March / April 2024 | Issue #2

Tissue World

Magazine

The independent news provider for the global tissue business

INDONESIA

The road ahead for the Asian powerhouse

Plus

MARKETISSUES

Records soar - Tissue World Miami 2024

FOCUS ON

Value-centric consumers go back-to-basics

TECHNICAL THEME: PACKAGING

Automation – the latest advances

EXITISSUES

North America back on track with dynamic market changes

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A Southeast Asian "premier titan" embarks on visionary expansion. In March, Indonesia's Sun Paper Source announced it had invested in four tissue machines at its plant in Ngoro, Mojokerto, boosting production capacity to 300,000tpy in total with sister company Sopanusa. Here, TWM Senior Editor Helen Morris interviews Chief Executive Ronald Rusco to get the latest on the company's growth ambitions across Southeast Asia and beyond.

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North American tissue is back on track after the pandemic … but dynamic changes lie ahead for the new market. Against a background where grocery prices have risen by 26% and consumers are spending the highest share of their income on food for 30 years, AFRY Management Consulting's Sanna Sosa, Senior Principal, and Soile Kilpi, Director, discuss the forces shaping the tissue sector in 2024 and beyond, from decarbonisation to industry re-structuring and raw material challenges.

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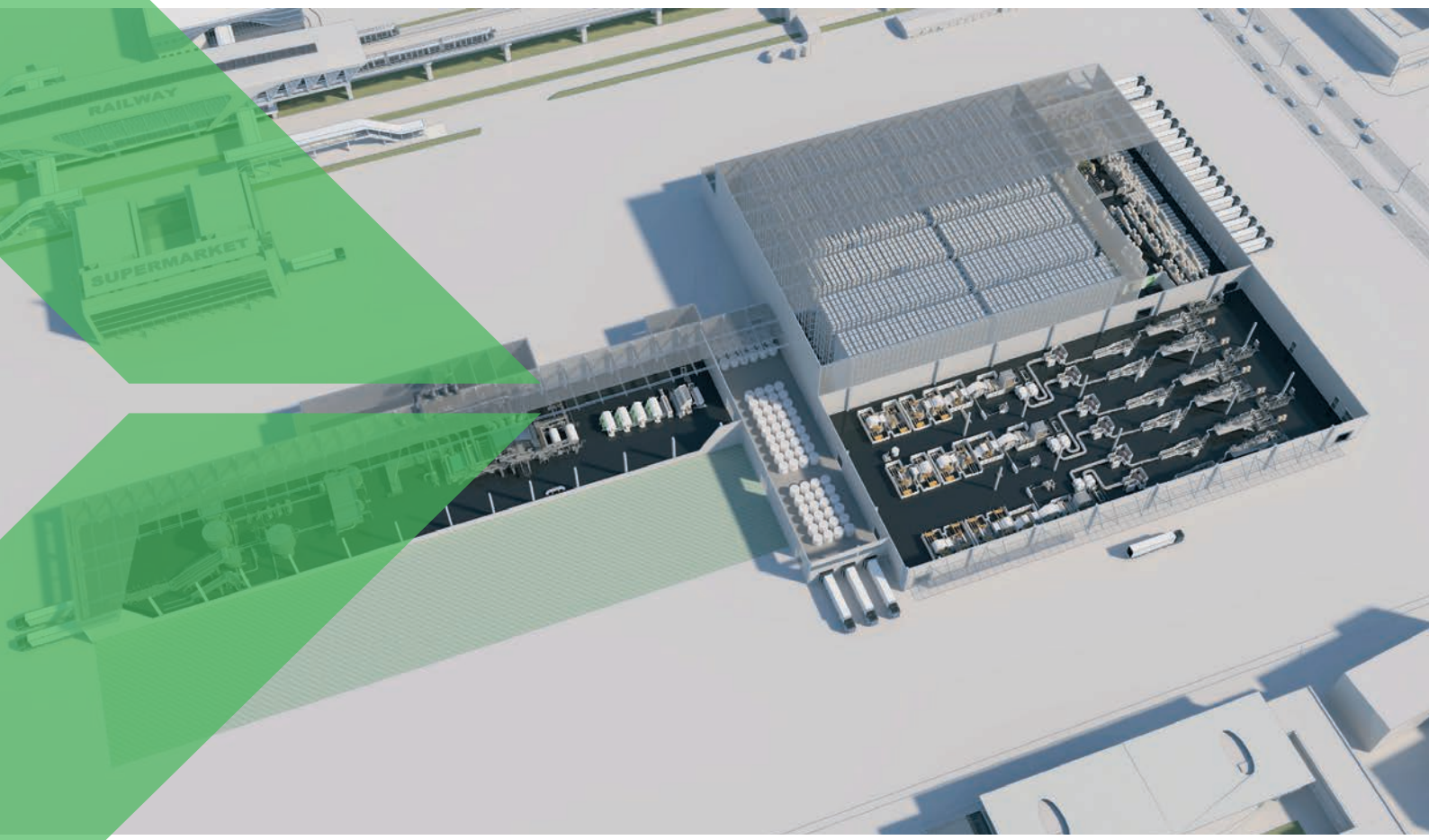
Cover: Image showing how the emerging tissue superpower that is Indonesia is unfolding at speed, as reported in TWM's Indonesia Country Report.

Image by Stefano Vuga, Founder, PurplePrint Creative, Spain/ Italy, www.purpleprint.eu

Driving tissue innovation forward



Valmet offers the most complete and integrated portfolio of process technologies, services and automation systems for the entire tissue value chain.

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Valmet FORWARD

The results are in, and the post-Covid surge gathers pace

Helen Morris, Senior Editor, Tissue World Magazine

You will quickly pick up the mood of the industry in TWM's pages as analysts and executives across global tissue look back on fiscal 2023 results.

Here are just a few examples:

"We are thrilled to witness Sun Paper Source and Sopanusa Tissue … achieve unprecedented sales." Ronald Rusco, President Director of Indonesia's Sun Paper Source.

"We had a great year driven by a significant improvement in our tissue margins and strong operational execution … tissue demand remained strong." Arsen Kitch, President and Chief Executive of North America's Clearwater Paper Corporation.

After the pandemic's four-year economic slowdown an impressive projected five-year CAGR is now "*inevitable*" for Indonesia. Jason Tjiptadi, Euromonitor International Consultant.

"Strong industrial performance." Portugal's Navigator Company.

A POST-COVID SURGE IS UNDERWAY, AND THE RIPPLES WERE CLEARLY IN EVIDENCE AT INFORMA CONNECT'S TISSUE WORLD MIAMI 2024

1,862 visitors from 86 countries – a 61% increase. Informa Connect has hailed the success of North America's largest tissue exhibition and conference. The exhibition hall saw a 30% increase to 135 exhibitors, generating 2,629 leads. During the three-day event deep dive talks and Q&A sessions with 50+ speakers explored the theme *All to Play for in a VUCA World: Strategies for Winning with Tissue*. Keynote speaker was Jean-David Tardif, President and Chief Operating Officer of Cascades, and in a first for Tissue World visionary Italian tissue entrepreneur Fabio Perini delivered a pre-recorded keynote address and Q&A session. Another first was the Tissue Workshop, with participants collaboratively designing a sustainable blueprint for the future of the industry. An extensive report from Miami is in *MarketIssues*.

INDONESIA COUNTRY REPORT: AN EMERGING TISSUE SUPERPOWER

The statistics make clear the short – and long-term prospects for tissue in Indonesia ... and they are impressive. It is a classic low base success story unfolding at speed, despite a relatively slight stall during the Covid years. TWM last visited Indonesia in 2013, when tissue consumption per capita was relatively low, but that is changing rapidly as the economy – set for 5.2% GDP growth this year – is projected to make this vast archipelago the fifth biggest economy in the world in the coming decades.

Many of its relatively young population, median age 31, are new to tissue, so as they discover its many benefits, they are going to become converts. They will have more money to spend, as gross national income per capita is rising yearly, and two years ago the World Bank gave it the imprimatur of middle-class status.

In 2013, the prediction was: "Soon tissue paper will become a necessity in every family life." TWM's *Country Report* make clear how that prediction is working through.

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In Tissue World all measures are metric and all dollars ($) are US dollars, unless otherwise stated.

TISSUE WORLD MIAMI 2024: THE GLOBAL TISSUE INDUSTRY STEPS OUT IN STYLE

Event organiser Informa Connect has hailed the impressive success of Tissue World Miami 2024 after recording visitor growth up 61% compared with 2022's exhibition.

135 exhibitors showcasing the very latest technologies – from paper machinery through to converting, packaging, chemicals, and AI – generating 2,629 leads during the three-day event.

North America's largest tissue exhibition and conference saw over 1,862 visitors from 86 countries attending, taking time to talk to customers, peers, meeting old friends and making new.

The floorplan saw growth of 30% with 135 exhibitors showcasing the very latest technologies – from paper machinery through to converting, packaging, chemicals, and AI – generating 2,629 leads during the three-day event.

Hundreds of delegates also attended the conference – themed *All to Play for in a VUCA World: Strategies for Winning with Tissue* – which offered insights via deep-dive talks and Q&A sessions from 50+ speakers, including keynote speaker Jean-David Tardif, President and Chief Operating Officer of Cascades.

Fabio Perini, Italian entrepreneur and tissue technology visionary, also heralded a first for Tissue World by delivering a pre-recorded keynote address and Q&A session that was presented live at the Miami conference.

A new addition to the conference was the Tissue Workshop, where participants collaboratively designed a sustainable blueprint for the future of the industry.

Visitors to the exhibition also attended Tech Talks, featuring 15-minute sessions on the latest trends and technologies in tissue manufacturing.

Topics include maintenance practices, converting design considerations, creping technology, and more.

And on Day Zero, to welcome the start of the exhibition in true Tissue World Miami style, the networking drinks reception – held at the Clevelander Hotel's iconic rooftop bar – was the busiest seen in years.

For those who couldn't attend, below TWM summarises some of the key talks and themes from the conference.

Miami 2024's conference theme: *All to Play for in a VUCA World: Strategies for Winning with Tissue*

Clean Living, how Sofidel America works to meet market challenges and customer needs

Derek Dafoe, Executive Vice President, Marketing & Sales USA, Sofidel America

"Sofidel is committed to continued growth and expansion that will result in the doubling of our volume within the next decade."

- Entering North America – understanding the marketplace and creating a map to success.
- Accomplishments to date – update on where we are 11 years later.
- Vision for the future – where does Sofidel see the North American market in 10 years.
- Points of Difference in a commodity driven future – how will Sofidel drive future growth.

THE FACTOR'S DRIVING SOFIDEL'S GROWTH

- Asset Quality – Sofidel is committed to ongoing investment to provide newer and better performing production plants than the industry average.
- Geographical Coverage and Proximity – with the presence of plants closer to the end user we focus on efficient supply chain management.
- Sustainability – as part of Sofidel's social-cultural efforts and competitive growth strategy we are committed to helping people and the planet.
- Digitalisation – with increasing attention paid by Sofidel to the impact of ongoing digital transformation, from operational processes to logistics, the customer experience, and cyber security.

As of 2022 Sofidel was the sixth largest global producer of tissue products, with operations in North America & Europe. Sofidel is 100% focused on the production of tissue. Where others have diversified, Sofidel has focused. Manufacturing in 13 Countries across two continents.

COMING TO AMERICA – 2012

The North American market has lagged global developments, this has resulted in a lack of new tissue assets and the ageing of existing tissue assets.

Sofidel believed that by investing in new tissue technology and assets we would enable the company to compete successfully in terms of cost structures, production efficiency and organizational flexibility.

Building on our heritage we believe that the North American private label market is underdeveloped and will grow at an accelerated pace moving forward.

NEW TECHNOLOGY FOR PAPER MILLS

Sofidel is focused on acquiring new generation machines for producing paper tissue, the latest being installed in Sofidel Poland, Sofidel Spain and in Sofidel America. With these machines Advantage New Tissue Technology (NTT) 200 made by Valmet, Sofidel can now produce textured paper and further raise the quality of its product line, whilst improving the energy efficiency of the production sites.

NEW TECHNOLOGY FOR CONVERTING LINES

Sofidel is also focused on acquiring new state of the art converting assets, most recently the new Constellation Technology made by Fabio Perini which guarantees uniform rolling of any type of paper, from the first to the last sheet, that will be installed in 23 converting lines. The result is a high performing converting process, which is a key factor of Sofidel's growth strategy.

SMART STORE: NEW WAREHOUSE TECHNOLOGY

Moving forward with automation and robotics.
Sofidel has implemented:

- system of automatic reel transfer between the paper mill and converting stages
- through laser-guided vehicles (LGVs)
- the complete automation of finished product management thanks to the automatic Smart Store warehouse, capable of handling tens of thousands of pallets in an area with 14% oxygen (to prevent fire risks) and saving 40% space.

This is in place in Sweden, Poland, and America.

PRIVATE LABEL: HOW WE DIFFER FROM OTHERS

- Private Label represents about 70% of market share in Western Europe while in the United States, private label is less developed accounting for approximately 30% of the market share.
- Sofidel is establishing new production plants with a national footprint to service the needs of today's retailers.
- New and innovative product capabilities: i.e., NTT & updated Converting Assets.
- Flexible Innovation with a willingness to do different things and offer solutions to a changing market.
- Sustainability: as a strategic factor and core strength.

OPTIMISING OUR NORTH AMERICAN FOOTPRINT

Sofidel is committed to expanding our manufacturing footprint to allow us to meet the needs of our National and Regional customers. Our focus is to locate our facilities where the market is and optimise our supply chain and transportation costs to better support our customers' needs. We believe that this strategy will allow for a continued growth model that offers strategic benefits beyond many of our regionally based competitors.

Most recently, in 2018 our State-of-the-Art Greenfield facility in Circleville, Ohio, began operations. This facility is built to support Sofidel's environmental focus with new state of the art paper making and converting assets. Total annual capacity increases by over 140,000 metric tons.

In 2020, our second State-of-the-Art Greenfield facility in Inola, Oklahoma, begins operations, allowing Sofidel to move forward in our goal to become a national supplier and to provide another 140,000+ metric tons of capacity.

In 2023, we announced the acquisition of a third Paper Machine to be located in our Circleville, Ohio facility. This will increase capacity by an additional 77,000 metric tons per year beginning in 2025. Also in 2023, we finalised the acquisition of the paper machine and facility in Duluth, Minnesota, adding 70,000 metric tons to meet our immediate needs.

2024+ Sofidel is committed to additional investment in our North American business filling out our vision to be a coast-to-coast supplier of high quality, sustainably manufactured products.

Sofidel America has now become the largest operating division of Sofidel Group representing over 26% of overall group revenue. As of 2022:

United States – 26.7%, UK – 13.5%, Italy – 12.1%, Germany – 9.5%, France – 8.8%, Poland – 6.3%, Spain – 4.7%, Ireland – 2.6%, Belgium – 2.5%, Romania – 2%, Others – 11.4%.

SOFIDEL'S ASSET BASE IS ONE OF THE NEWEST IN NORTH AMERICA

According to AFRY, because of the aggressive growth and investments in the tissue sector in emerging markets, North American tissue assets have become old (26 years on average on technical age) in comparison to what is found in other regions (the average tissue machine technical age globally is at 15 years; while only eight years in China. The investments Sofidel has made have positioned us

Post-Covid surge: the floorplan saw growth of 30% with 135 exhibitors showcasing the very latest technologies

with newer, more efficient assets than the base of our North American competition.

NEW TECHNOLOGY, COMBINING INCREASED EFFICIENCIES AND UPGRADED PERFORMANCE ALLOWS SOFIDEL TO DRIVE GROWTH

Volume breakdown by line of business:

Total 2022: Private label – 62%, Brand – 12.9%, AfH – 14.60%, Jumbo Reel – 9.80%, Contract – 0.80%.

USA 2022: Private Label – 62.4%, Jumbo Reels – 5.9%, AfH – 28.6%, Contract – 3.1%, Brand – 0.0%.

Sofidel is committed to continued growth and expansion that will result in the doubling of our volume within the next decade.

