market value is expected to rise 3.4% per year to $63.1 billion in 2027, a deceleration from the prior five-year period as price growth moderates following above-average increases from 2020 to 2022 that resulted from:

- supply chain disruptions associated with the pandemic, as producers faced unreliable logistics and inconsistent raw materials supply.
- surging demand for certain nonwoven-inclusive products, most notably medical masks.
- a spike in the prices of oil and petroleum products following the 2022 onset of the Russia-Ukraine war.

Asia/Pacific is expected to post the largest gains, rising to half of the world market in 2027. The region represents a somewhat smaller share of the total by value than by weight, reflecting relatively low-price levels in many lower-income countries. Growth will be driven by expansion in the region's lower-income countries:

- Improving standards of living will boost demand for and production of wipes and personal hygiene products.
- Development of regional manufacturing industries will support sales in applications like filtration, motor vehicles, and electrical and electronic equipment.

North America and Western Europe will continue to be important outlets for higher-end nonwovens and contribute to large markets for these products (in value terms). However, growth will be restrained by market maturity in both regions. Eastern Europe holds stronger growth prospects, as demand will be boosted by expansion of manufacturing industries throughout the region.

Africa/Mideast and Central and South America will remain among the world's smallest regional markets for nonwovens in 2027. Both regions have underdeveloped manufacturing sectors, with limited financial flexibility reducing average price levels and further restraining the market size by value.

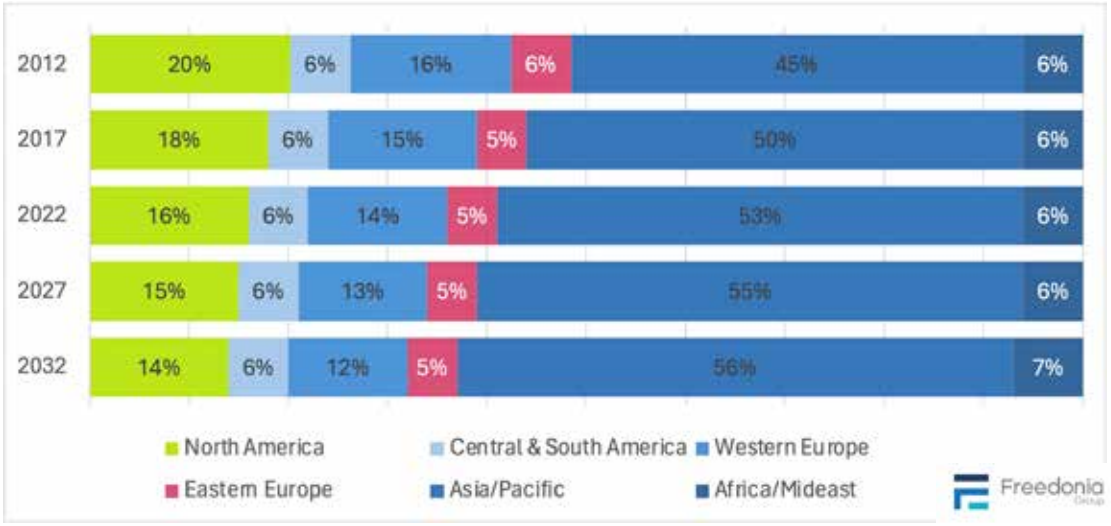


Figure 1: Global Nonwoven demand share by region, 2012, 2017, 2022, 2027, 2032 (thousand metric tons)

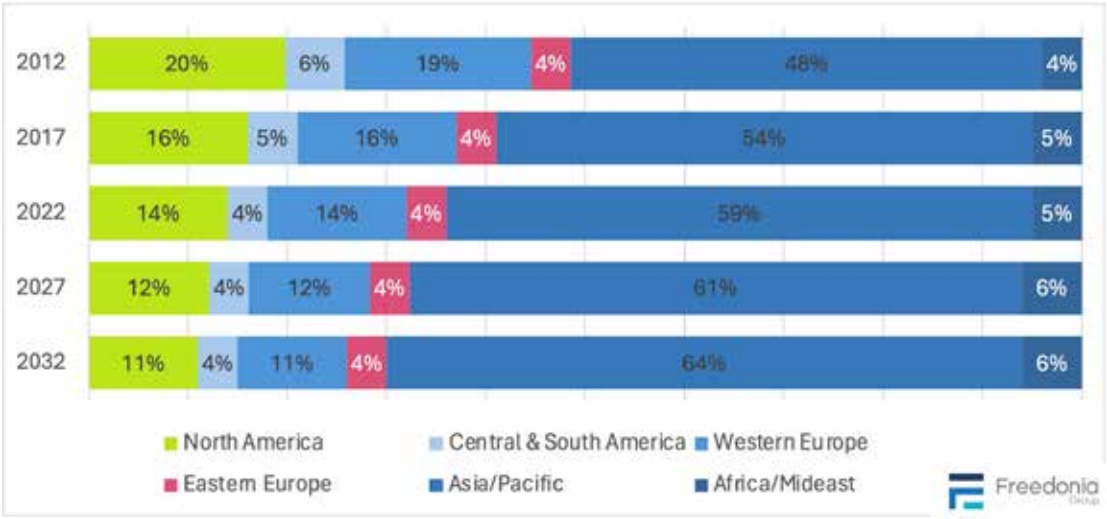


Figure 2: Global Nonwoven production share by region, 2012, 2017, 2022, 2027, 2032 (thousand metric tons)

### Personal hygiene market outlook

The personal hygiene market includes:

- infant diapers and training pants
- feminine hygiene products
- adult incontinence products

Nonwovens typically make up large portions of these products due to their use as absorbent core materials, cover stock, and backings. Personal hygiene products used in medical settings (e.g., patient care incontinence products) are included in this category.