SOFIDEL STRATEGIC PILLARS:

Investment

- Over $1B invested since 2017 (more coming)
- National footprint enables more economical freight
- Asset age among lowest in US market

Innovation

- Unique value-added products to drive differentiation for distributors and end users
- Flexible organisation enables quick responds to needs

Sustainability

1. Cost Reduction
2. Motivating Personnel
3. Public Support
4. Higher Market Standards
5. Consumer Satisfaction
6. Responding to Customers
7. Anticipating Regulation
8. Increased Credibility & Trust
9. Access to Capital
10. Enhanced Reputation

COMMITTED TO GROWTH

- Investing in state-of-the-art equipment that uses the latest energy and performance technology.
- Geography, reducing transportation costs by locating our operations within 500 miles of our customer base.
- Sustainability, everything we do is focused on delivering value that leaves the world in a better place.
- Challenge, we challenge the status quo, partnering with customers to drive strategic engagement.
- Focus, we are a tissue company, we are not distracted by other industries.
- Family, we are family owned with a commitment to mid to long term results.

Envisioning carbon-free tissue production

Bruce W. Janda, Senior Business Information Consultant, ResourceWise

The tissue-making process is one of the most energy-intensive papermaking processes, accounting for only 9% of global paper production tons but 14% of total scope 1 and 2 yearly carbon emissions on the machine. Tissue machines run the fastest with the lowest basis weight on generally narrow machines compared to the high-volume Packaging and Communications grades. Global tissue machines have the highest average emission of any pulp and paper process at 0.984 tons of CO2 per ton of finished tissue production (machine energy only).

Tissue manufacturers have increasingly focused on strategies for reducing or offsetting carbon emissions in part due to the high visibility and consumer engagement with tissue products. Low or carbon-free drying equipment is available, and several tissue machines are running or planned as demonstration projects.

This report will look at the scope and variability of tissue machine production using the ResourceWise FisherSolve Next system to identify some of the critical steps required to reduce the carbon footprint of tissue products. Beyond using all renewable or noncarbon power and fuel for tissue machine operation, there are also opportunities for the tissue industry to make significant carbon emission reductions through process efficiency improvement and waste reduction. A deep dive into the United States' tissue industry and the planned hydrogen hubs will identify opportunities and risks.

OVERVIEW OF CURRENT INDUSTRY CARBON EMISSIONS

Definitions of Scope 1, 2, and 3 Emissions:
Scope 1: Covers direct emissions from sources that an organization owns or directly controls. These include on-site fuels such as Boiler – Steam for Yankee, Yankee Hood Burners, and CoGen Turbines.

Scope 2: Emissions that company causes indirectly and come from where the energy it purchases and uses is produced. Off-site emissions from electric power grid and other power supplies.

Scope 3: Encompasses emissions that are not produced by the company itself and are not the result of activities from assets owned or controlled by them. Instead, those up and down the value chain are responsible for these emissions. These include all sources not within the scope 1 and 2 boundaries, such as fiber sources, supply chain, transportation, and use and disposal.

- Pulp and paper is not the big industrial problem! Tissue makes up only 14% of the global industry – but customers are very emotionally engaged. All industries discharged about 30% of total greenhouse gas emissions in 2021.
- Focus on machine operations
- Tissue Machine CO2 Emissions: Scope 1 & 2 only (fuel and electric power)
- Total emissions per year:
- China and US make the most tissue and CO2 per country
- EU would make list too if a country

Total emissions per ton of tissue – coal power grids and site fuels
1. South Africa
2. Serbia
3. Zimbabwe
4. Australia
5. Poland

GLOBAL TISSUE MACHINE CO2 EMISSION/FMT

There are thousands of global tissue machines, and huge opportunities for improvement. Integrated sites are more efficient.

Where are the lowest and highest carbon-emitting machines? Lowest Emitting Machines by Region: Sweden – Brazil – Indonesia.

Highest emitting machines by region: Australia – United States – China.

Essity's Lilla Edet mill now produces tissue with zero fossil fuel emissions. Essity cissue's transition to carbon-free production on an older three-machine tissue mill using 100% recycled furnish included:

- In 2021, new biomass boiler uses renewable fuels, such as wood chips and bark, to generate heat and electricity.
- In 2022, biogas is used to power the mill.
- In 2022, new heat recovery system captures waste heat from the drying process and uses it to heat other parts of the mill.

Eliminating Scope 1 emissions with hydrogen fuel: 2021 pilot trial at Essity's Mainz-Kostheim plant in Germany. This included recycled integrated fibre to produce commercial tissue products on three newer or medium-age tissue machines. Already some biogas for boiler and power. Hydrogen used for hood gas (600° C). Not claimed to be economically viable.

Source: **www.essity.com**

DECARBONISATION OPPORTUNITIES AND CONCERNS

Site location is a major factor in mill carbon content.

Scope 1: Fuel Used On-Site – California gas fuel includes electric power.
Scope 2: Purchased Power – Utah, Missouri, Kentucky, Wisconsin use coal power. Canada and North West US use waterpower.

- Fuel intensity GJ generally correlates to carbon intensity
- Advanced Tissue Technology (TAD) has higher carbon and fuel intensity
- Integrated fibre sites have lower carbon intensity/ per power intensity
- Virgin fibre integrated sites have lower carbon intensity
- Scope 2 North American tissue machines: purchased electricity
- Carbon Emissions/FMT and GJ Fuel/FMT
- Power Intensity GJ generally correlates to Carbon Intensity
- Advanced Tissue Technology (TAD) has higher power and fuel intensity
- High cost of vacuum dewatering and fan for air drying vs. pressing
- Reduced purchased power for machines at virgin integrated sites

Scope 1: On-site Fuel for Steam and Hot Air: Hydrogen, Mixed Gas, or Ammonia Fuel Replacement?

- Hydrogen Costs Projected by US DOE:
- Current NA Average Site Fuel = 13.123 GJ/FMT
- Natural Gas = $5.12/GJ
- Current Natural Gas Avg Cost/Mill = $67.18/FMT
- Hydrogen = 0.141878GJ/Kg
- Hydrogen @ $1/Kg = $92.49/FMT
- Hydrogen@ $7/Kg = $647.46/FMT

Scope 2: electric grid decarbonisation – increased costs and variability risk as coal shuts down? Power storage on-site? Cost to prepare for renewable power – renewables have a daily cycle that makes the base load plants uneconomical. Power Storage is required to use renewables economically, but battery storage has to go somewhere. More renewables are needed to replace base load systems and this adds to the total costs and risks. Power storage on the tissue mill site?

The California "Duck Curve" shows the net base load demand shifts when renewable solar power takes over. Existing base load systems become uneconomical and shutdown due to low run times.

Battery prices continue to fall with new technologies and capacity. These costs may be doable for tissue mills. On-site storage will be a "thing" for homes, businesses, and mills with increased renewable power. What would be the cost of a mill-based system? How many hours are required to ensure profitability?

WHAT IS POSSIBLE NOW?

North American tissue machine technical age vs. Scope 1 and 2 Carbon

- Blue circles are Advanced Technology (mostly TAD) and show higher carbon emissions per ton
- Orange circles are Conventional Wet-pressed Technology
- Circle size is tons/year for each tissue machine
- Trend lines show improved carbon emissions per ton with newer machines
- Advanced Technology carbon emissions are improving caster than Conventional Machines.

PROCESS EQUIPMENT UPGRADES CAN REDUCE CARBON INTENSITY

Examples of the North American machine dataset filtered by technology and equipment type:

- Shoe Press has better results than Roll Press
- Less drying energy
- Increased Production Rate
- Headbox Dilution vs. Headbox Slice Control shows dilution capabilities to fix CD grammage
- Steel Yankee 8-10% increased production rate or reduced energy – found on newer machines.

THE BASICS OF TISSUE MAKING: MANAGING VARIABILITY AND WASTE

- Low converting efficiency (40-70%) is partially attributed to MD/CD profiles
- Base sheet variability follows Weibull distribution
- Don't let tissue converting waste drive tissue machine carbon intensity
- Focus on waste energy cost: tissue machine GJ/ FMT is 10-20X2 converting GJ/FMT
- Scope 3: NA Emissions Curve: Fibre – Raw Materials Cradle-to-Gate
- Integrated fibre mills have clear low carbon advantage. TAD and other advanced processes have reduced grammage effect not shown as units per ton

Observations: current mood of climate frustration – it's going to take a lot more money and time than first estimates

- Lots of Hype, and Now Reality Sets in:
- Pandemic effects and economic realities of 2023
- Inflation and interest rate effects on cost of alternatives
- Energy upset due to war in Europe
- Eliminating energy sources before alternatives are available
- EV cost and performance
- Supply chain stresses
- Politics, budget issues and citizen fatigue
- Coal plant additions in India and China.

My reasons for long-term optimism:

- Better visibility of the real issues is developing
- Energy companies carbon removal and sequestration: Prove it.
- We can now measure methane emissions from orbit
- If the plan is for 2050, there is still time to make deliberate changes.
- Acceptance of change and the need for adaptations will come.
- New technologies need time to develop.
- Magical thinking is being rejected.
- After exhausting all other alternatives, we will do the right things.

CONCLUSIONS/RECOMMENDATIONS

Carbon-free is the wrong word, but fossil fuel-free does exist, as shown by Essity. Less total carbon per year is the global climate goal, but the solution requires CO2/FMT metric. CO2/FMT is the process of carbon intensity – can we report progress on carbon intensity?

Carbon intensity includes: site location and local power grid carbon, site fuels, process energy efficiency and waste – less energy is less carbon, site configuration can make a big difference, integrated recycled fibre offers biofuel opportunities and lower Scope 3 carbon content, integrated virgin pulp can provide power, fuel, and lower Scope 3 carbon content.Hydrogen and on-site power storage are very expensive options at today's costs. Newer, more productive tissue machines have lower carbon intensity. Improved technologies can reduce energy and carbon intensity. Elimination of tissue process variability and waste reduces carbon efficiency

It is going to be very interesting times for tissue makers!

The normalisation of global conflict in a changing world order

Mark Goddard, Partner, Director, Secure Value

CONFLICT CONTAGION: WARS IN UKRAINE AND GAZA ARE HAVING A KNOCK-ON EFFECT

- Unequal fight.
- "Democracies are very cumbersome and slow in their decisions, unfortunately. And because of this, they are constantly threatened by totalitarian regimes."
- "I think Ukraine is yesterday's news" - war media cycle fatigue
- "If the international order is not able to give us 100% guarantees to scare off and defend ourselves against a Russian attack… we have to be able to give ourselves the right to possess national nuclear weapons." (Poland 2023)
- Maersk diverts vessels away from the Red Sea.
- British troops patrol Kosovo-Serbia border as tensions remain high
- Real impact on global trade.

Most major carriers are rerouting away from the Suez Canal and the Red Sea to avoid the risk of Houthi attacks, despite increased security cover from the US and others. At the same time a severe drought has affected shipping levels in the Panama Canal. Shipping costs between Asia and Europe have already jumped and will increase further when re-routing via Africa.

GEOPOLITICAL WEAPONISATION OF SUPPLY ROUTES – CHOKE POINTS

- Black Sea – 22% of global grain supply.
- Malacca Strait link between the Indian Ocean and South China Sea vulnerable
- Northern Sea Route – 30% of Russian GDP dependent – China's Belt and Road (B&R) investment – limited and highly politicised.
- Suwalki Gap – NATO's East European weak spot

SANCTIONS CIRCUMVENTION

- The third-party problem: countering sanctions circumvention
- The US has sanctioned Türkiye-based entities it claims helped Russia's war.

A YEAR OF ELECTIONS: IMMIGRATION A KEY ISSUE

Eight of the 10 most populous countries in the world will hold elections in 2024. Short term appeal of populism.

NATO AND EU ENLARGEMENT

- 75th Anniversary NATO Summit Washington (July 2024).
- Finland joined NATO in April 2023 (Sweden March 2024)
- Four partner countries have declared they want to join, including Ukraine and Georgia.
- The European Council decides to open accession negotiations with Ukraine and Moldova.
- The European Council decides to grant candidate country status to Georgia.
- NATO & EU expansion were cited by Russia as acts of aggression pre the annexation of Crimea in 2014.

SHIFTING GLOBAL ORDER: RESTRUCTURING AWAY FROM UNIPOLARITY

- BRICs invites new members - Egypt, Ethiopia, Iran, Saudi Arabia, and the United Arab Emirates joined BRICS+ as new full member.
- Russia's 2024 BRICS+ Chairmanship began at the beginning of 2024.
- Gulf Cooperation Council: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia & UAE makes first foreign policy statement – on the war in Gaza.
- Eurasian Economic Union signs.
- Iran accesses a market of 190m in five member countries via the Eurasian Economic Union (EEAU) free trade agreement – 25 December 2023

SHIFTING GLOBAL ORDER

China's Belt & Road initiative – 2023 is its 10th anniversary. More than 150 countries have signed up, including 18 of the EU's 27 members. 24 February 2024: the two-year anniversary of Russia's invasion of Ukraine

Compared to the first anniversary, the mood of optimism and unanimous support for Ukraine from the US, EU, and UK, was markedly more muted. The most significant change is the breakdown of bipartisan support in the US for financial and defence support. This has exposed the EU's inability to match that support should it be permanently withdrawn (in terms of funding, procurement, and supply of crucial military supplies).

Momentum is currently in Russia's favour, and Russia is making incremental territorial gains, albeit slowly, as its armed forces exploit wavering international support for Ukraine. This has resulted in military vulnerabilities, not least the lack of ammunition. Ukraine has also shifted tactics with some success, most recently in the Black Sea on 14 February 2024, when Ukraine successfully attacked a Russian warship off the coast of Crimea. This followed another successful attack on a large Russian landing craft in the same area in December 2023. Both attacks have effectively neutralised Russia's ability to control the northern Black Sea.

PUTIN AND THE BRICS+: THE END OF US UNIPOLARITY

Putin's strategy of displacing the US as the dominant world power also lies behind Russia's championing of Saudi Arabia and the UAE as members of the BRICS+ (they joined in January 2024). Both countries gave Putin a warm reception when he visited in 2020, and neither has supported sanctions against Russia over Ukraine.

Russia is openly pushing for change in the world order and this expansion of BRICS is part of Russia's strategy to achieve that end. As well as rewarding Iran for military support by championing its entry to the grouping, an objective of the BRICS+ is a rebalancing of country representation on key international bodies, such as the UN Security Council. The admission of these countries is also a show of support by Russia for China—they are not aligned with the US and UK's increasingly hawkish stance on China.

Before the war with Ukraine, it was believed that Putin was preparing to stand down in the face of declining popularity. However, the war, and particularly increased success on the battlefield in recent months, has restored Putin's popularity back to mid-2010s levels. His legacy among Russians would also be significantly damaged if he stood down without concluding the conflict — they contrast this with a perception that UK Prime Minister David Cameron did not take responsibility when he lost the Brexit vote.

The rhetoric in the run up to the elections will increasingly contrast Putin holding elections to President Zelenskyy, who has overruled Ukraine's constitution by cancelling elections, which were due by 31 March 2024. The Kremlin's core message will be that Putin encourages elections, whereas Zelenskyy has established himself as a dictator.

THE ECONOMY

The war in Ukraine will entrench a greater dominance of the Russian state over the economy. The government is preparing for a long war in Ukraine, which will mean increasing taxes (this is not being acknowledged by the government) and introducing special measures in the economic sphere to meet targets that support the defence industry, such as directing production towards military hardware.

Sanctions will continue to prompt the Putin administration to impose new measures to circumvent them and strengthen economic policies to alleviate economic shocks, such as the parallel-imports scheme, which allows imports of goods without the permission of the intellectual property owner.

In this context, there has been a huge increase in Chinese imports, with logistics routes between the two countries now improved and better established. One example is procurement by Moscow City council: before the war 95% of municipal goods and services, such as lifts and escalators, came from Europe. These have now been replaced by Chinese substitutes. There has also been an increase in local production with business adapting to produce goods that were previously imported. The message the Kremlin is trying to convey is that, despite unprecedented levels of sanctions, the economy is doing fine.

In the long term, economic decoupling from the West will push Russia to take further steps towards shifting its supply chains to Asia, including building new energy infrastructure, and pursuing technological independence from Western countries via import substitution. However, this will take time and likely be hindered by a lack of investment and operational capacity.

OUTLOOK FOR GLOBAL CONSUMER TISSUE AND OPPORTUNITIES AMID NEW CONSUMER REALITY

By Liying Qian, Head of Tissue and Hygiene, Euromonitor International.