Demand for personal hygiene end-use products is influenced by population changes in certain demographics:

- infants and toddlers (diapers and training pants)
- women aged 15-49 (feminine hygiene products)
- people aged 65 and over (adult incontinence products)

Global demand for nonwovens in the personal hygiene market is forecast to increase 1.8% per year to 2.3 million metric tons in 2027. Africa/Mideast was the second smallest market for these products in 2022, but the region is expected to post the fastest gains and account for 23% of global demand growth between 2022 and 2027.

This growth will be fueled by:

- a high birthrate, which will contribute to growth in the infant and toddler population.
- improving medical care and standards of living, which will drive rapid gains in the elderly population.
- rising income levels, which will allow for greater penetration in all segments.

The Asia/Pacific region will remain the largest outlet for personal hygiene nonwovens, accounting for 43% of the global total in 2027. However, gains will not be particularly fast, due to:

- a steep decline in the Chinese birthrate during the COVID-19 pandemic, which will continue to restrain demand in the country's infant diapers and training pants market.
- flat-to-declining populations in Japan, South Korea, and Taiwan

Nevertheless, population growth and improving standards of living offer opportunities in India and Southeast Asia. In addition, rising production for export in China will somewhat offset demographic-related weakness in that country's domestic market.

In Europe, demand growth will be restrained by market maturity in Western Europe and a shrinking population in Eastern Europe. North

America's market is also mature, but a slightly better outlook for population growth in the US offers some opportunities for gains. Population growth and rising consumer spending levels will likewise allow for demand gains in Central and South America.

Demand for nonwovens used in adult incontinence products will grow fastest globally through 2027. This will largely be driven by demographic changes worldwide, with growth in the elderly population supporting gains even in mature high-income markets.

As the personal hygiene market is the largest and is well established, participation by nonwovens producers is widespread. Major suppliers to the global personal hygiene nonwovens market include:

- Évora (via Fitesa)
- Fibertex Personal Care (Schouw)
- First Quality Enterprises
- Freudenberg
- Kimberly-Clark
- Suominen

**Table 1: Global Personal Hygiene Nonwovens Demand by Region & Product Type, 2012, 2017, 2022, 2027, & 2032 (thousand metric tons & million square meters)**

| | | | | | | % Compound Annual Growth | |
|---|---|---|---|---|---|---|---|
| Item | 2012 | 2017 | 2022 | 2027 | 2032 | 17-22 | 22-27 |
| Global Nonwovens Demand (000 m tons) | 7865 | 9990 | 12050 | 14050 | 16200 | 3.8% | 3.1% |
| % personal hygiene | 18.7 | 17.6 | 17.5 | 16.4 | 15.5 | -0.1% | -1.3% |
| Global Personal Hygiene Nonwovens (000 mt) | 1467 | 1760 | 2110 | 2305 | 2510 | 3.7% | 1.8% |
| **By Region:** | | | | | | | |
| North America | 268 | 280 | 296 | 321 | 340 | 1.1% | 1.6% |
| Central & South America | 169 | 237 | 271 | 297 | 319 | 2.7% | 1.8% |
| Western Europe | 244 | 250 | 254 | 258 | 263 | 0.3% | 0.3% |
| Eastern Europe | 130 | 139 | 151 | 158 | 156 | 1.7% | 0.9% |
| Asia/Pacific | 534 | 684 | 909 | 998 | 1115 | 5.9% | 1.9% |
| Africa/Mideast | 122 | 170 | 229 | 273 | 317 | 6.1% | 3.6% |
| **By Product Type:** | | | | | | | |
| Infant Diapers & Training Pants | 873 | 1039 | 1213 | 1295 | 1395 | 3.1% | 1.3% |
| Feminine Hygiene Products | 400 | 479 | 604 | 662 | 706 | 4.7% | 1.9% |
| Adult Incontinence Products | 194 | 242 | 293 | 348 | 409 | 3.9% | 3.5% |
| grams/square meter | 24.1 | 22.5 | 23.2 | 23.5 | 23.7 | 0.6% | 0.3% |
| Global Personal Hygiene Nonwovens (mil sq m) | 60815 | 78375 | 90935 | 97905 | 105830 | 3.0% | 1.5% |

Source: Freedonia Group

**Table 2: Global Personal Hygiene Nonwovens Demand by Region & Product Type, 2019 – 2026 (thousand metric tons & million square meters)**