2023 was a year of demand recovery in consumer tissue. However, elevated inflation has led to diverging performance in value and volume sales across tissue categories, most notably in paper towels and paper tableware. Such divergence, underpinned by inflation-induced consumption rationing and trade-outs, reflects a new consumer reality where the focus is firmly on affordability, value, and cost of living.

While key fundamentals such as real disposable income recovery and population growth will sustain the resilience of consumer tissue demand, this value-centric economic reality will likely sustain a lifestyle pursuit towards simplicity, which will shape tissue's preference and businesses' value creation.

Euromonitor International has summarised four manifestations of simplicity shift in consumer tissues – back to basics, blurring wellness, digital rewire and affordable sustainability.

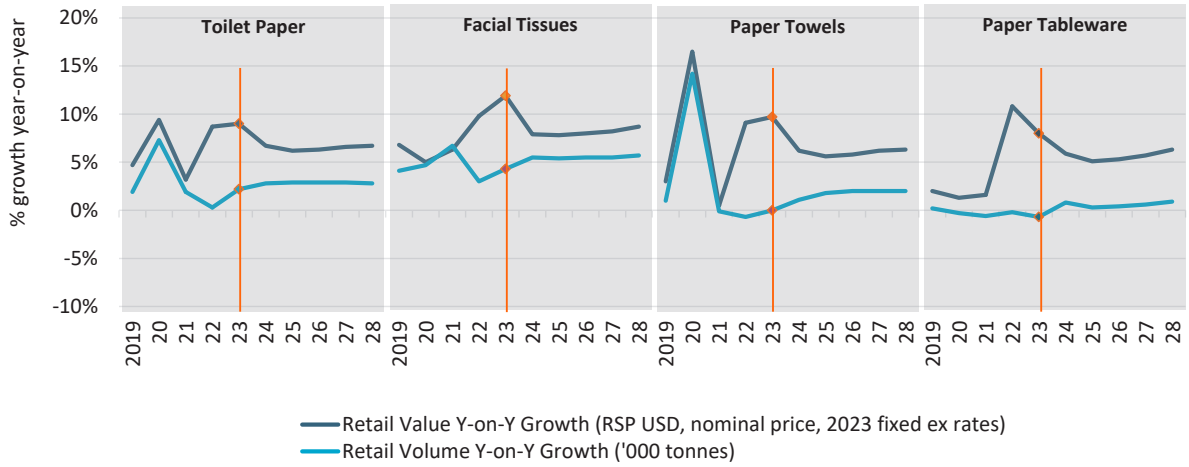
BACK TO BASICS

Consumers are accelerating recessionary behaviours to cope with the rising cost of living, demonstrating a growing desire for back to basics.

Back to basics in tissue is often reflected in trading down to cheaper options, as evidenced in private label's consistent growth in sales and market share at the expense of top players 2018-2023. Yet, it is also evidenced in a sharpened focus on products' fundamental benefits such as cleaning efficiency, as demonstrated in the latest product releases such as Procter & Gamble's Bounty Quicker Picker Upper paper towels in North America and Kimberly-Clark's Scottex Complete Clean in Italy with 3D texture for strength and softness.

Durability and comfort are two other key pillars of consumers' value perception, inspiring new cloth-resembling tissue products and marketing narratives. In China, for instance, Vinda International launched new kitchen towels dubbed "washable kitchen towels." Another example is the rise of a new tissue format known as disposable facial cloth, or facial towel, which is designed for facial cleansing and drying and has carved out a growing category in Asian tissue market. Many large tissue players such as Unicharm in Japan have joined the segment. This format is becoming popular, as it combines the best of two worlds: the convenience and hygiene

Global Retail Tissue by Category: Retail Nominal Value vs Volume Y-on-Y Growth, 2019-2028



Source: Euromonitor International's Passport Tissue and Hygiene research, published February 2024. Data for years 2024-2028 are forecasts

EUROMONITOR INTERNATIONAL

that come with disposables, and wet strength and absorbency of washables.

On the other hand, consumers' value expectation is also enriched by changing household structures, which in turn drives new cleaning occasions. Notably, nearly 70% of global consumers consider pets as beloved members of the family, according to Euromonitor's voice of the consumer lifestyle survey fielded in early 2023. Echoing with the trend, Portuguese Renova tapped into the high-growth pet care sector through its new multi-purpose Pet Care paper towels in 2023.

BLURRING WELLNESS

Today's wellness connotes a broader lifestyle orientation, as much emotional and sentiment-driven, as it is health-based. This trend underlies the growing wellness positioning in the tissue industry that taps into broader wellness needs - such as mental and skin health. This is increasingly reflected in beauty-inspired ingredient choice, fragrance integration and skin-focused wellness marketing.

Nearly 30% of global consumers said they prefer scented feature in household essentials in 2023, according to Euromonitor's lifestyle survey. Unsurprisingly, odour control and botanic-inspired fragrances are increasingly seen in tissue products, particularly toilet paper and facial tissues. For instance, Essity's OdourBlock technology for its Zewa brand aims to neutralise toilet odour, while Asia Pulp & Paper (APP) introduced microcapsules embedded in its Paseo Aroma Relief facial tissues to provide personal hygiene routines an added clean sensation.

Another manifestation of blurring wellness is the merging of beauty and hygiene. Notably in facial tissues, beauty-inspired ingredients such as hyaluronic acid - a skin moisturiser that is typically seen in beauty and skin care products - are increasingly used in facial tissues as a

On the other hand, consumers' value expectation is also enriched by changing household structures, which in turn drives new cleaning occasions.

premiumisation strategy to address common skin concerns such as dryness and irritation.

This is a trend most notable in Asia where beauty perceptions, a humid climate, and allergy seasons make sensitive skin care a crucial pain point.

DIGITAL REWIRE

Between 2019 and 2023, e-commerce has driven more than a third of global retail tissue's incremental value sales increase, with its share of global total reaching 16% in 2023, up from 9% in 2019.

Though the channel's growth has much slowed from peak of pandemic, it has continued to outgrow offline channel, though from a much smaller base. As such, digital share of shelf will have an increasingly increased impact on tissue businesses' revenues and brand loyalty.

In the US, key mass retailers' digital investments play a key role in shaping tissue's e-commerce momentum. For instance, over the past few years, Walmart has leveraged its vast brick-and-mortar network to drive e-commerce capabilities, from curbside pickup in 2019 to same-day delivery launched in 2022. Starting 2023, subscription service and express delivery. To stay competitive, brands need to stay digitally compatible through inventory management, packaging design and pricing.

In comparison, in the Asia Pacific region, tissue e-commerce's development is uniquely driven by social marketplaces such as TikTok, which pivoted in 2020 from being a pure social media platform to being a retailer. Since then, it has emerged as a livestreaming giant in its home market of China and Southeast Asia.

Notably, TikTok in China (known locally as Douyin) accounted for 24% of total Chinese retail tissue online sales in 2023, up from 14% in 2022. The whopping 10%-pt increase marks the channel's importance.

An interrelated trend is the rise of livestreaming, which has made meaningful inroads because of its ability to create an emotional connection, tangibly demonstrate product features live and selling high volume of products on promotion. Local brands such as Hearttex in China are especially keen on using TikTok live shopping shows and KOL (key opinion leader) marketing to drive brand exposure and sales.

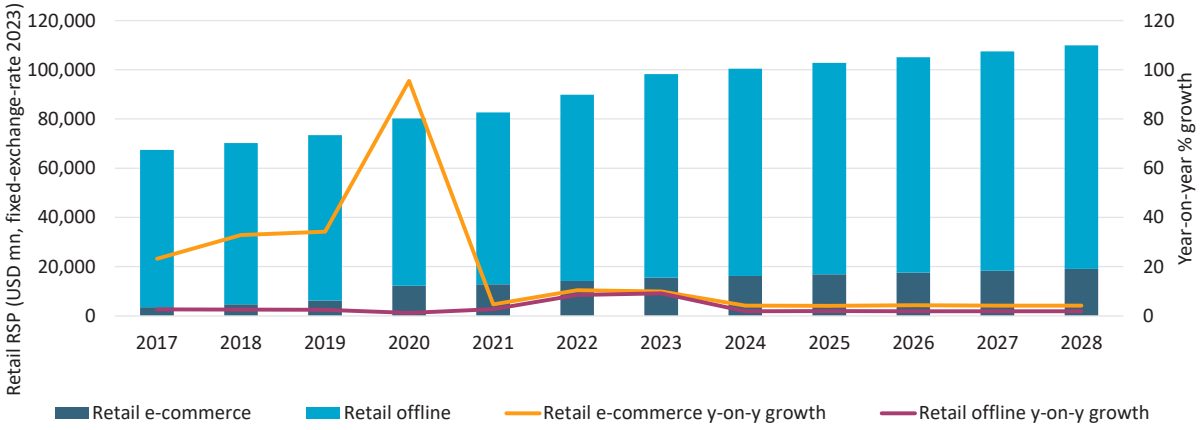
AFFORDABLE SUSTAINABILITY

Tying sustainability and affordability is as much to the benefit of consumers as to businesses, especially in resources-intensive tissue industry.

Although consumers are generally becoming more eco conscious, their aspirations and economic realities are unfortunately out of sync. According to Euromonitor's Sustainability Survey, consumers in lower per capita income markets such as India, China, and Brazil, are more willing to pay extra for at least one sustainability attribute. Such willingness to make an economic effort is more notable in essential categories such as food and beverages and household essentials like tissue, providing an added incentive for tissue businesses to close action gap by merging affordability with sustainability.

While circular business model offers a long-term solution to reduce costs, choosing the

Composition of Retail E-commerce vs Retail Offline, Retail Tissue, World, 2017-2028



Source: Euromonitor International's Passport Tissue and Hygiene research, published February 2024. Data for years 2024-2028 are forecasts

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right sustainability claims that resonate with consumers is also key.

With sustainability attributes in tissue still commonly associated with premium pricing, indicating existing economic barrier for adoption, consumer satisfaction, interestingly, does not always correspond with a cheaper price tag.

For example, locally sourced is associated with higher price premium per SKU, but consumers seem to be on average quite happy with the products, indicating the claim's ease to comprehend and tangibility that evokes trust and willingness to pay. In contrast, plastic-free packaging has a much lower price premium per SKU on average, yet consumers don't seem to reward it with higher satisfaction, which exposes potential consumer concerns about packaging quality and product contamination during shipping and reveals quality as a fundamental priority above all.

While circular business model offers a long-term solution to reduce costs, choosing the right sustainability claims that resonate with consumers is also key.

CONCLUSION

With the cost-of-living crisis solidifying importance of value and affordability, demonstrating product mileage with a focus on core benefits and problem solving is key to differentiate in a commoditised sector as tissue. Adapting products to changing household structures, need states and expanded wellness demands and aligning supply chain with new digital business models can bring new opportunities for penetration and differentiation.

More importantly, while sustainability is increasingly recognised as a long-term, cost-saving strategy, it often comes with a hefty price tag. Choosing claims that best resonate with consumers in the short-term, with tangible, traceable evidence, and uncompromised quality, while pursuing a circular business model in the long run will be key to drive consumer adoption.

GLOBAL NEWS UPDATE

A roundup of news from across the global tissue industry. To get the very latest news go to www.tissueworldmagazine.com

First paper on reel at Xuong Giang Paper's second Andritz tissue line. L-r: Tran Xuan Nam, Deputy General Director of Xuong Giang Paper, Director of Xuong Giang Paper Factory; Ha Ngoc Hoa, Vice Chairman of the Board of Directors, Xuong Giang Paper; Ngo Van Khanh, General Director of Xuong Giang Paper, Chairman of the Board of Directors; Ji Haihong, Andritz Project Manager; Xie Hui, Andritz Vice Director Project Execution Automation; Chen Zhijian, Andritz Deputy Process & Plant Engineering Director

VIETNAM

XUONG GIANG PAPER BOOSTS CAPACITY TO 72,000TPY WITH TM START-UP

Xuong Giang Paper has started up its second Andritz-supplied PrimeLineCOMPACT S 1300 tissue line at its plant in Song Khê – Nội Hoàng Industry Park, Bắc Giang Province. With this new line Xuong Giang Paper's tissue capacity will reach up to 72,000tpy. Andritz supplied the first PrimeLineCOMPACT S 1300 to the company in 2020. Both machines processes virgin pulp to produce high-quality facial, toilet and towel paper with a speed of 1,300 m/min and a paper width of 2.85m. It is equipped with a 12-ft. PrimeDry Steel Yankee with a steam-heated hood ensuring highly efficient drying and energy cost savings.

Tran Xuan Nam, Mill Director, Xuong Giang Paper, said: "We are proud to be able to continue and expand our strategy of sustainable high-quality tissue production. Especially the HC refining system and the Steel Yankee with the steam-heated hood make a difference in terms of fibre quality and energy efficiency."

The stock preparation plant is split into separate systems for short and long fibres with high-consistency (HC) refining, which Andritz said will achieve "better fibre quality in terms of strength, softness and absorbency compared to conventional low-consistency systems."

UK

NAVIGATOR PAPER UK MAKES OFFER TO ACQUIRE ACCROL GROUP

Navigator Paper UK has launched a public all-cash firm offer for the acquisition of UK-based tissue paper converter Accrol Group Holdings.

Accrol converts and supplies toilet tissues, kitchen rolls, facial tissues, and wet wipes to UK-based discounters and grocery retailers.

Its proposed acquisition would reinforce Portugal-headquartered Navigator's market positioning in the Western European tissue market, which Navigator said it anticipates would result in a consolidated turnover of £500m, with the UK market contributing around 50% of Navigator's total tissue turnover.

In the year ended 30 April 2023, Accrol posted

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revenues of £242m and adjusted EBITDA of £15.6m.

For the half-year ending 31 October 2023, Accrol had revenues of £100.3m and adjusted EBITDA of £10.2m.

Navigator Paper UK is a wholly owned indirect subsidiary of the Navigator Company, a Portuguese integrated pulp, paper, tissue, packaging, and biomass-based energy company. In the financial year ended 31 December 2023, Navigator reported consolidated revenues of €1,953m and consolidated EBITDA of €502m. It diversified and entered the tissue market in 2014 and now produces tissue paper parent reels on a large industrial scale with direct integration of pulp into tissue production. It also has converting facilities at sites across Western Europe and the UK which serve the At-Home and AfH markets.

Navigator acquired AMS Star Paper in 2015 and invested in a greenfield tissue paper production plant in the Aveiro district of Portugal in 2018.

In 2023, it acquired the tissue consumer business of Spanish Gomà-Camps group and its Zaragoza industrial site. It now has a total production capacity of 165,000 tons of tissue paper and 180,000 tonnes of tissue converting capacity per year, generating approximately €293m of annual revenue in 2023.

The company said Accrol "is a key pillar" in its strategy of sustained expansion of its tissue business in the Western European market. It will focus on building on Accrol's market position in the UK tissue private label market and supporting its growth across all its core product segments.

It added: "Combining Accrol's industrial sites, personnel, and client commercial relationships into the Navigator Group has the potential to enhance its performance for the benefit of customers, employees and stakeholders."

The acquisition of Accrol by Navigator Paper UK is subject to terms and conditions.

NORTHWOOD TISSUE BOOSTS CAPACITY WITH PRIMEDRY HOOD INVESTMENT

Northwood Tissue has increased its production capacity after investing in an Andritz-supplied gas-heated PrimeDry Hood HT and air system for a tissue machine rebuild at its mill in Chesterfield.

Andritz's scope of supply includes installation work, supervision of mechanical installation and commissioning. Start-up of the turn-key order is planned for the third quarter of 2024.

David Harries, Director at Northwood Tissue, said: "This investment is another milestone in improving carbon footprint and operational efficiencies."

The supplier added that the installation of the new PrimeDry Hood HT will increase the drying capacity due to an impingement temperature of up to 530°C.

It will also enable a higher heat transfer rate, which Andritz said will result "in considerable energy optimisation per ton of tissue produced."

Northwood Tissue (Chesterfield) is a member of the Northwood Group. It produces high-quality tissue grades for Consumer and AfH sectors at its mills in Chesterfield, Disley, and Lancaster, England.

The group has paper making capability in excess of 100,000tpy in the UK and Spain.

POLAND

GRIGEO ACQUIRES GZP'S NIEDOMICE TISSUE MILL

Grigeo has acquired a tissue paper mill from Polish tissue paper and paperboard producer Głuchołaskie Zakłady Papiernicze (GZP). Grigeo Hygiene – which is controlled by the Baltic States-based paper and wood industry group Grigeo – has acquired 100% of the shares of a GZP's subsidiary Niedomickie Zakłady Papiernicze, which is the operator of a tissue paper business in Niedomice, Poland.

It is the first purchase by Grigeo group of a site in the Polish tissue market. The acquisition was financed from funds raised by Grigeo.

Tomas Jozonis, Chief Executive of Grigeo, said: "This transaction will allow us to strengthen our position in the fast-growing Eastern and Central European market. Optimisation of logistics costs will also open up wider opportunities for sales of top-quality products in Germany and other Western European markets."

The acquisition of the Polish factory was one of the company's strategic steps: "We acquired not only the factory, but also the expertise. We will be able to combine it with the best production practices we already have in the Grigiskes factory when looking for new solutions and expanding our product range."

It currently employs around 170 people and operates a paper machine and conversion lines.

The company said that according to unaudited data, the acquired GZP unit had an annual turnover of around €40m in 2023 and a business value of around €22m. Grigeo employs around 860 people, and in 2023 it reported an annual turnover of €195,4m. In 2023, the net profit of the Grigeo group of companies amounted to €29.6m, an increase of €18.0m compared to the same period in 2022.

BRAZIL

WALTER SCHALKA STEPS DOWN FROM SUZANO PRESIDENCY

Walter Schalka is to step down from his role as the President of Suzano and be succeeded by João Alberto Abreu, who is leaving the Presidency of Latin America's largest logistics operator Rumo.

Schalka has spent the last decade in the role and will step down on 1 July 2024. He will be nominated for a seat on the company's board of directors.

Abreu has been President of Rumo for five years and will now step down to take on the new position at Suzano. Suzano has also confirmed it has nearly completed the start-up of its R$22.2bn Cerrado Project – a new pulp mill in Ribas do Rio Pardo in Brazil – which is due to start operations in June. Once up and running the pulp mill will produce 2.55m tons of pulp a year, increasing the company's market pulp installed production capacity to 13.5m tons a year.

GLOBAL

K-C UNVEILS RESTRUCTURING INITIATIVES FOCUSED ON GROWING BRANDS AND BUSINESSES

Kimberly-Clark Corporation (K-C) has unveiled the next phase of its growth strategy that it said will "catapult" the company into its next chapter.

The next phase of growth will include changes to its operating model and key commercial initiatives that it said are designed to grow its brands and businesses at a faster pace than its categories.

Mike Hsu, Chairman and Chief Executive, said: "Over the past five years, our global team's dedication and strong execution have positioned us to fully leverage the scale we've built and to catapult Kimberly-Clark into its next chapter of growth. We are building on the consumer centricity and commercial advantages we've established by moving to a more agile and focused operating structure that we are confident will help accelerate our proprietary pipeline of innovation in right-to-win spaces and improve our growth trajectory, profitability, and returns on investment. We have more than 150 years of history, transforming ground-breaking insights into innovative categories.

"We are excited to build on the strength of that legacy as we drive for consistent, long-term value creation."

Its growth initiatives will include:

- Accelerating Pioneering Innovation to capture significant growth available in its categories by investing in science and technology to satisfy unmet and evolving consumer needs. K-C will focus on growing 12 "powerhouse brands" that have number one or strong number two positions, and that drive more than 80% of the company's net sales in five spaces with a total addressable market of $240bn: Baby & Child Care, Feminine Care, Adult Care, Family Care, and Professional.
- Optimising its margin structure to deliver superior consumer propositions at every rung of the price-value ladder. K-C will implement initiatives and deploy technology and data analytics designed to create a fast, adaptable, integrated supply chain with greater visibility that can deliver continuous improvement. It said the planned supply chain modernisation is expected to generate more than $3bn in gross productivity and $500m in working capital savings that will be used to help fuel growth investments.
- Wiring its organisation for growth to drive agility, speed, and focused execution that extends the company's competitive advantages further into the future. These three new business segments will be supported by more efficient, world-class functions, including Research & Development, Marketing, Finance, Information Technology, and Human Resources. The company expects to complete its transition to the new organizational structure by the end of 2024. These actions are expected to generate approximately $200 million of selling, general and administrative savings in the next few years that will be available to invest back in the business.

100% NATURAL FOREST-FREE AMBITION

Hsu added that sustainability will continue to be a critical component of the company's innovation strategy. He said that over the past decade, the company has explored "an extensive array of alternative fibre options, investing significantly in developing more sustainable products."

Based on progress against existing goals, Kimberly-Clark is setting a new ambition to be 100% Natural Forest Free across its product portfolio. The company expects to be more than halfway to this goal by 2030.

CLEARWATER REPORTS NET INCOME UP $61.7M IN 2023; BOOSTS PAPERBOARD PRESENCE WITH AUGUSTA ACQUISITION

Clearwater Paper Corporation has said it will "explore strategic options for its tissue business", as it rates the division's performance improvement "outstanding" in its 2023 results. In the fourth quarter of 2023, the company reported a strong performance driven by "solid operational results and continued strength in tissue."

Arsen Kitch, President and Chief Executive, said: "We had a great year driven by a significant improvement in our tissue margins and strong operational execution across both businesses. Tissue demand remained strong, and we benefited from favourable input costs. Paperboard demand was soft."

For the full year, the company reported an "outstanding year driven by performance improvement in tissue" as net income reached $108m, up $61.7m when compared with 2022.

Net sales of $2.1bn – flat compared with 2022 – were a result of a strong tissue demand offset by softness in the company's paperboard division.

Net income was $108m compared to net income for 2022 of $46m.

Adjusted EBITDA for 2023 was $281m compared to 2022 Adjusted EBITDA of $227m.

The ground-breaking ceremony at the company's Sun Paper Source factory: the four new lines will be homed in a total area of 9.5 hectares

INDONESIA

SUN PAPER SOURCE INCREASES CAPACITY WITH FOUR TMS

Sun Paper Source has invested in four paper machines to be installed at its plant in Ngoro, Mojokerto, boosting its production capacity to 300,000tpy in total with sister company Sopanusa. The new lines – PM18, 19, 20, and 21 – will be homed in a total area of 9.5 hectares and will be integrated to fully automated converting machines. The expansion initiative was officially announced by a ground-breaking ceremony held on 7 March at its Sun Paper Source factory. A spokesperson for the business confirmed to TWM that two machines will be operated by the end of 2024, and the remaining two machines are planned to be operational by February 2025. The name of the machinery supplier is confidential at this time.

Ronald Rusco, Chief Executive of Sun Paper Source, said: "After navigating the challenges poses by the Covid-19 crisis in 2020, we are thrilled to witness Sun Paper Source and Sopanusa Tissue & Packaging Saranasukses (a sub-holding of SPS Corporate), achieved unprecedented sales. As one of the premier titans in the Southeast Asian tissue industry, we currently boast a fleet of six PMs, and are now advancing in 2024 by adding four paper machines. At this new location, our plan is to increase the total number of machines to eight within the next five years."

Sun Paper Source is part of SPS Corporate, a tissue paper producer based in East Java, Indonesia. It currently produces up to 180,000tpy along with its sister company Sopanusa.

Read TWM's interview with Ronald Rusco, Chief Executive of Sun Paper Source, on p.30.

"As one of the premier titans in the Southeast Asian tissue industry, we currently boast a fleet of six PMs, and are now advancing in 2024 by adding four paper machines."

SAUDI ARABIA

CROWN PAPER BOOSTS CAPACITY BY 70,000TPY WITH TM INVESTMENT

Crown Paper Mill is to boost its high-quality tissue production capacity after investing in a second Valmet-supplied Advantage DCT 200 tissue line.

Start-up is scheduled for the second half of 2025 and the tissue line will have a design speed of 2,200m/min, a width of 5.6m, and a production capacity of 70,000tpy. The scope of supply includes an OptiFlo headbox, Yankee cylinder, extensive automation package and flow control valves. It will also feature a ViscoNip press, AirCap Heli hood with air system, WetDust systems and a SoftReel reel as well as a Focus Rewinder. The Advantage DCT 200 is the first tissue machine installed at the company's new site in Dammam area in Saudi Arabia, after the first Valmet-supplied line started-up at Crown Paper's Abu Dhabi site in March 2019.

Abdullah Al Katheeb, Managing Director, Crown Paper Mill, said: "The cutting-edge technology and unwavering support have elevated our operations.

"We look forward to continued collaboration and shared success."

Headquartered in the Industrial City of Abu Dhabi, 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' market and surrounding region.

CHINA

HENGAN LAUNCHES TAD PRODUCTS INTO THE CHINESE TISSUE MARKET

China's Hengan International Group has officially launched premium quality structured TAD tissue products into the local market, following the start-up of its Toscotec-supplied TADVISION tissue machine. Installed at the company's Xiaogan mill, the machine started up in 2023 and is the first of two Toscotec-supplied TAD machines that Hengan ordered. Hengan's second TAD machine will be installed at its headquarters production base in Fujian province. Start-up is scheduled for later this year.

The machinery supplier said: "As the nation's first TAD machine, Toscotec's TADVISION sets a new benchmark for tissue quality in China.

"Hengan is leading the transformation of the Chinese tissue market towards top quality tissue.

"It is producing actual structured tissue with the best bulk, softness and absorbency properties available in the marketplace, which are significantly higher than conventional and textured tissue."

Hui Ching Lau, Chief Executive of Hengan Group, said: "At Hengan, we have timely insights into market changes, and focus both on production scale and product innovation.

"Our new high-end TAD tissue products will drive a consumption upgrade in the Chinese tissue market and help us achieve Hengan Group's grand development goal of "a hundred-year history and a hundred billion Yuan turnover."

Alessandro Mennucci, Chief Executive of Toscotec, said: "We are delighted to be Hengan's partner on a milestone project for their growth strategy and for the Chinese tissue market at large.

"We have now successfully achieved our first shared target, and China's second TAD machine will follow suit."

Founded in 1985, Hengan International Group is a leading Chinese tissue and hygiene products manufacturer.

According to the latest Chinese market report issued by CNHPIA, with over HK$22bn annual revenue and annual capacity of 1.497m tons per year in 2022, Hengan ranks first overall among China's tissue producers.

ROMANIA

PEHART GROUP ENTERS THE AFH MARKET WITH LAUNCH OF SOVIO BRAND

Pehart Group has diversified its product offering after entering the AfH market with the launch of its Sovio brand of products. The company has invested €8m in a conversion line to produce the Sovio brand, which will initially consist of 18 products including paper towels of various sizes and shapes, paper sheets for cosmetic and medical cabinets, napkins, and toilet paper in formats dedicated to AfH spaces. The new conversion line has been operational since the end of last year.

Gabriel Stanciu, General Manager of Pehart Group, said: "One of the major business objectives for the past year was Pehart Group's debut on the AfH market. Our newly launched brand Sovio has a high degree of purity and strength, and the technologies equipped in the conversion line provide the products with a high capacity for absorption, elasticity, and increased finesse. We use only FSC-certified cellulose in production, without any additional recycled material or mechanical fibres."

The Sovio brand is currently intended for the domestic market, but in the medium term Stanciu added the business is considering international markets. In 2023, Pehart Group made investments of over €20m to diversify its portfolio, increase export capacity, and enhance the energy efficiency of production lines.

This included investing €12m to optimise the energy performance of production lines at its two factories in Petrești-Sebeș and Dej.

The modernisation process for tissue paper production aimed at reducing energy consumption by 20% for each machine, with a company-wide energy resource savings reaching 10%.

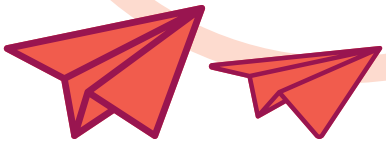
The process of upgrading production capacities will continue in 2024, with the goal of achieving premium product quality with optimised energy consumption. Ovidiu Hoza, National & Export Sales Manager of Pehart Group and manager of the AfH division, said: "The Sovio brand offers a personalised approach to cleanliness, as it is designed to meet the needs of different customer categories. We consider the products grouped under this brand a culmination of Pehart Group's nearly 200 years of experience. The SOVIO brand is also an example of sustainable practices in the industry. In addition to responsible and ecological cellulose sourcing, the machines producing tissue paper have been technologically upgraded in the last two years to optimise energy efficiency."

Stanciu added the investments were the stages "of an ambitious development plan" through which the company aims to strengthen its position in the domestic and European markets.

"We aspire to continue investments in our factories, employing state-of-the-art technologies that help us achieve superior quality at competitive production costs. Moreover, we are aware that, both nationally and beyond borders, the premium quality of our products is the most effective promoter," he added.

With a 187-year history, Pehart Group is one of the largest paper producers in Southeast Europe.

"The Sovio brand offers a personalised approach to cleanliness, as it is designed to meet the needs of different customer categories."



FRANCE

PAPECO BOOSTS CAPACITY WITH YANKEE AND STEAM PLANT REPLACEMENT

Papeteries du Cotentin (PAPECO) has purchased a Toscotec-supplied TT SYD Steel Yankee Dryer and a complete high-performance steam and condensate plant for its Orval sur Sienne mill in Normandy.

The project will replace the company's existing cast iron dryer and steam system on PM3.

It includes modifications to the machine for the new steam system and it is planned for start-up in the third quarter of 2024.

According to the supplier, compared with the existing cast iron Yankee the TT SYD will "significantly increase PM3's production capacity, which will guarantee higher operational safety and delivering energy savings."

Emmanuel Coulon, General Manager of PAPECO, said: "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 fibres is also a big part."

Founded in 1990, PAPECO produces industrial wiping rolls, medical sheets, and toilet tissue.

PERU

PAPELERA REYES INCREASES CAPACITY WITH TM START-UP

Papelera Reyes has boosted its production capacity after starting up an Eil / Replus Tissue-supplied Crescent Former tissue machine.

PM2 started production at the company's Callao-based plant on 23 February, running at a speed of 1,700m/min and producing 130tpd.

The scope of supply includes a turnkey plant from pulper conveyor up to pope reel, a Crescent Former machine and a 15ft Steel Yankee.

A hood with Reenergy system - a gas turbine which generates the electrical energy for the plant and its exhaust fumes feed the hood and a recovery boiler – has also been started up.

The supplier said this means that there is only one source (natural gas) that produces 100% of the electrical and thermal energy required by the plant.

Stock preparation for virgin fibre designed to run 100% short fibre, and the line has a net sheet width at reel at 2.7m and a maximum operating speed of 2,000m/min

The entire plant's mechanical parts, process, electrification, automation, aerothermal system were designed, manufactured, and supplied by Italy's Eil / Replus Tissue, the supplier's first ever start-up.

TISSUE EXPORT POWERHOUSE: INDONESIA RETAINS ITS SOUTHEAST ASIAN REGIONAL LEADERSHIP POSITION

Technology upgrades are seeing capacity CAGR of 11% from 2007 to 2025 … a more than five-fold increase, as exports exceed imports 166-fold. By Bruce Janda, Senior Consultant, Fisher International.

Population growth, rising consumer incomes, increased hygiene awareness and advanced technology in Indonesia are the major drivers in increasing tissue per capita consumption. GDP did stall during the pandemic years, but has now recovered sharply, boosted by the developing income stream from exports.

The population growth over the past 17 years is shown in Figure 1 as bars. The blue line in Figure 1 is the GDP per capita adjusted for purchasing power parity. GDP growth stalled with the pandemic but recovered sharply after 2020.

Population and GDP per capita growth helps support domestic tissue consumption, but inflation and unemployment provide the headwinds. The trend of inflation is shown in Figure 2 as the blue line. Indonesia made remarkable progress in controlling inflation except for a post-pandemic blip that appears to be settling out. Unemployment, shown as the bars in Figure 2, is trending lower with the same pandemic upset. About 9.4% of the population was below the poverty line in 2019.

The country's tissue manufacturing base includes about 16 companies. Asia Pulp & Paper (APP) accounts for over three-quarters of the total installed capacity and much of the newer capacity. The changes in the Indonesian tissue fleet are shown in Figure 3. The total number of tissue machines has remained almost constant since 2007, but the total tissue capacity will grow at a CAGR (compound annual growth rate) of

WORLD'S FOURTH MOST POPULOUS COUNTRY AND THIRD LARGEST DEMOCRACY

Indonesia is an archipelago with 13,466 islands, 922 of which are inhabited. The main island of Java is one of the most densely populated locations in the world. Despite the large population, Indonesia is the second most densely forested region in the world, after the Amazon.