| Item | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 |
|---|---|---|---|---|---|---|---|---|
| Global Nonwovens Demand (000 m tons) | 10810 | 10960 | 11610 | 12050 | 12350 | 12690 | 13110 | 13570 |
| % personal hygiene | 17.5 | 18.0 | 17.6 | 17.5 | 17.3 | 17.0 | 16.6 | 16.5 |
| Global Personal Hygiene Nonwovens (000 mt) | 1890 | 1971 | 2044 | 2110 | 2135 | 2156 | 2182 | 2241 |
| **By Region:** | | | | | | | | |
| North America | 284 | 287 | 292 | 296 | 301 | 305 | 309 | 316 |
| Central & South America | 251 | 257 | 265 | 271 | 274 | 280 | 284 | 291 |
| Western Europe | 248 | 251 | 252 | 254 | 255 | 252 | 255 | 255 |
| Eastern Europe | 145 | 145 | 150 | 151 | 153 | 156 | 156 | 155 |
| Asia/Pacific | 771 | 826 | 868 | 909 | 915 | 918 | 923 | 961 |
| Africa/Mideast | 191 | 205 | 217 | 229 | 237 | 245 | 255 | 263 |
| **By Product Type:** | | | | | | | | |
| Infant Diapers & Training Pants | 1114 | 1159 | 1189 | 1213 | 1219 | 1219 | 1222 | 1259 |
| Feminine Hygiene Products | 517 | 542 | 575 | 604 | 614 | 626 | 635 | 648 |
| Adult Incontinence Products | 259 | 270 | 280 | 293 | 302 | 311 | 325 | 334 |
| grams/square meter | 23.0 | 23.0 | 23.2 | 23.2 | 23.4 | 23.2 | 23.4 | 23.5 |
| Global Personal Hygiene Nonwovens (mil sq m) | 82325 | 85670 | 88065 | 90935 | 91160 | 92850 | 93155 | 95350 |

Source: Freedonia Group

### Wipes market outlook

The wipes market encompasses a broad range of disposable products for both consumer and industrial/ institutional use, including:

- baby wipes
- facial wipes
- moist towelettes and other hand wipes
- moist toilet tissue
- disinfectant surface-cleaning wipes
- floor-cleaning wipes
- manufacturing clean-up wipers
- foodservice wipes
- healthcare wipes

Wipes used in medical settings (e.g., patient care wipes, surface-disinfectant wipes) are also included in this category.

Global demand for nonwovens in wipes is forecasted to increase 3.3% per year to reach 2.0 million metric tons in 2027. Growth will be supported by ongoing increases in market penetration as global incomes rise.

Wipes continue to find increased use due to their convenience relative to traditional alternatives (e.g., reusable cloth, paper towels) and wide variety of applications (including personal care, household, industrial, and institutional uses). Wipes generally have many desirable performance characteristics:

- They typically contain cleansers, disinfectants, polishes, and other substances, thereby circumventing the need for multiple products (e.g., soap and a washcloth) to perform a single task.
- Wet iterations are pre-moistened and do not require additional water (which is especially useful for away-from-home personal care).
- They help to contain pathogens by being discarded after use – particularly favorable in healthcare applications, where concern over healthcare associated infections (HAIs) requires effective disinfection.

The wipes market was heavily impacted by the COVID-19 pandemic, although demand trends differed significantly by application. In wealthier countries, consumer demand for wipes surged during the pandemic because of both increased attention to sanitation and greater time spent at home.

**Table 3: Global Wipes Nonwovens Demand by Region, 2012, 2017, 2022, 2027, & 2032 (thousand metric tons & million square meters)**

| | | | | | | % Compound Annual Growth | |
|---|---|---|---|---|---|---|---|
| Item | 2012 | 2017 | 2022 | 2027 | 2032 | 17-22 | 22-27 |
| Global Nonwovens Demand (000 m tons) | 7865 | 9990 | 12050 | 14050 | 16200 | 3.8% | 3.1% |
| % wipes | 14.1 | 14.6 | 14.4 | 14.6 | 14.9 | -0.3% | 0.3% |
| Global Wipes Nonwovens Demand (000 mt) | 1108 | 1459 | 1740 | 2045 | 2420 | 3.6% | 3.3% |
| North America | 398 | 449 | 504 | 529 | 570 | 2.3% | 1.0% |
| Central & South America | 50 | 59 | 68 | 78 | 93 | 2.9% | 2.8% |
| Western Europe | 237 | 264 | 274 | 282 | 296 | 0.7% | 0.6% |
| Eastern Europe | 36 | 49 | 56 | 63 | 70 | 2.7% | 2.4% |
| Asia/Pacific | 355 | 598 | 787 | 1035 | 1323 | 5.6% | 5.6% |
| Africa/Mideast | 32 | 40 | 51 | 58 | 68 | 5.0% | 2.6% |
| grams/square meter | 58.2 | 60.0 | 61.5 | 63.6 | 65.9 | 0.5% | 0.7% |
| Global Wipes Nonwovens Demand (mil sq m) | 19035 | 24330 | 28315 | 32130 | 36725 | 3.1% | 2.6% |

Source: Freedonia Group

“Global demand for nonwovens in wipes is forecasted to increase 3.3% per year to 2.0 million metric tons in 2027.”

Conversely, industrial and institutional demand for wipes fell:

- Reduced manufacturing activity in many countries tamped down industrial wipes demand in 2020, with particularly strong losses for wipes used in motor vehicle manufacturing.
- Restaurant closures and reduced use of non-emergency medical facilities hampered demand for wipes despite greater emphasis on cleaning and sanitation.

In the aggregate, global demand for nonwovens in the wipes market declined in 2020, returned to growth in 2021, and recovered to well above the 2019 level in 2022. Wealthier countries in North America and Western Europe have limited remaining recovery potential, and they are largely projected to post sluggish growth through 2027. However, greater consumer familiarity with wipes is expected to precipitate higher demand relative to pre-pandemic levels.

Stronger gains for wipes nonwovens are expected in the Asia/Pacific region, which will account for 81% of global demand gains between 2022 and 2027. As China's middle class continues expanding, an increasing share of the population is forecast to begin using wipes. In addition, Asian manufacturers are expected to achieve gains associated with greater manufacturing of wipes for export.

Major producers of nonwovens for the wipes market include:

- Berry Global
- First Quality Enterprises
- Kimberly-Clark
- Suominen

> "Asia/Pacific region, will account for 81% of global demand gains between 2022 and 2027."