Indonesia's paper business developed rapidly over the past four decades with new investments, starting with communications papers and pivoting to become a significant market pulp leader. Tissue grew in a second wave, with the latest capacity added in the last 20 years. Tissue remains a minor focus compared to market pulp and the packaging grades, but will surpass the communications grades by about 2026.

The rapid pulp and paper growth resulted in significant deforestation, much of it illegal. Much of the deforestation was on the island of Sumatra, resulting in wildfires, heavy smog, and loss of critical habitat for endangered wildlife.

Indonesia is the world's fourth most populous country and third largest democracy. Rapid population growth was slowed from the 1960s to the 1990s and has started to run just above the replacement rate in the 2020s. Indonesia continues to be a source of temporary migrant workers but now is also a destination for highly skilled migrant workers. In 2023, the population growth is estimated to be moderate at 0.76%.

about 11% from 2007 to 2025. This represents a more than five-fold capacity increase as the newer machines are much faster and wider.

Indonesia's tissue imports and central supplier countries are shown in Figure 4. Tissue products from China, New Zealand, and South Korea accounted for 88% of non-domestic imports in 2023.

Indonesia has become a tissue export powerhouse, with exports exceeding imports by about 166-fold. Figure 5 shows the leading customers for Indonesian tissue by country and amount. The United States, South Korea, Japan, Taiwan, and the Philippines are the leading customers, accounting for almost 60% of the total exports.

The country's tissue producers are located on the Islands of Java and Sumatra, as shown in Figure 6. The Javanese machines are older and smaller than the newer Sumatran tissue machines. Sumatran machines tend to be based on virgin fibre integration, while Java machines focus more on recycled fibre or market pulp.

More details on Indonesian tissue sites by fibre source are shown in Figure 7. Sites with virgin integrated fibre represent 31% of the total capacity. The amount of virgin integrated tissue production has grown during the Sumatran expansion, while some older recycled machines have shut down on Java.

Indonesian tissue products average over 60% Tropical Hardwoods, as shown in Figure 8. This fibre is mainly from the Sumatran Acacia plantations and pulp mills. Acacia fibre is good for tissue formation and softness but is not quite as highly regarded as eucalyptus pulp for tissue. Note that Figure 7 represents sites with at least some fibre integration, and some market pulp production is transferred to non-integrated sites within the country. Bleached Northern Softwood market pulp is

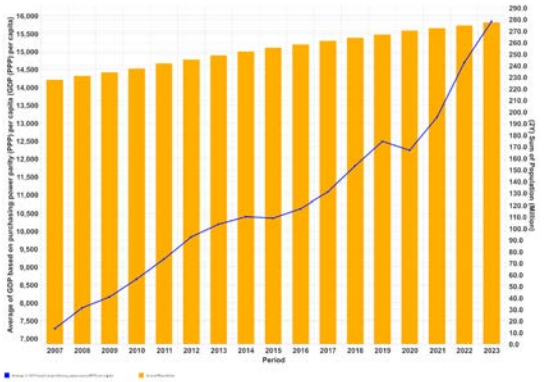


Figure 1: Indonesia Population and GDP/Capita (adjusted for PPP)

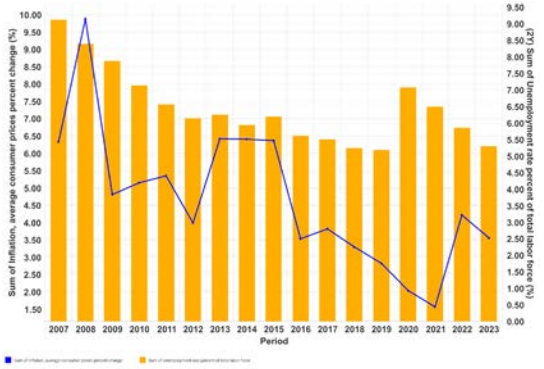


Figure 2: Indonesia Inflation and Unemployment

Figure 3: Indonesia Tissue Machine Count Changes

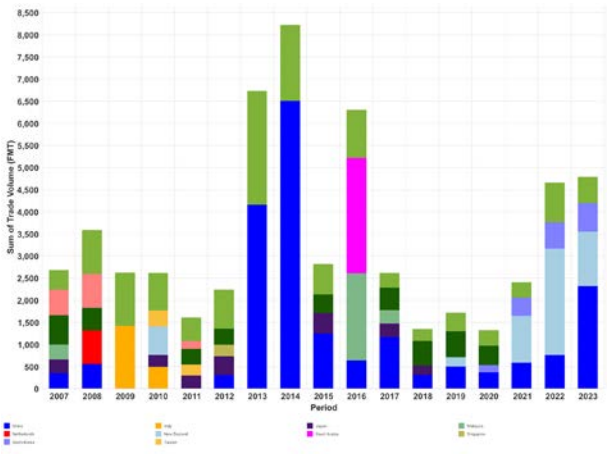


Figure 4: Indonesia Tissue Imports

Indonesian tissue products average over 60% Tropical Hardwoods. This fibre is mainly from the Sumatran Acacia plantations and pulp mills.

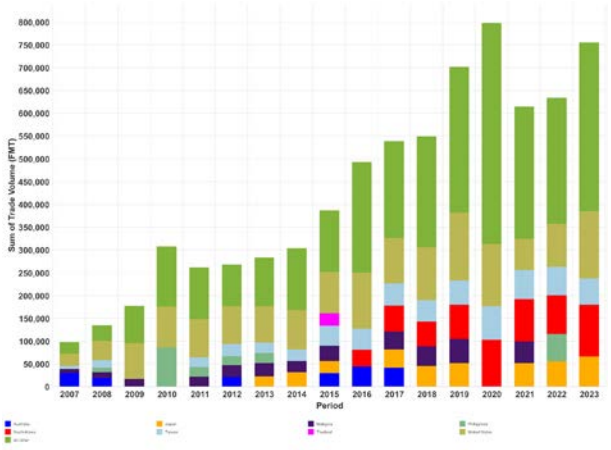


Figure 5: Indonesia Tissue Exports

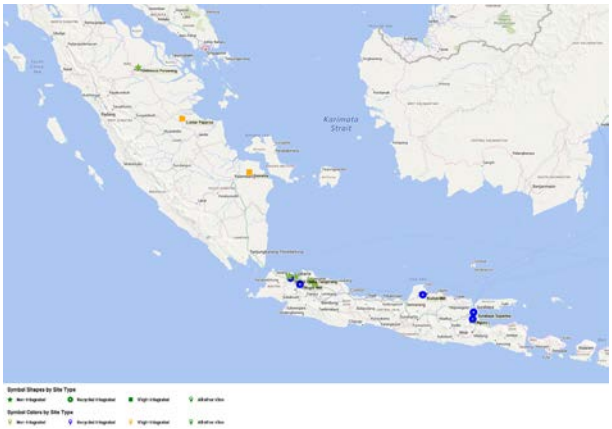


Figure 6: Indonesia Tissue Mills

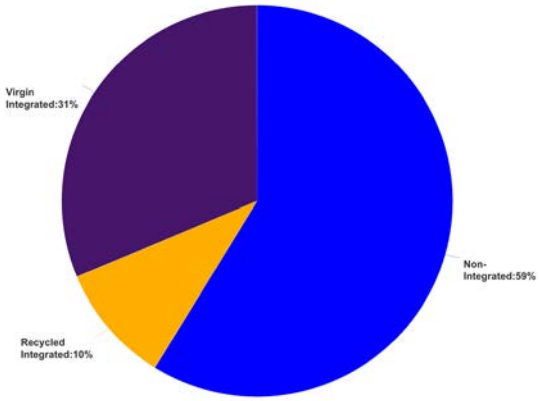


Figure 7: Indonesia Tissue Mill Site Fibre Integration

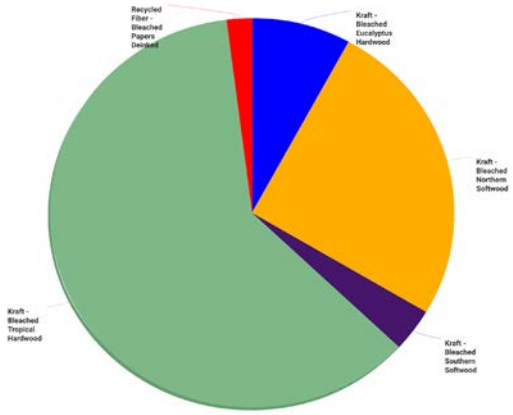


Figure 8: Indonesia Tissue Fibre Types

Indonesian tissue machines are the second newest on average, followed by Vietnam. Despite being older, Australia still has the fastest tissue machine speeds.

imported to about one-quarter of the total furnish. Less than 10% of eucalyptus fibre is imported.

Figure 9 provides a summary of how these fibre sources are used. Most production is devoted to consumer tissue grades, led by Bath Tissue. Consumer Facial and Towel also represent significant production. Similar furnish is used for all three of these products. On average, they all contain some imported eucalyptus and substantial amounts of Northern and Southern Softwood. The Consumer Towel products contain mostly Softwood long fibre, as expected. The volume of Consumer Napkin and Commercial products is relatively small.

Figure 10 summarises Indonesia's tissue machine quality versus a comparison set drawn from local trade partners and Brazil. The size of each bubble represents the relative proportion of total tissue production for each country. The X-axis represents each country's average tissue machine technical age, while the Y-axis provides the average tissue machine speed. Of course, China has the overwhelming share of tissue volume produced and the newest tissue machine fleet on average. Indonesian tissue machines are the second newest on average, followed by Vietnam. Despite being significantly older, Australia still has the fastest tissue machine speeds, with Indonesia in second place. This suggests that Japan's, Taiwan, China's, and possibly Malaysia's tissue industries will fall further and further behind in tissue productivity and quality.

A manufacturing cash cost ranked comparison of the same set of countries is shown in Figure 11. This curve shows the relative capacity for each country as the width of the bars and the relative cash cost for production as the height of the bars. Indonesia has the lowest cost position on average, followed by Vietnam. China

occupies the wide middle, with Japan and Taiwan as relatively high-cost producers.

A similar ranked comparison for Scope 1 & 2 carbon emissions is shown in Figure 12. Again, the bar width represents the tissue capacity of each country, while the height of each bar represents the average CO2 emission per ton of tissue production. Brazil has the lightest carbon footprint per ton of tissue produced due mainly to its high site integration with fibre production and the relatively low-carbon electric grid. Indonesia ranks second lowest due to similar site integration advantages but tends to have a higher-carbon electric grid.

Indonesia is a tissue export powerhouse well-positioned to maintain this Southeast Asian Regional leadership. The acacia plantations in Sumatra provide low-cost tropical hardwood with good softness properties. Indonesian tissue production costs are the lowest in the region and favourable to Brazil. The Indonesian tissue machine fleet has a lower technical age than any country in the region other than China. However, on average, Indonesian tissue machines run faster than Chinese tissue machines. Indonesia has relatively low scope one carbon emissions due partly to large integrated sites, but the Indonesian electric grid is relatively high carbon compared to similar Brazil.

Analysis of competitive position requires specifics on tissue producers and individual machines. This article presents a static summary of Indonesia's tissue industry today. Fibre prices, exchange rates, and environmental regulations will change, providing some participants advantages and new challenges. In addition, Indonesia's tissue mills will continue to change hands and consolidate, and neighbouring countries may invest in tissue-making capacity, affecting Indonesia's imports and exports.

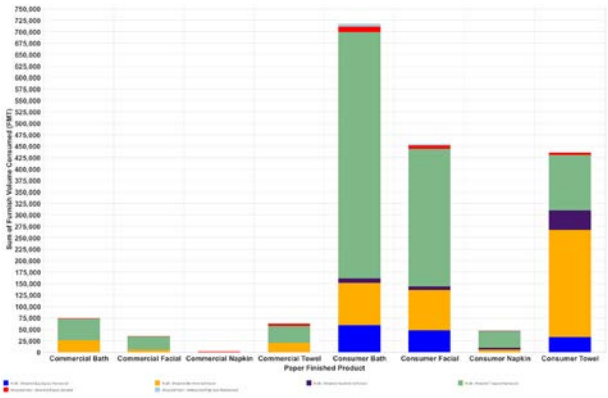


Figure 9: Indonesia Tissue Finished Products and Fibres

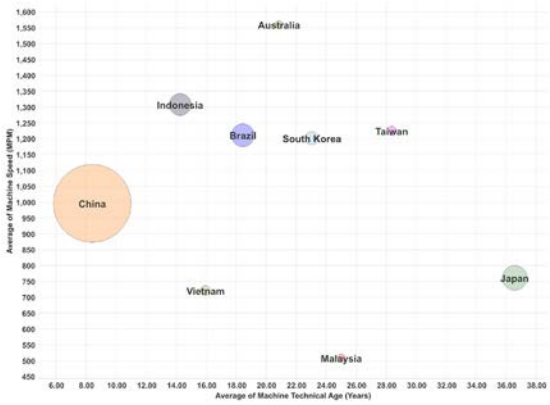


Figure 10: Indonesia Tissue Machine Quality

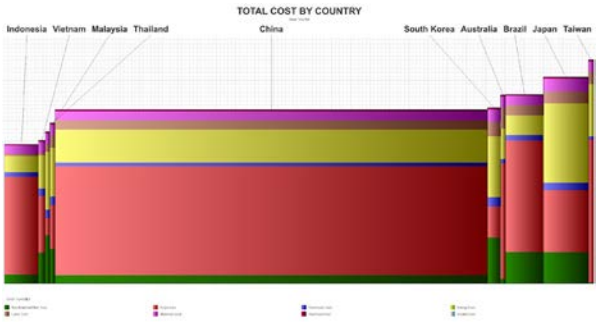


Figure 11: Indonesia Comparison Set Cost Curve

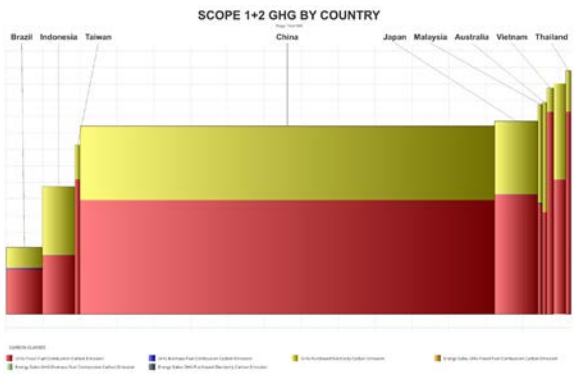


Figure 12: Indonesia Comparison Set Carbon Curve

Indonesia is a tissue export powerhouse well-positioned to maintain this Southeast Asian Regional leadership.

INDONESIA POISED TO GET BACK ON ITS FAST-GROWTH PATHWAY

The pandemic caused a four-year economic slowdown and hit consumer confidence – but an impressive projected five-year CAGR is now "inevitable," says Euromonitor International Consultant Jason Tjiptadi.

The Indonesia retail tissue market is poised to experience double digit CAGR growth in the next five years, the second highest in the Asia Pacific region. The growth will be fuelled by the increasing disposable income within young middle-income households, improved consumer awareness, favourable demographic trends, enhanced digital engagement and business-led product diversification and innovations.

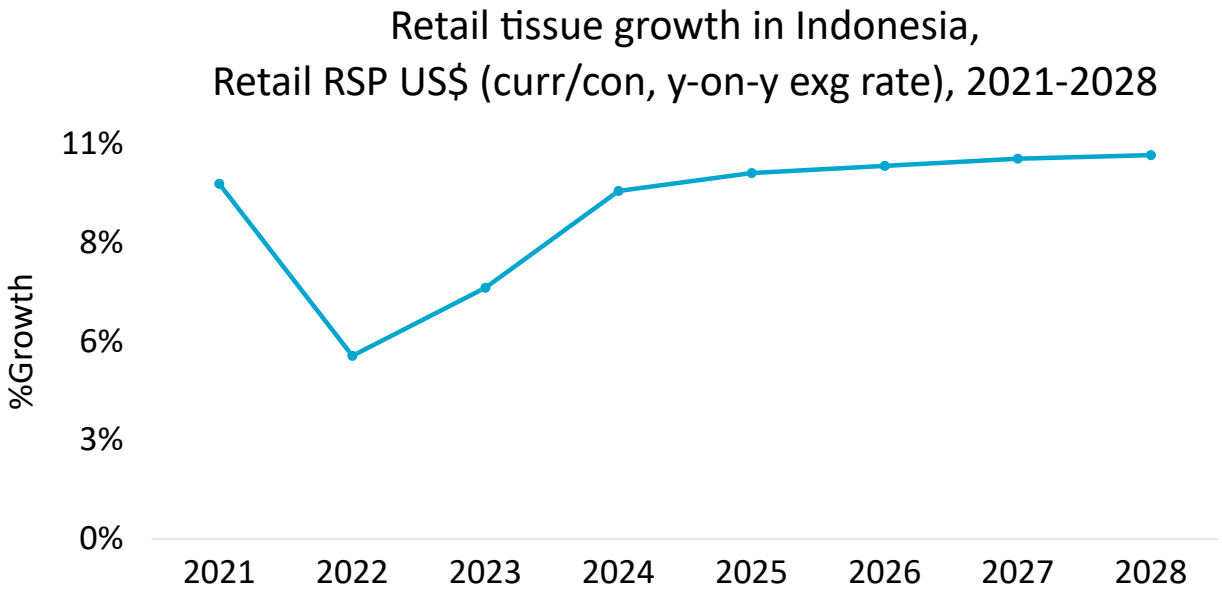
ECONOMIC UNCERTAINTIES COMPROMISED SHORT-TERM GROWTH

Over the past decade, the tissue market in Indonesia has seen remarkable growth, buoyed by the country's robust economic expansion which has fuelled urbanisation and the rise of middle-income households. Manufacturers have also actively raised awareness through endorsements and live campaigns, effectively reaching new consumers and increasing per capita consumption.

However, this promising growth trajectory faced challenges during the pandemic in 2020, as well as periods of high inflation and federal interest rates in 2022 and 2023, leading to reduced consumer confidence. Manufacturers struggle with escalating costs of raw materials and production, necessitating price hikes. Consequently, consumers have become more cautious, cutting back on usage to manage expenses, resulting in significantly weaker growth for retail tissue compared to pre-pandemic projections.

Simultaneously, consumers are cutting back on leisure spending and dining out. The consumer foodservice market in 2023 continues to lag, with a 20% decline in output value sales compared to pre-pandemic levels. Additionally, inbound travel numbers in 2023 remain below those of the pre-pandemic era, leading to slower growth of AfH tissue value (curr/con) in 2023.

Despite recent challenges of rising inflation and interest rates, there's a noticeable uptick in product and hygiene awareness, with middle to higher income households demonstrating increased spending on innovative, higher-quality tissue products. This trend is amplified by the power of social media platforms, particularly TikTok and Instagram, which effectively reach consumers from diverse backgrounds. Influencers and users sharing their tissue usage experiences online contribute significantly to public awareness regarding the importance of tissues in various settings, including the kitchen, living room, and bedrooms. Manufacturers are also doubling down on innovation, introducing new products equipped with features like antibacterial properties and extra softness. These advancements are pivotal in laying the groundwork for the future growth of retail tissue.



Source: Euromonitor International Tissue and Hygiene, data published February 2024. Numbers for 2024-2028 are forecasts

FAST-PACED ECONOMIC GROWTH AND FAVOURABLE DEMOGRAPHY TRANSLATES TO LONG-TERM GROWTH

While the Indonesia economy and consumer confidence has been compromised the past four years, it is inevitable that the country will be back on a fast-growth track. Indonesia is expected to experience 5.2% GDP growth in 2024. The country has a median age of 30.9, in which around 70% of the population will be in working age at least for the next 20 years. At the same time, Indonesia just received upper middle-income status from World Bank in 2022, showing a significant growth of gross national income per capita every year. All these statistics are important to know for tissue manufacturers as it shows that the demography is on their side to have double-digit forecast CAGR in the next five years. The double-digit is also made possible by the low current consumption per capita as compared to countries in the region. Manufacturers will be able to capture first time buyers while continuing to increase penetration among existing users.

The rapid expansion of the economy is also leading to the construction of more public facilities such as hospitals, malls, and offices, which will also benefit the market for AfH tissue products. Additionally, the revitalisation of domestic and inbound tourism will contribute to increased sales within the HORECA industry, the largest channel for AfH tissue consumption in Indonesia.

In the next five years, retail tissue in Indonesia is expected to grow 7% CAGR in volume terms and 10.3% CAGR in retail value US$ (curr/con, y-on-y exg), while AfH tissue in Indonesia is forecasted to grow 8% CAGR in volume terms and 10% CAGR in AfH value US$ (curr/con. Y-on-y exg).

The robust growth outlook and a large influx of first-time buyers present an opportunity for new manufacturers to enter the market and secure significant market share. This trend aligns with consumer behaviour across various industries in Indonesia, where brand loyalty tends to be low, and consumers prioritise perceived value, even from products with little established presence in the country. For example, newer local brands such as Yukinawa and Montiss gained significant sales growth in recent years - especially in e-commerce platforms - by offering lower unit price.

Presently, the Indonesia tissue market is largely dominated by two manufacturers, Asia Pulp & Paper (APP) and Graha Kerindo Utama, commanding nearly 80% of the market share. Their popularity stems from effective product segmentation, innovation, and adept utilisation of online platforms, all of which will remain pivotal growth drivers in the coming five years.

PRODUCT AND PRICE SEGMENTATION TO CATER TO A WIDE RANGE OF AUDIENCE AS A KEY COMPETITIVE PIVOT

The key for growth lays in the understanding that there is no "one-size-fits-all" product and innovation for a population of over 270 million. This means that manufacturers have to offer diversified brand portfolio to cater to different market segments.

For instance, APP has three distinct brands: Paseo for the premium segment, Nice for the mid segment, and Jolly for the economical segment. Volume growth in the next five years will be mainly driven by the mid and economical segment as Indonesia's middle-income households still have the reputation of being price sensitive. According to Euromonitor's lifestyle survey 2023, 57% of Indonesian respondents' future spending habits involves putting more money aside for savings, higher than the global average of 44%.

Simultaneously, most of the value growth is expected to be generated from the premium segment, where affluent consumers prioritise high quality and innovative products.

Therefore, introducing new products with attributes such as anti-bacterial properties, extra softness, and eco-friendliness remains paramount to cater to the increasing numbers of health-conscious and environmentally-aware consumers. Paseo's recent launch of Paseo Aroma Relief, which infused with soothing aromas from Eucalyptus and Lavender essential oils, exemplifies this trend. Additionally, its triple softness, dermatological testing, and halal certification are features highly valued by Indonesian consumers.

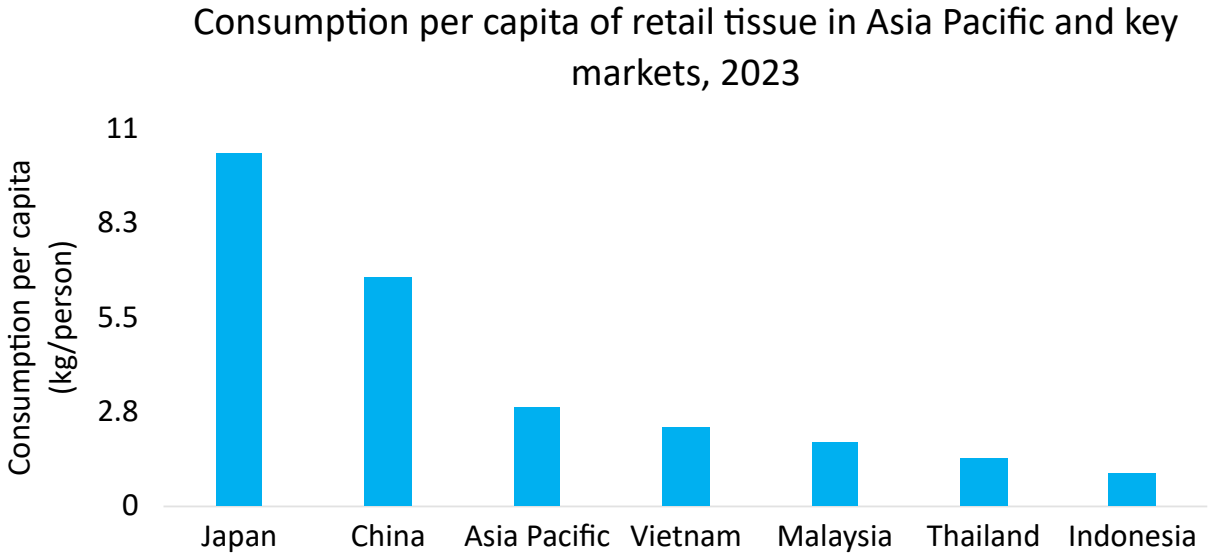
SOCIAL MEDIA AND E-COMMERCE AS ENDURING KEY SALES DRIVERS

Sustaining the trajectory of recent years, the significant influence of both social media and e-commerce will continue to drive sales. By 2028, approximately a quarter of all retail tissue sales are projected to come from e-commerce channels, driven by consumers seeking cost-effective bulk purchases. E-commerce platforms serve as crucial avenues for Indonesian consumers to discover new products, given their prolonged engagement with these platforms.

Concurrently, leveraging influencers on platforms like TikTok and Instagram will be essential for market expansion and competitive positioning, as influencer endorsements can significantly impact consumer choices regarding products and brands.

CONCLUSION

Indonesia's favourable demographic profile, characterised by a young population and expanding middle-income households, coupled with rapid economic growth, is poised to propel the tissue market to a double-digit CAGR over the next five years. Increased disposable income and heightened awareness of products and brands are pivotal factors driving this expansion. To capitalise on these opportunities, manufacturers must prioritise fostering social media engagement and introducing innovative products to maintain consumer interest and satisfaction.



Source: Euromonitor International Tissue and Hygiene, data published February 2024

A SOUTHEAST ASIAN "PREMIER TITAN" EMBARKS ON VISIONARY EXPANSION

In March, Indonesia's Sun Paper Source announced it had invested in four tissue machines at its plant in Ngoro, Mojokerto, boosting production capacity to 300,000tpy in total with sister company Sopanusa Tissue & Packaging Saranasukses. Here, TWM Senior Editor Helen Morris interviews Chief Executive Ronald Rusco to get the latest on the company's growth ambitions across Southeast Asia and beyond.

Sun Paper Source's plant in Ngoro, Mojokerto, East Java:
"Unprecedented sales" after navigating the challenges of Covid-19

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Production boost: following the investment, most new capacity will be converted into finished products ready for export

"Tissue paper is now very much considered an essential item for daily living here in Indonesia," Sun Paper Source Chief Executive Ronald Rusco explains from his tissue plant in Ngoro, Mojokerto, East Java. "And that was never more the case than during the pandemic. Then we saw that the people here had become more concerned about health and hygiene issues, and so tissue paper usage substantially increased during the pandemic years in Indonesia, and across the whole of Southeast Asia."

Sun Paper Source was quick on its feet. Such was the increase in tissue demand, in March this year it and sister company Sopanusa Tissue & Packaging Saranasukses (Sopanusa), as part of SPS Corporate, announce visionary expansion plans. Four new Crescent Former paper machines (currently supplied confidentially) will be installed at the Ngoro facility, and Rusco confirms that the investment decision was driven by Sun Paper Source and Sopanusa achieving "unprecedented sales" after "navigating the challenges posed by the Covid-19 crisis".

"As one of the premier titans in the Southeast Asian tissue industry, we currently boast a fleet of eight tissue machines, and are now advancing by adding four new tissue machines," he said at the time.

Production capacity will increase from the current 180,000tpy – which sits across the company's existing eight tissue machines – to a total of 300,000tpy along with Sopanusa. Most capacity will be converted into finished products, and more fully automated converting machines will be integrated into the new tissue machines to produce facial, toilet, and kitchen towel rolls. "By dedicating the machines to produce based on their best capability, we will make sure they run efficiently," he says. "We will also continue to adopt new technologies to be competitive at production cost."

The lines – PM18, 19, 20, and 21 – will be homed in a total area of 9.5 hectares, with two machines operational by the end of 2024, and the remaining two expected to be up and running by February 2025.

It is not the first time the business has announced rapid investment plans in response to a rapidly changing environment. TWM last visited the company at Sopanusa's site in the city port of Surabaya, in 2013. An hour and a half flight from Jakarta, the integrated tissue plant is located on the outskirts of the vibrant, sprawling metropolis, which mixes modern skyscrapers with canals and buildings from its Dutch colonial past. Thousands of motorcycles, cars, lorries, and bikes drive past stalls and houses, mosques, and statues – which now, as then, proved that the country was very much on the rise.

At the time Sopanusa was rapidly expanding the site, and the main growth potential lay almost solely abroad in the tissue jumbo reel export market. Back in 2013, some 85% of its jumbo roll capacity was exported to 60 countries, supporting independent producers across the world with a focus on businesses in the Middle East and South Africa,

"As one of the premier titans in the Southeast Asian tissue industry, we currently boast a fleet of eight tissue machines, and are now advancing by adding four new tissue machines," Sun Paper Source Chief Executive Ronald Rusco

as well as its main target region – the Southeast Asia Pacific.

New machinery investments enabled it to expand into new and bigger markets where it had previously not been able to get a foothold. In the AfH market, Sopanusa/Sun Paper Source produces the OEM brand and special packaging designed products including Multifold and Interfold Towel, Jumbo Roll Toilet, Kitchen and Towel roll, Facial Tissue, Standard toilet roll, as well as coreless and small core toilet. In 2013, tissue consumption per capita in Indonesia was "still low" compared to surrounding countries, around 0.5 kilos per person per year. But the business was seeing big potential to grow due to the fast growth of the Indonesian middle class. "Soon tissue paper will become a necessity in every family life," they said at the time. Things were changing, and the company said it was seeing "more Westernised habits for tissue use".

The business was seeing big potential to grow due to the fast growth of the Indonesian middle class. "Soon tissue paper will become a necessity in every family life," they said at the time.

Based on data from the Ministry of Industry, Indonesia's per capita paper consumption is relatively low at 32kg in 2022, yet the industry is expected to grow driven by higher demand for tissue and paper-based packaging from domestic and international markets. Elsewhere, data from Statista sites that Indonesia's tissue and hygiene paper market is "experiencing a surge in demand due to the country's growing population and increasing awareness of personal hygiene." Its latest report said the largest segment within the market is toilet paper, which is expected to have a market volume of $3.12bn in 2024. Online sales are predicted to contribute 3.5% of the total revenue in the market by 2024. Furthermore, the volume in

Strengthening brand awareness: Following the outbreak of Covid-19, the company has continued to increase its presence in the modern marketplace, as well as nationwide distribution

Growth potential: The business says there is still room to grow in the domestic market, whilst the global market will "just grow organically."

this market is expected to reach 3.5bn kg by 2028. In 2025, the market is projected to show a volume growth of 1.9%.

Generally across Indonesia, Rusco says tissue paper consumption is increasing, both in the private label sectors and also in the regular brands sectors. "However, the trend is showing that private label growth is higher than the regular brand. In terms of the AfH market, this sector has recovered by around 90% compared to pre-pandemic conditions."

Over the past year, the company has continued to focus on increasing its presence in the modern marketplace, as well as nationwide distribution, by strengthening its brand awareness, he says. "During the pandemic, people's concern about health and hygiene issues and tissue paper usage is increased. And in the domestic market, we still believe it has more room to grow, whilst the global market will just grow organically."

Changing e-commerce trends – many of which were driven by the pandemic – have also offered up opportunity: "The growing rate in e-commerce is the highest amongst the other market channels," he says. "However, most of the tissue sales are still in the retail and modern marketplaces."

He elaborates that as both the export and domestic tissue paper markets are a commodity item, price is mostly driven by the market, and so he isn't concerned with inflationary pressures. "As tissue paper is considered such an essential item for daily living, the fluctuation of the pricing drives the customer to choose the "value for money" item rather than the premium or branded one," he adds.

Is he worried about overcapacity in the market? "No, exporting is a key opportunity for us. Indonesia is a net tissue exporter, especially for us, and our export market is up to 80% of our capacity."

Back in 2013, the company confirmed that differentiation was the key for it achieving success in the marketplace, and its strategy was to "continue to grow steadily into new markets with a unique product offering to meet a demanding market." One aspect of that outlook was environmental certification, and in April 2012 Sopanusa became the first Indonesian tissue manufacturer to become FSC-certified. When asked what further environmental advances the company has made, Rusco explains that in the last few years the business has adopted the latest technology to reduce the energy cost, such as steam and electricity. Plans also include changing some of the company's electricity sources to using Geothermal energy.