**Table 4: Annual Global Wipes Nonwovens Demand by Region, 2019 – 2026 (thousand metric tons & million square meters)**

| Item | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 |
|---|---|---|---|---|---|---|---|---|
| Global Nonwovens Demand (000 mt) | 10810 | 10960 | 11610 | 12050 | 12350 | 12690 | 13110 | 13570 |
| % wipes | 15.0 | 14.2 | 13.9 | 14.4 | 14.5 | 14.6 | 14.6 | 14.5 |
| Global Wipes Nonwovens (000 mt) | 1622 | 1557 | 1610 | 1740 | 1793 | 1852 | 1911 | 1970 |
| North America | 478 | 457 | 468 | 504 | 507 | 509 | 515 | 519 |
| Central & South America | 62 | 57 | 60 | 68 | 69 | 71 | 73 | 75 |
| Western Europe | 279 | 254 | 252 | 274 | 272 | 277 | 278 | 280 |
| Eastern Europe | 55 | 53 | 53 | 56 | 56 | 57 | 60 | 60 |
| Asia/Pacific | 705 | 693 | 733 | 787 | 834 | 881 | 929 | 979 |
| Africa/Mideast | 43 | 43 | 44 | 51 | 55 | 57 | 56 | 57 |
| grams/square meter | 60.3 | 61.2 | 61.2 | 61.5 | 62.0 | 62.3 | 63.0 | 63.4 |
| Global Wipes Nonwovens (mil sq m) | 26890 | 25450 | 26295 | 28315 | 28920 | 29730 | 30350 | 31095 |

Source: Freedonia Group

**For more details about the Global Nonwovens report visit Freedonia Group website: https://www.freedoniagroup.com/industry-study/global-nonwovens**

# PAPER WRAPPING: AN EMERGING TREND

SENNING, a subsidiary of the German OPTIMA group, is a renowned supplier of wrapping machinery for napkins, hand towels, facials, and handkerchiefs. “We are receiving more and more inquiries for paper wrapping solutions”, says SENNING’s Senior Sales Manager Christoph Fahrenholz. “While this trend is not entirely new, the landscape for technical solutions has notably expanded. Over the past decades, requests for paper wrapping were already surfacing, but today, we offer a wide range of machinery and materials solutions to meet these demands.”

Senning SE 660 – run filmic packaging in the forenoon and paper packaging in the afternoon.

### Innovative hot melt application system

One of the options offered by SENNING is a stand-alone solution equipped with a hot melt application system. In this setup, an upstream unit applies precise hot melt points on standard wrapping paper. The hot melt is heated in a metal container and then applied via spray nozzles onto defined points on the paper. This high-performing unit features a tank with strong heating capabilities for high-quality melt application. The hot melt system is connected to the wrapping machine and is managed through the wrapper’s control panel. The advantages of this solution include minimal consumption of gluing material, utilization of standard paper, and a streamlined machine design with minimum complexity, as the gluing solution is located outside the wrapping machine. These key success factors contribute to high production efficiency, reliability, uptime, increased throughput, and superior packaging quality – all fundamental aspects of SENNING’s offerings. Another advantage is the high flexibility offered, with short change-over times from paper to foil wrapping.

### Market shift

With increasing consumer demand for environmentally friendly packaging and the implementation of initiatives such as the EU Green Deal, along with new environmental regulations globally, the global economic landscape is shifting. SENNING, together with Austrian based speciality paper manufacturers, delfort AG, is responding to this shift in the market segment for wrapping packaging. delfort AG has developed a transparent lightweight, heat sealable paper, that allows for a seamless transition to a paper wrapping alternative solution compatible with SENNING machines.

### Speciality grade paper for modern production needs

To meet today's production requirements for excellent quality and high efficiency, a solution would be to use a specialty grade of paper designed to support these requirements on existing production assets. The delfort paper solution has a special heat-sealing layer on the paper surface, activated under temperature and pressure. Additionally, the paper design allows for excellent folding properties, thus ensuring that products are well packaged and of high aesthetic quality. Moreover, the high level of processability of delfort specialty paper is a significant advantage including that of low reject rates. For the operations manager and production team, the ease of use and wide application range due to flexible change between different wrapping materials is important.

### Enhancing product presentation and durability

In support of environmental sustainability, delfort has developed both a transparent and white heat sealable paper solution in low basis weights. These solutions are certified TÜV OK HOME Compostable and comply with the newly introduced EU-based CEPI recycling standards.

End-wrapped products, such as napkins and handkerchiefs, sometimes feature colourful prints or patterns for different seasons or celebrations. These attractive prints stand out when using delfort's transparent heat sealable paper wrapping solutions, capturing customer's attention. Other important characteristics of the final product include optimum protection, tear resistance, paper robustness, and surface water-repellent effect.

### Leading the transition to paper packaging

Retailers and brands partnering with us are at the forefront of the transition from plastic to paper packaging. Retailers appreciate the excellent communication potential offered by this premium paper solution. Due to limited resources, speed is key, and anyone can seize the opportunity to become a professional first mover in positive customer communication. As a result, initial trials are being discussed in major retail chains and with well-known brands.

SENNING and delfort AG approach and support different partners along the value chain. Clients have full flexibility, allowing the plant managers to select solutions according to production, quality, and capacity requirements, all running reliably and with high quality on SENNING's high-performance wrappers. The positive ecological profile, low carbon footprint, and low energy consumption of SENNING wrapper further underscore the advantages of paper wrapping.

Transparent heat-sealable specialty paper made by delfort for packaging tissues and napkins.


W+D's VENTUS-TI enables high-speed interfolding while optimizing operator experience for ease of use.

# REDEFINING END-TO-END TISSUE MANUFACTURING THROUGH COLLABORATIVE PARTNERSHIPS

## Prioritizing Efficiency, Innovation and Quality to Deliver Unmatched Results

**In an era defined by the tissue industry's pivotal shift towards sustainability, digitalization, and increasing consumer demands, efficiency, innovation, and quality are the cornerstones of success. BW Converting Solutions (BWCS) Hygiene Division harnesses the collective expertise of PCMC, W+D, STAX and Northern Engraving, to create a transformative shift in the tissue industry. This strategic collaboration presents manufacturers with an unparalleled combination of machinery and systems for tissue and hygiene converting, packaging, and folding to address every need, from end to end.**

### Rewinding: PCMC's Revolutionary PARAGON Winding Nest

PCMC's PARAGON winding nest has marked a leap forward in tissue manufacturing technology. Characterized by its patented center-surface design and a pivoting winding belt for unparalleled support throughout the rewinding process, it minimizes the destruction of bulk, reduces stress on the tissue web, and lowers the frequency of web breaks. The ability to precisely manage the formation and structure of the tissue roll during rewinding is key. Paragon's exceptional caliper retention and energy-efficient operation ensure that the thickness of the tissue remains consistent from the beginning to the end of the roll, enhancing its firmness. The equipment's ease of operation also differentiates it from others on the market, as it is less sensitive to paper variations and maintains consistent performance at high speeds.

Paragon also integrates with PCMC's INVISIBLE-O technology, a brand-new innovation that enables the production of high- and low-firmness coreless rolls, for both consumer and away-from-home products. This combination allows for seamless transition between core and no-core production, enabling manufacturers to adapt to diverse market demands with agility and responsiveness.

### Embossing: Northern Engraving's Digital Design Innovation

Embossing, the next step in the tissue's journey, enhances both functional and aesthetic aspects of the final product. This stage presents a significant opportunity for branding while ensuring the desired bulk, stretch, and softness of shelf-ready tissue rolls.

Northern Engraving's Embox software serves as a digital design platform accessible via laptop, tablet, or mobile device, giving manufacturers unprecedented control over the design process. The software offers a free, secure, and collaborative platform that places advanced embossing capabilities at manufacturers' fingertips. Built on a database developed over Northern Engraving's more-than-85-year history, Embox enables the design and implementation of thousands of unique patterns and branding opportunities. Once a pattern is selected, the software automatically proposes design solutions based on established parameters, including material, converting line figuration, and end-use application.

### Interfolding: W+D's Energy-Efficient Solution

Certain hygiene products, like folded facial tissue and hand towels, require a unique folding solution. The new W+D VENTUS-TI interfolder high-speed production line was designed with energy-saving features that optimize production while minimizing environmental impact.
VENTUS-TI features a quick cut-off length changeover and is capable of producing multiple product options within a short time. High efficiency and ease of operation and maintenance are achieved due to its compact layout, unique design and user-friendly SmartTouch© HMI.

### Bundling and Wrapping: STAX's Versatile Packaging Solution

Tissue packaging involves thoughtful engineering and planning to maintain product integrity during the shipping process, which is where STAX comes in. MAXIMA is an all-in-one packaging solution that integrates into the VENTUS-TI line. MAXIMA is capable of banding in foil and paper as well as four sides foil wrapping of towels or napkin stack, reaching the speed more than 100 packs/min. Folded tissue wrapper MAXIMA is extremely easy to use and is fully servo driven, with features including continuous product feeding, continuous foil/paper feeding, a spiral rotary knife, and spring loaded infeed pushers.

### A Unified Approach to Manufacturing Excellence

By harnessing the synergies within the BWCS Hygiene Division, manufacturers can navigate the complexities of tissue manufacturing with confidence, secure in the knowledge that they are backed by industry-leading solutions tailored to their needs. As the industry evolves, BWCS remains steadfast in its commitment to delivering innovative, sustainable, and customer-centric solutions, shaping the future of tissue manufacturing worldwide.

Experience unmatched simplicity, productivity, and product quality with the innovative PARAGON winding nest subsystems.

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## 04 – 06 JUNE 2024

SMARTVILLAGE BOGENHAUS | MUNICH

The EDANA Innovation Forum will explore the significance of innovation for nonwovens and what it entails. While innovation is typically associated with Confidential Business Information, partnerships can be the key to success, and it's possible to discuss innovation without revealing business secrets or risking your intellectual property.

The Forum is designed to be more than a conference; it will be an immersive experience including visits and inspirational activities focusing on innovation across all nonwovens applications. It will address topics from why innovation fails to technological innovations.