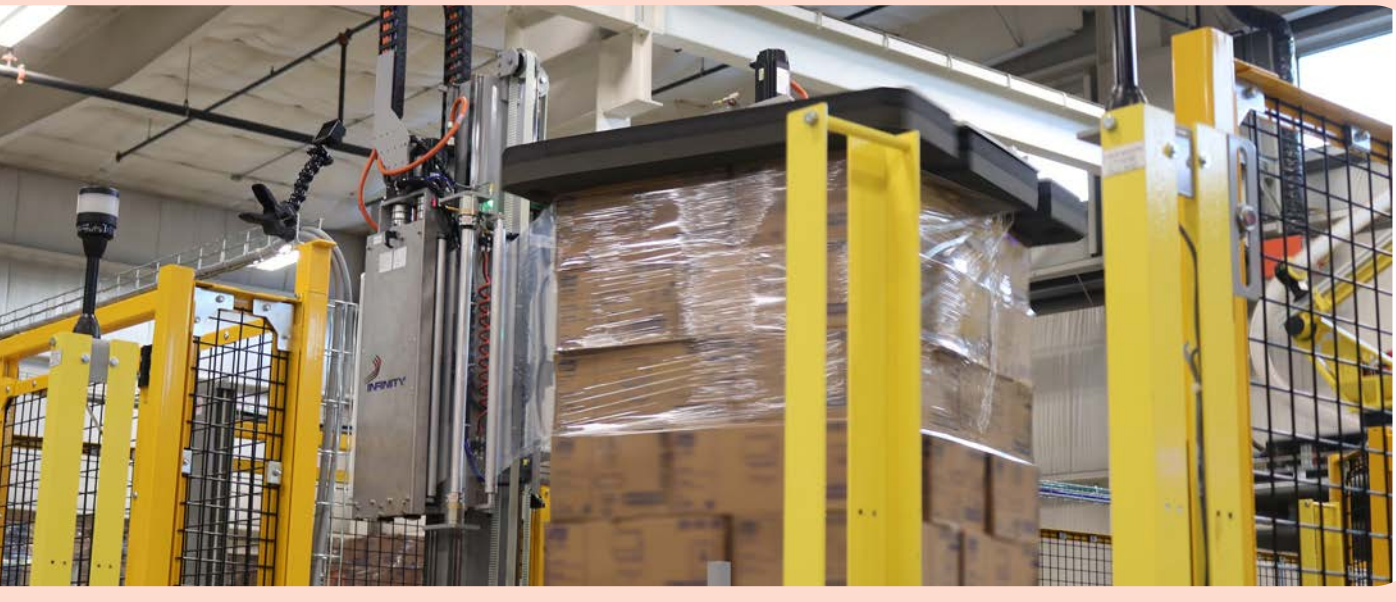
With most of the company's new four tissue machine capacity being converted into finished products ready for export, Indonesia's – and Sun Paper Source's – potential as a net exporter is firmly cemented, and ever growing. "For a net exporter country such as Indonesia, the main challenge will continue to be logistical issues," Rusco adds. "Especially based on the logistic situation that we faced during the pandemic. Whilst for us as a business, the key opportunities will be continuing to take advantage of our geographical location and abilities by continuously growing, and keeping an excellence level of service."

INFINITY'S LATEST AUTOMATION ADVANCE COMPLETES TOTAL MODULAR PRODUCTION LAYOUT

In January, Infinity Machine & Engineering Corp., headquartered in De Pere, Wisconsin, US, announced it had further expanded its roster of automated machinery to cover the end of the production line by launching its latest palletiser, the R10SW. Here, Gregory Sense, Marketing Coordinator, details its qualities. A TWM report.

It is no secret that in recent decades manufacturers have pivoted toward automating the production process at a rapid pace. And as the cost of labour has steadily increased, there is no indication this shift towards automation will slow down anytime soon.

Tissue converters have been especially proactive in implementing automation into their production, as nearly every step of the converting process can and has been automated. In 2004, Infinity Machine & Engineering Corp. was founded in response to the surge in automated tissue converting lines and has led the charge in automating the tissue packaging process ever since.



Automation at every step: Infinity's R10SW palletiser can be integrated with Infinity packaging lines

Quick cycle times and robust performance: the R10SW palletiser comes equipped with an articulated robot arm from FANUC

Already boasting the most comprehensive roster of automated packaging machinery in the industry, Infinity is further expanding its roster of automated machinery to cover the end of the production line with the R10SW palletiser. Responding to consumer demand, the R10SW palletiser can be integrated with Infinity packaging lines, enabling Infinity machinery to automate every step of the tissue production process after the log saw.

A key aspect of the R10SW palletiser is its modularity. The R10SW is made up of modular palletiser sections that can be arranged into countless different layouts to accommodate production requirements, as well as facility limitations. The flexibility created by these palletiser sections make it perfect for a multitude of product lines, from single product, to large-scale, multi-line operations.

The palletiser segments offered by Infinity include automatic slip sheet placement, integrated labelling, and fully automatic, fully servo stretch wrapping. All designed to provide extreme efficiency and flexibility in a minimal amount of space.

The R10SW palletiser comes equipped with an articulated robot arm from FANUC, one of the world's largest industrial robot manufacturers. The R10SW's FANUC articulated robot arm is capable of quick cycle times and robust performance. The development of the R10SW palletiser has led to Infinity becoming an official "FANUC Authorised System Integrator".

Versatility and robust performance capabilities are built into the design of the R10SW. Vacuum or servo gripper end effectors can be equipped on the palletiser, allowing for high-speed stacking on a wide range of products, including cases, bundles and DRP.

One focus for Infinity engineers in the design of the R10SW was prioritising operator convenience and safety. This resulted in a machine that features multiple safety zones separated by access gates, allowing for safe observation of production. Access to hard-to-reach areas of the machine has also been improved, culminating in a palletiser that is as safe as it is accessible.

Operators of the R10SW are given total control from the machine's HMI. Convenient access to production information such as wrap status, load height, and slip sheet quantity allows for possible adjustments in production to be identified and made immediately from the HMI.

As tissue converters throughout the world continue to embrace automation, flexibility is as essential in the production's end-of-line as it is in the converting and packaging process. The R10SW brings Infinity's signature innovative engineering and robust build quality to the world of palletising solutions, making the production end-of-line safer, smarter, and as flexible as the rest of your line.

This article was written for Tissue World Magazine by Gregory Sense, Marketing Coordinator, Infinity Machine & Engineering Corp.

THE BUNDLER WAS STANDING IDLE ... THAT MADE NO SENSE

In the tissue packaging technology market Plusline wanted to set new efficiency standards. Business Development Director Matteo Giardini explains how they went about it. A TWM report.

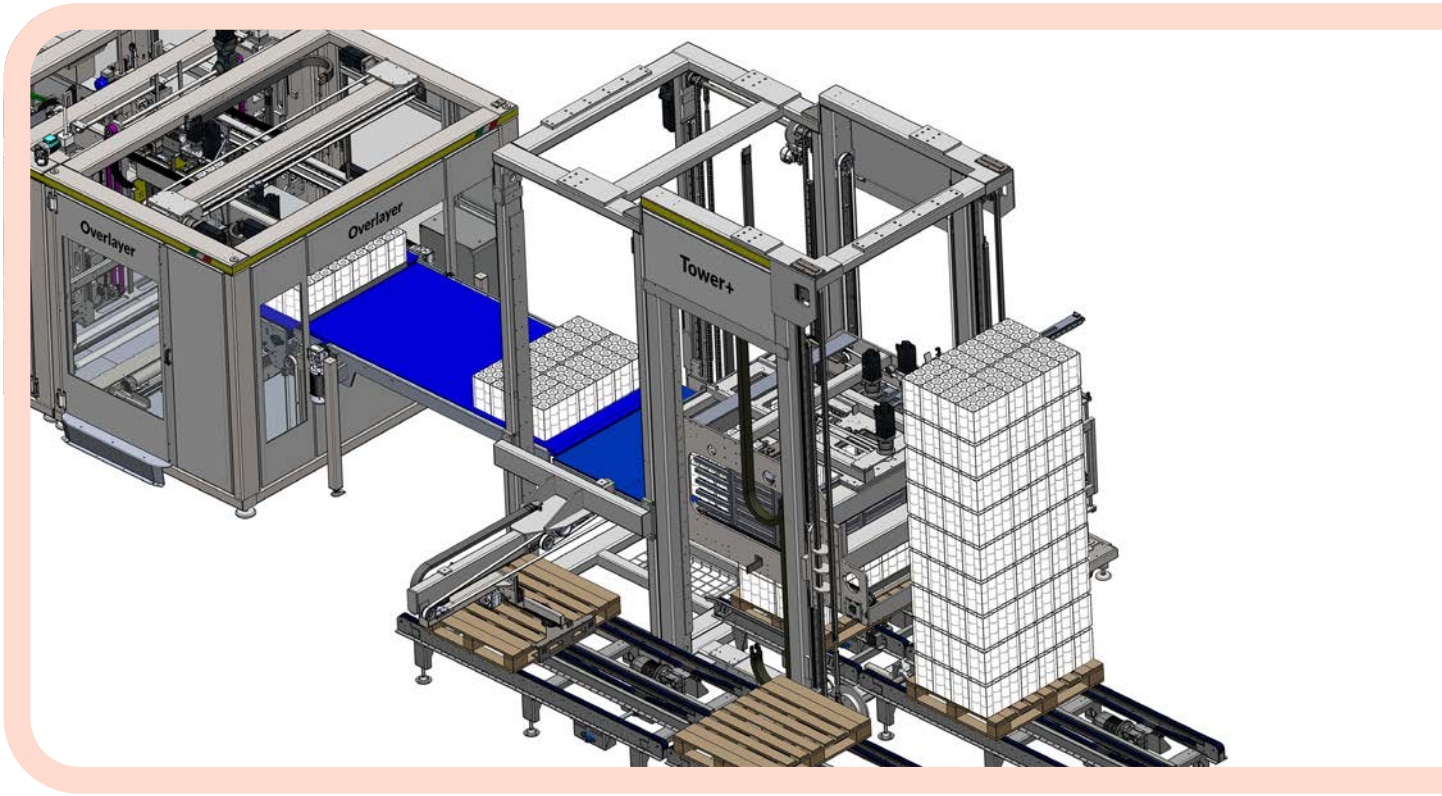
Anyone who has recently visited Lidl, Aldi or indeed any highly price-competitive supermarket, will have noticed the increasing use of display-ready pallets (DRPs). As the name suggests, these are loaded in such a way that the consumer can access products directly from the pallet, which is delivered to the shop floor with a pallet truck and replaced as a complete unit when empty. There is no need to stack or replenish shelves and it is a format which is increasingly used to sell tissue products along with many other consumer items.

This developing trend means that bundling of tissue products for delivery to retail customers is not always required, because consumers shopping for groceries just grab the product directly from the pallet in the store. This also has the benefit of reducing plastic consumption. When Plusline entered the tissue packaging technology market in 2018 our focus was wrapping and the seamless transition from logsaw to wrapper. The aim was to set new standards in terms of space-saving and efficiency. Bundling wasn't really on our radar, let alone palletising. But then we introduced the Overpack high-speed automatic bundler to satisfy market needs for flexibility and substantial wrapping-material reduction with horizontal and vertical cores in multiple configurations. A further turning point came during discussions with some tissue colleagues last year. They were expressing frustration with the fact that at the end of their converting/packaging line, when producing DRP, the bundler was either idle or just used as an "expensive by-pass conveyor" while the palletiser was operating. It struck them as a sub-optimal use of resources.

THE FIRST INTEGRATION IN THE SECTOR

We identified a challenge, and created the first machine in the tissue sector to integrate palletiser and bundler, capable of both bundled and DRP products with no limitations in the composition of the layer mosaic. We named its palletising unit Tower+ after the towers which are familiar on the skyline of our hometown Bologna (and it is compact but quite tall). When combined with the Overlayer patented forming solution, integrated with our bundling machine, you have the possibility of forming any layer with both bundled and display-ready product. It faithfully follows the Futura/Plusline philosophy of process simplification.

The first Overlayer&Tower+ delivery, one of two ordered by the same customer, is due for startup in Latin America during the second quarter of 2024. We shall also be delivering a complete Overlayer&Tower+ installation to FuturaLab for customer trails from June this year. The motivation for creating a single machine for bundling and palletising is not purely to avoid investing in technology which is underutilized. There is also the considerable space-saving which also reduces project capex. A bundler together with a high-end palletizer will typically occupy 30-40 linear meters on the factory floor. Overlayer&Tower+ require just 15 m.



Overlayer & Tower: the first delivery - one of two ordered by the same customer - is due for startup in Latin America during the second quarter of 2024

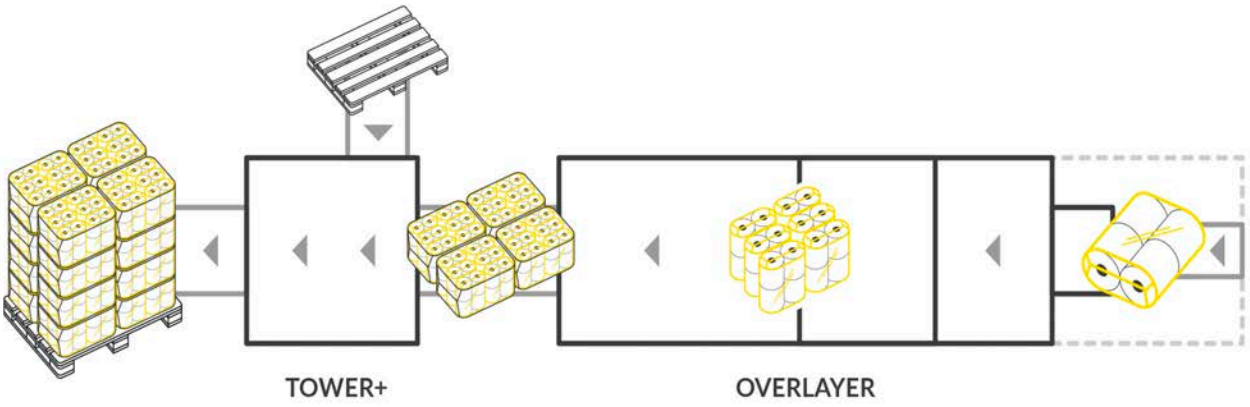
Apart from lower total cost of ownership (TCO) the reduced footprint also has positive implications for the role of the operator, along with high levels of automation. Their supervising role becomes less about physical intervention and more about oversight and process management, just as with our parent company Futura's Andromeda converting line.

New ideas such as this can challenge those with a risk-averse mindset. This is understandable. Decision makers are judged on results, good and bad. However, in the current scenario where DRPs have gained a large market share in Europe and are starting to catch the imagination of retailers in North America, a solution which combines bundling and palletizing in a single technology is essentially de-risking part of the packaging process.

FLEXIBLE FOR THE FUTURE

Nobody can accurately predict the trajectory for DRP versus traditional retail display, but a solution which genuinely combines both options ensures full capacity utilisation, no matter how the market evolves. It also enables producers who are fully focused on bundles to offer the option of DRPs should their customers start to demand them. The logistics benefits and reduction in use of plastic with DRPs compared with bundles suggest this trend will only go in one direction. DRPs are limited in that the packs must be of a certain size to ensure the integrity of the pallet. However, the market is moving towards larger packs anyway.

So how does it work? In simple terms, the bundler either creates the bundle configuration, whatever that might be, or it creates the layers for palletizing.



Space saving and efficiency: Plusline's aim was to set new standards for the industry

Process simplification: Display-ready pallets

Traditional bundling machines repeat the same pack combinations in terms of orientation and quantity. But the layers of a DRP will include a variety of pack orientations and quantities in what is known as a mosaic configuration.

The forming tunnel dimensions in the bundler are not fixed during operations, but vary according to the selected layer mosaic, including those with "on-edge" product. Two cartesian robots positioned at the exit of the sealing jaws prepare the layers combining the modules coming from the forming tunnel, which can be either bundles or groups of packs.

Thanks to Plusline's patented Overlayer technology, the bundler in the Tower+ has the flexibility to switch to palletising for DRP in the most complex mosaics with no more drama than a standard format change on a packaging line. The solution can work with EURO, UK, North American and Australian pallet sizes in half and full height.