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**The programme is available online and includes:**

**DAYS 1&2** ⇒ expert presentations, a tabletop exhibition and immersive workshops featuring roundtable discussions.

**DAY 3** ⇒ a visit to the Munich Urban Colab including inspirational talks and presentations from startups.

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Questions ? Contact **delphine.rens@edana.org**

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# TOSCOTEC RAMPS UP WATER REDUCTION IN TISSUE MAKING

**Elisa Bertolucci**
Fiber Systems Engineering Manager, Toscotec

**Water is an essential ingredient in the tissue making process and its reduction is a very sensitive topic. It is necessary to find the right balance between water reduction advantages and disadvantages.**

**Water reduction leads to the closure of the process water circuit, which can affect the tissue making process. In this study, we will illustrate state-of-the-art solutions to substantially reduce water consumption ensuring an efficient paper production.**

**In this field, great progress has been made in recent years, but the increasing stress on fresh water availability and widespread calls to reduce water usage have put water reduction strategies at the forefront of technological development.**

**In this article, we analyse the best practices and most advanced available technologies to reach a freshwater consumption in the entire tissue making plant lower than 4 $m^3$/ton paper.**

**This ambitious target can be reached by working on four main areas:**

- **Machine showers**
- **Suction roll sealing technologies**
- **Cooling utilities management**
- **Stock preparation**

**Introduction**

Water use in the industrial sector at large is one of the most important topics of debate; in particular, in paper production this natural resource is an essential component for fibres transportation, equipment cleaning, lubrication, cooling and in the achievement of high tissue quality.

Due to growing economic and environmental pressures, water saving strategies are one of the most important driving forces for paper technology development.

It is important to underline that pushing the tissue making process toward actual water reduction has significant negative impacts on several technological operations.

Water reduction approaches are very complex and bring to a progressive closure of the process water loop, which leads to accumulation of contaminants and may cause paper defects, deterioration of product quality and problems with tissue machine run-ability.

The degree of water loop closure is strictly correlated with the negative impact that may affect the paper process as shown by K. Olejnil et al [1] and J. Boguniewicz-Zabłocka et al [2]. In this context, it is crucial to establish the right equilibrium between advantages and disadvantages relevant to water consumption restrictions. The water consumption of today's paper making processes varies between 5 and 20 m3/ton paper [1].

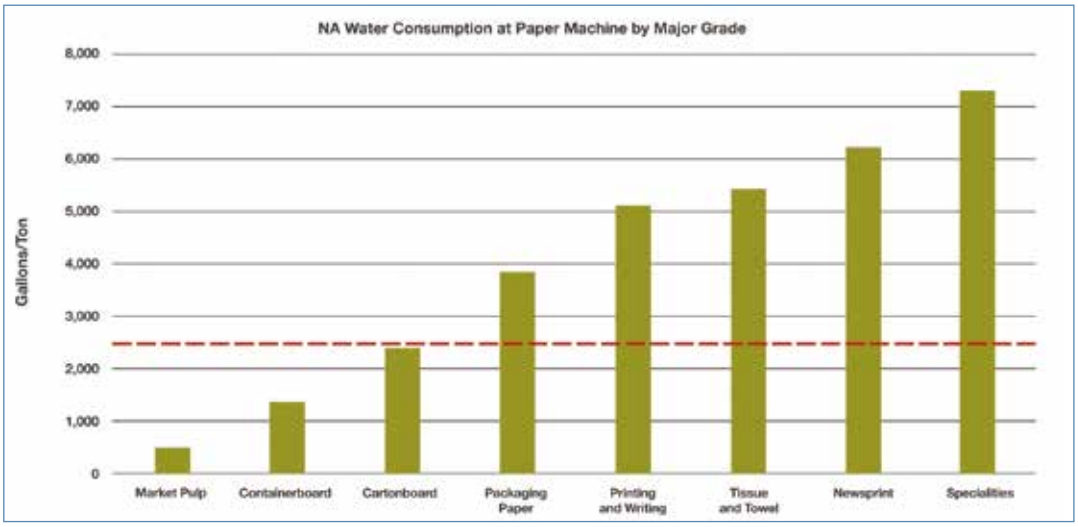


Figure 1: Water consumption at paper machine by major grade. Data from Fisher International for 2020

In particular, water consumption for tissue paper mills that work with virgin pulp is close to 5 m3/ton paper compared to mills that operate with recycled fibres.

There are two main approaches to water consumption, which can be combined to maximize water savings [3]:

- Implementation of advanced water treatment processes for wastewater recycling and re-use
- Development of new technologies that reduce water consumption.

The water re-use approach requires an advanced water treatment plant with specific purification technologies such as flotation, biological reactors, and membrane filtration, as described by M. Karthink et al [4].

Toscotec has taken up this technological challenge and is actively contributing to the reduction of water consumption in tissue making through the development of new technologies and strategies which require less water consumption.

Toscotec has achieved a remarkable reduction of water use by focusing on four main areas:

- Machine showers
- Suction roll sealing technologies
- Cooling utilities management
- Stock preparation

In this paper, we present the best practices adopted by Toscotec, which ensure an overall plant freshwater consumption of less than 4 $m^3$/ton paper.

All values reported below refer to a typical Toscotec tissue plant 2.2 with a max production capacity of 125 tpd. All water consumption figures calculated do not include freshwater use for chemicals preparation.

### Machine showers

Tissue machine showers are the most demanding utilities in a tissue plant that uses virgin fibres. All sections of the paper machine need showers for different functions including cleaning, moisturizing, lubricating, edge trimming, etc.

Depending on their function and position on the tissue machine, showers can be managed with different types of water (clarified water (CW), filtered clarified water (FCW), fresh water (FW)), with specific flows and pressures as described in the Technical Information Paper TIP 0404-61 recommendations.

Toscotec has optimized the design of machine showers by reducing their water pressure, expecially on lubrication showers and by preferring the use of CW or FCW over fresh water whenever possible.

Morover, the upgrade of their mechanical design (nozzle spacing and pitch, and orifice size) was aimed at reducing water consumption.

In the chart below, optimized shower's flows for Toscotec AHEAD 2.2 tissue machine plant are summarized:

Table 1: Tissue machine shower requirement for 2.2 plant

| Shower requirement | Total flow (lpm) |
|---|---|
| Continuous filtered clarified water | 2645 |
| Discontinuous filtered clarified water | 160 |
| Continuous fresh water | 60 |
| Yankee coating spray boom | 8 |

The above values have been obtained by using filtered clarified water (which typically has a suspended solid content of about 20 ppm) and enhancing its quality through cascade filtration steps to reach an average suspended solid content of about 10 ppm.

Among all tissue machine showers, some positions are more critical than others. Firstly, high pressure showers are fundamental to keep the machine cloths clean from contaminants, avoid open area reduction and guaranteeing proper water drainage during sheet formation. Secondly, chemical cleaning showers play a crucial role in preserving the good functioning of the wire and the felt during the paper making process.

Traditionally, both high pressure showers and chemical showers used fresh water. Thanks to the higher quality of filtered water, it is possible to feed high pressure showers with filtered clarified water, thereby reducing freshwater consumption.

In summary, the use of continuous fresh water is required by the following showers:

- Chemicals showers
- Suction roll seal lubrication shower
- Trim showers
- Tail cutter shower

In this configuration, Toscotec ensures a tissue machine water consumption lower than 2 $m^3$/ton paper while guaranteeing optimal machine performances.

### Suction roll sealing technologies

A traditional suction roll seal lubrication shower for a Toscotec AHEAD 2.2 tissue machine requires a freshwater flow of about 66 lpm to guarantee proper seal lubrication. Thanks to Voith's new HydroSeal technology, this freshwater requirement has been reduced by approximately 87%. The required flow with HydroSeal is around 8 lpm.

HydroSeal is a seal strip with a lubrication system designed to drastically lower water consumption in suction rolls installed in the forming and press section. Along with its water savings, it also increases drive operation efficiency, thereby reducing energy costs [5].

Upon installation of the HydroSeal seal strips, the mill realizes the following benefits [5]:

- 78% reduction in water lubrication for seals, producing $17,500 and 11 million gallons of water in annual savings
- Improved seal strip lubrication performance for the mill's tissue production

Additional benefits and advantages of Voith's HydroSeal:

- Improvement of moisture profile due to uniform lubrication
- No unwanted remoistening
- Constant and even lubricant feed at each seal strip
- Higher operational safety of roll, fewer downtimes, lower maintenance costs
- Homogeneous lubrication over the complete width

### Cooling utilities management

The management of process water cooling can make the difference in water saving strategies.

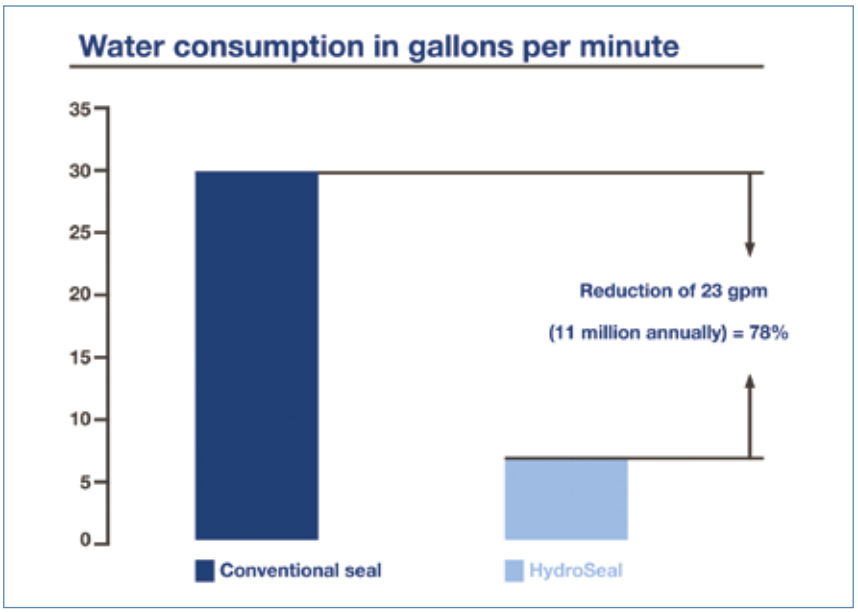


Figure 2: Water consumption for suction roll sealing technologies

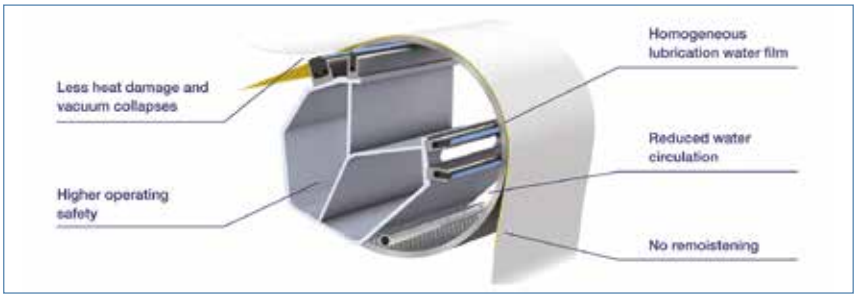


Figure 3: Voith's HydroSeal configuration

In paper making plants, lubrication units, gearboxes and other utilities are usually cooled down by water. The management of this water stream plays an important role in the overall freshwater consumption. Generally, cooling water can be managed through an open or a closed loop.
In open loop configuration, cold water is fed to the utilities and the resulting warm water can be used in the process for other purposes. In closed loop configuration, the warm water is cooled down through a dedicated cooling system and re-used to cool down the utilities again. Compared with the open loop, the close loop configuration reduces the amount of incoming fresh water through recirculation.

With the adoption of a closed loop management approach, it is possible to lower total water consumption to less than 4 m3/tons. This approach is usually more energy demanding than an open loop one, due to the cooling unit energy consumption.

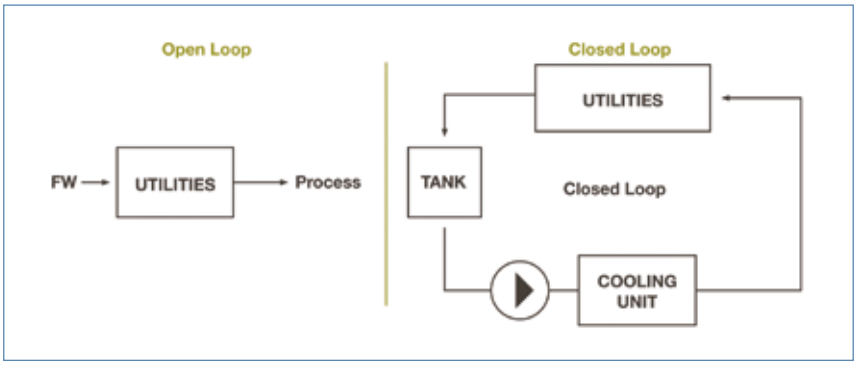


Figure 4: Cooling water circuit configuration: Open vs Closed loop

There are several cooling units available on the market which have different operation concepts leading to different energy and water consumption figures.

In this study three kinds of cooling units have been evaluated:
- Cooling tower
- Adiabatic liquid cooler
- Chiller unit

The cooling tower has the highest water consumption of all the above, usually this type of machine requires a constant water flow make-up of about 10 to 15 lpm.

The adiabatic liquid cooler has the lowest energy consumption, but still requires a water flow of 1 to 5 lpm.

Chiller units have the highest energy consumption but do not need a constant make-up of water. With reference to the case study of Toscotec AHEAD 2.2 tissue machine plant with a maximum production capacity of 125 tpd, we must cool down a total water flow of about 400 lpm, which can be managed in a closed loop configuration that guarantees a cooling capacity of about 282 kW.

According to the above data, a close loop configuration based on cooling tower technologies requires 7205 m3 of water per year and an annual electricity consumption of about 52,440 kWh.

Whereas, if one selected an adiabatic liquid cooler, the annual water consumption would drop to 692 m3 and annual electricity consumption would also drop to 13,585 kWh.

A proper chiller unit would allow to save water and reduce the annual water consumption up zero, but it would require the highest annual energy consumption of all three option, equal to 307,979 kWh.

Besides the energy and water evaluation, it is also important to underline that mill location plays an important role in the selection of the cooling unit. When the wet bulb temperature is too high, the cooling tower and the adiabatic cooler become inefficient, and a proper chiller unit is needed to guarantee the necessary cooling capacity.

## Stock preparation

The following water-demanding utilities can be found in the stock preparation system:
- Agitator and pump seal lubrication
- Hoses
- Chemical preparation units

Selecting the right sealing type can make the difference in the water consumption of the overall plant.

Each seal type has specific seal water flow and pressure requirements. Gland packing seal is the most common seal type used for pumps and agitators. Gland packing offers a lower upfront cost and easier installation compared to mechanical seals, as it does not require decoupling of drive shaft, resulting in a shorter turnaround time but lead to higher water consumption.

In general, glad packing seals require 5 to10 lpm which can increase if the sealing unit is not well regulated. In a typical Toscotec AHEAD 2.2 tissue machine plant with a max production capacity of 125 tpd where pumps and agitators are equipped with gland packing, the required water seal is about 100 lpm which accounts for 30% of the entire incoming freshwater flow. By installing mechanical seals on all pumps and agitators, it is possible to drastically reduce the total water seal flow (even though for certain equipment it is not possible to change seal type) reaching an overall stock preparation freshwater consumption of lower than 2 $m^3$/ton of paper.

Another aspect worth mentioning is the amount of fresh water required for chemicals preparation and dosage. Chemical dosages and therefore fresh water required for chemicals strongly depend on water quality (conductivity, impurities content, cationic charge demand, suspended solid content, pH, temperature).

All the above-mentioned parameters are strictly connected with the plant's water degree of closure. Therefore, it is crucial to find the right balance between plant water closure (which mean freshwater reduction) and plant runnability. The water requirement for the use of chemicals is not investigated in detail in this study, because there are several aspects that may come into play, including the sort of chemicals used, the type of production, raw materials, freshwater characteristics, etc.

## Conclusion

Water reduction approaches are very complex and lead to a progressive closure of the process water loop which gives rise to contaminant accumulation, and may cause paper defects, deterioration of product quality and machine run-ability issues. The water consumption of today's papermaking processes varies between 5 and 20 $m^3$/ton paper.

Toscotec has taken up this technological challenge and is actively contributing to the reduction of water consumption in tissue making through the development of new technologies and strategies which require less water consumption.

In this paper we summarized all the best practise and technological developments which allow to reach an overall plant freshwater consumption lower than 4 m3/ton paper.

The above figure can be reached acting on the different aspects of the tissue plant.Thanks to machine showers optimization and Voith's new HydroSeal technology, it is possible to obtain a total tissue machine water consumption lower than 2 m3/ton paper. To this result, we have to add the stock preparation water consumption that can be lowered down to 2 m3/ton paper through cooling utilities strategies and seal selection.


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