FACIAL TISSUE BOX OVERWRAPPER

We have also turned our attention in the past few months to facial tissue boxes with Pluspack FBO – a high-speed facial tissue box overwrapper. As with Overlayer&Tower+, this innovation's genesis came during discussions with a customer, this time in North America, who was looking for a higher-speed wrapper which would also reduce changeover time and minimize the compression, and therefore damage, on tissue boxes using linear motors. Delivery to the customer would take place in the following weeks.

Flexibility is the mantra in terms of capacity range and box dimensions. And with up to six lanes infeed and three layers of stacking, Pluspack FBO has a production speed of up to 160 packs per minute, which is at least 25 percent higher than standard machines, and with changeover times typically less than 15 minutes.

A GLIMPSE INTO THE NEAR FUTURE

Finally a glimpse into a new Plusline chapter. We have a case packer, the Case+, which is set to have a maximum speed of between 35 and 40 cases per minute compared with a typical sector maximum of 20-25 per minute. We're stretching the limits through challenging tradition in terms of design. But it is a stable, robust solution based on proven components which we believe will be validated during imminent tests at our HQ in a real-world scenario. The footprint is small, a USP which we believe in strongly and defines much of what we do: "shrink the line, increase the efficiency".

This article was written for TWM by Matteo Giardini, Business Development Director at Plusline.

FLEXIBILITY, PRECISION, RELIABILITY AND SPEED – OVERCOMING THE RIGORS OF INDUSTRIAL PACKING

Edson has launched its 4000TL-Robotic Top Load Case Packer. Josh Goulet, Account Manager at Edson, outlines its qualities. A TWM report.

In the fast-paced world of manufacturing and packaging, efficiency, precision, and adaptability are paramount. Edson continues to push the boundaries with its latest offering, the Edson 4000TL-Robotic Top Load Case Packer. This cutting-edge system combines advanced robotics with intuitive design to revolutionize the case packing process.

At the heart of the 4000TL is the FANUC M-710iC/50 robot, renowned for its reliability and precision. The Edson team designs a variety of end-of-arm tool options, ensuring seamless integration with a wide range of products. Whether your items need to be packed standing up, laying down, or in single or multi-stream infeeds, the 4000TL-Robotic delivers unparalleled versatility.

Reliability and precision: the Edson 4000TL packing toilet paper rolls into cases

Packaging innovation: a variety of end-of-arm tool options fit virtually any application

One of the standout features of the Edson 4000TL is its ability to accommodate flexible packages of different sizes and shapes. This makes it an ideal solution for contract packers, specialty product makers, and businesses launching limited time offers or new products. Despite its advanced capabilities, the 4000TL boasts a compact footprint, occupying similar floor space to manual packing operations while offering fully automatic performance.

Safety is a top priority in any manufacturing environment, and the 4000TL is equipped with advanced safety features to protect both products and operators throughout the packaging process. With robust tube framing and automotive finishing, this system is built to withstand the rigors of industrial use while ensuring the highest standards of safety and reliability.

Ease of use is another key aspect of the system. A user-friendly Human Machine Interface (HMI) provides operators with simple touchscreen controls, allowing for quick and seamless changes between pack patterns. Furthermore, with under 15 minutes required for changeover, downtime is minimised, maximizing productivity and efficiency.

In summary, the Edson 4000TL-Robotic Top Load Case Packer represents the pinnacle of packaging innovation. With its precision robotics, flexible design, and emphasis on safety and ease of use, it offers a comprehensive solution for businesses across a wide range of industries. Whether you're a contract packer, a specialty product maker, or a company launching new offerings, the 4000TL-Robotic is poised to elevate your packaging operations to new heights of efficiency and performance.

Despite its advanced capabilities, the 4000TL boasts a compact footprint, occupying similar floor space to manual packing operations while offering fully automatic performance.

This article was written for TWM by Josh Goulet, Account Manager at Edson.

NORTH AMERICAN TISSUE IS BACK ON TRACK AFTER THE PANDEMIC … BUT DYNAMIC CHANGES LIE AHEAD FOR THE NEW MARKET

Against a background where grocery prices have risen by 26% and consumers are spending the highest share of their income on food for 30 years, AFRY Management Consulting's Sanna Sosa, Senior Principal, and Soile Kilpi, Director, discuss the forces shaping the tissue sector in 2024 and beyond, from decarbonisation to industry re-structuring and raw material challenges.

Across North America, tissue products demand growth has stabilised from the pandemic panic buying years and is settling back on its pre-pandemic tracks. After the Covid-driven surge in demand in 2020 and 2021, At-Home tissue demand has settled in 2022 and 2023 close to 7.1m short ton, which is 4.5% above pre-covid demand level. Increased working from home (WFH) and attention to cleanliness and hygiene are bolstering the At-Home tissue demand to above pre-pandemic levels.

Consumers are monitoring their grocery bills in an environment where food prices have shot up by 26%, according to the Bureau of Labor Statistics, and American consumers are spending the highest share of their income on food for 30 years. The high inflation market environment has been beneficial for lower cost private label products.

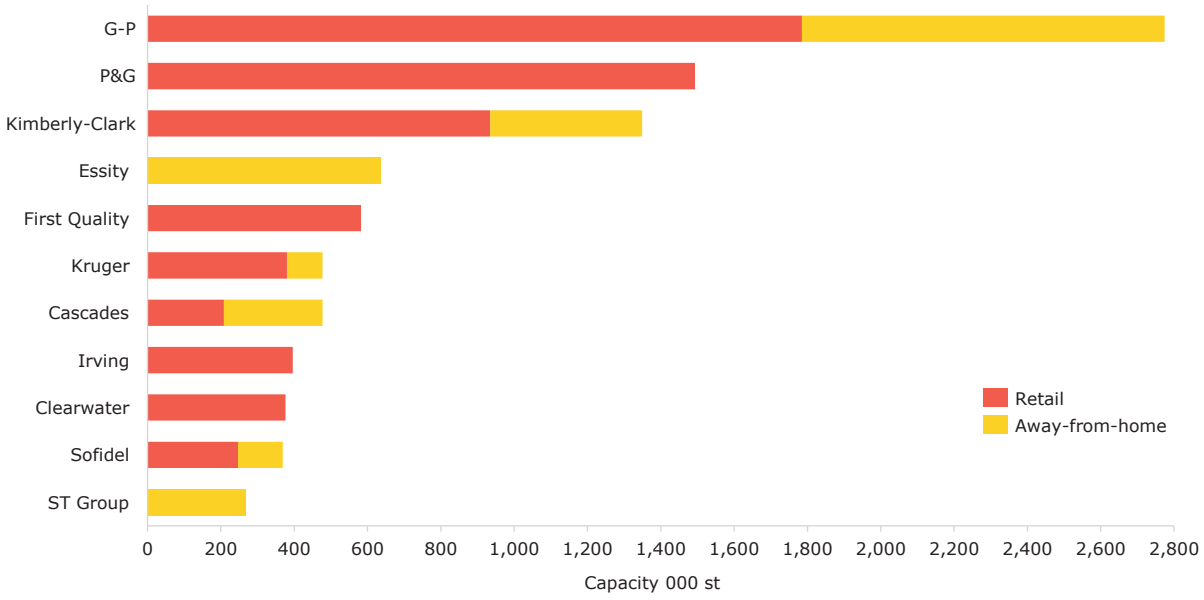
Private label tissue is estimated to have reached 36% market share of North American retail tissue demand – impressively up from 30% in 2016 or growth of 0.5m short tons of annual demand. However, Americans' shopping behaviour remains far from Europeans' love and appreciation for private label products. Private label tissue products are estimated to have close to 70% of the market share in Western Europe.

AfH tissue demand recovery has continued steady from the Covid lows in 2020, when non-essential businesses, travel, and events ground to an abrupt halt, at around 2.8m short tons, reaching 3.2m short tons in 2023 and showing 3% growth from the year before. However, AfH tissue demand remains close to 160,000 short tons below pre-Covid level. Although WFH and hybrid work models are here to stay, AFRY expects AfH tissue demand to surpass pre-Covid levels by 2025, driven by growing population and mobility.

On the supply side, the market turmoil of recent years has seen a high number of tissue machine and mill closures. Tissue assets worth over 500,000 short tons of annual manufacturing capacity have closed since 2020. Most of the closed assets were small, aging, and focused on the AfH tissue markets.

However, the capacity rationalisation did not significantly impact the overall tissue industry structure. Georgia-Pacific, Procter & Gamble, and Kimberly-Clark continue to be the clear industry leaders and hold about 60% of North America's tissue capacity.

Figure 1. North American top tissue manufacturers



The midsize producers have been adding - and continue adding - new capacity and betting on private label tissue market growth. The market share of "mid-size" players has grown from 27% in 2007 to current 33%. First Quality, Kruger, Sofidel, and Irving have all been adding capacity over the past four years. In addition to continued new tissue machine investments by Kruger and Sofidel in 2024/25, Georgia-Pacific and Procter & Gamble are following suit with new projects expected to come online this year.

But, in addition to organic capacity growth and capacity rationalization, merger and acquisition (M&A) activity is again emerging as an element in the North American tissue sector. First, in early 2024, Sofidel - which has and continues to build new capacity, after their initial North American market entry acquisition of Cellynne in 2012 - acquired ST Tissue's newly build tissue operation in Duluth, Minnesota. The M&A news was followed by Clearwater's statement during their 2023 fourth quarter analyst call that they are currently evaluating strategic options for their tissue business, while investing in their cartonboard business.

M&A certainly makes sense in the North American tissue market setting where demand growth is steady but slow (at typical 1-2%/a) and the competitive landscape consists of a few large-scale players and many medium to small size challengers. Typically, in industries with similar fundamentals, the market leaders drive growth by acquiring competition and market share, or the medium size players consolidate to become one of the industry leaders.

Clearwater Tissue combined with another mid-size, private label focused player would consolidate the private label supply landscape and potentially create a new private label market leader to captain the segment. A large-scale private label supplier with strong nationwide footprint could further drive market adoption, as well as steer positive EBITDA development.

UP-STREAM CHALLENGES

Pulp price volatility and parent roll costs are major drivers for tissue company bottom lines, as pulp represents close to 70% of parent roll manufacturing cost and base paper typically represents two thirds of converted bath tissue manufacturing cost. Additionally, AfH focused tissue mills (which includes 30% of North American market) and independent tissue converters (which supply 10% of North American tissue demand) often focusing on the AfH segment and have been facing their own set of up-stream challenges with reduced availability of high-quality recovered fibre and open market parent rolls.

Availability of domestic open market parent rolls has shrunk in the past four years, with closures of mills that supplied parent rolls to the independent converter market. Cascades rationalised its St. Helens, Oregon, and Ransom, Pennsylvania, mills, which were both supplying market parent rolls. Sofidel's Duluth mill acquisition from ST Tissue is

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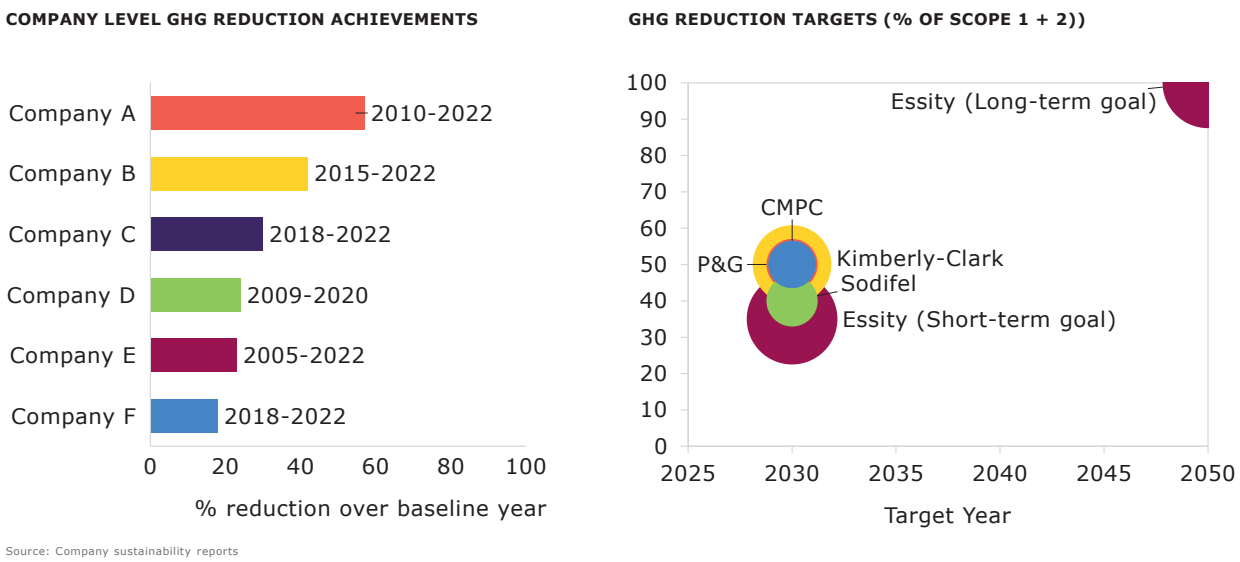
Figure 2. Tissue industry decarbonization pathways



Source: Company sustainability reports

likely to further shrink the domestic parent roll availability. In addition, the traditionally open market focused ST Tissue has been forward integrating in their operations, following the still prevailing paradigm of the value of integration between base paper production and converting of tissue end-use products.

What has kept the independent tissue converting market humming? Partly imports, but the parent roll market is increasingly tight. Tissue parent roll imports to North America have been growing. Tissue parent roll imports close to doubled from 230,000 short tons in 2015 to over 400,000 short tons on peak year of 2020, but then crashed to just 215,000 short tons in 2021/22, driven by high logistics costs and supply chain issues. Parent roll imports bounced back up to 330,000 short tons in 2023 reflecting recovering AfH market and tightening domestic market parent roll availability.

Over the next five-10 years, the AfH tissue sector has a fibre raw material dilemma to solve, as availability of high-quality recovered fibre material such as sorted office papers continues to decline due to less and less consumption of printing and writing papers and high export market prices drawing supply.

Tissue mills in North America as well as Europe have started to investigate alternative fibre options to traditional high grade recycled papers. Other fibre options, aside from moving to higher cost virgin market pulp, include; old corrugated containers (OCC), when brown colour is not an issue, or sourcing of still underutilised recycled liquid packaging or food service board materials, which can be a source of strong and white fibres. However, use of recycled liquid packaging and food service boards represents not only mill technical and operational challenges, but also challenges in fibre sourcing and management of complicated side-streams.

In addition to different types of recycled fibres, tissue mills can consider inclusion of alternative non-wood fibres such as bamboo, bagasse, straw, and others, in their products. Use of non-wood fibres in tissue products is rather prevalent in Asia, and some bamboo containing tissue products have started to find their way into the increasingly eco-conscious North American market. However, in the North American context, large scale and cost-effective sources of non-wood fibre pulps have so far been hard to find. Therefore, tissue companies with sustainability and ESG related ambitions to increase use of "environmentally preferred fibres" have had to keep pivoting to FSC-certified recycled and virgin wood fibres.

SUSTAINABILITY CHALLENGES

To combat the looming threat of climate change, the US, Canada, and countries around the world have pledged to significantly curb carbon emissions, cut emissions in half by 2030, and achieve net-zero carbon emissions by 2050. Therefore, jurisdictions are setting carbon taxes that emitters must pay for each ton of CO2 they emit, and companies including tissue manufacturers and tissue manufacturers'

customers from major retailers to food service operators are setting targets for decarbonisation.

The tissue industry has a large carbon footprint. Tissue production is a carbon-intense process due to the energy requirement for the drying process, and the still high use of fossil fuels and purchased electricity. However, good progress has been made over the past 20 or so years in terms of tissue industry greenhouse gas (GHG) level reductions.

Based on publicly available information, tissue companies have been reporting 20-60% reductions from baseline years. But the challenges and journey continues for the tissue industry to further reduce GHG emissions. Leading North American and global tissue companies have announced aggressive short term GHG emission reduction targets ranging from 30-50% by 2030, while Essity has already published its long-term commitment to get to net zero by 2050.

North American tissue manufacturing sites have a wide range of GHG emissions ranging from <500 kg CO2e/ton to close to 2,500 CO2e/ton. The low emitting tissue mills typically have high levels of energy self-sufficiency and they may use up to 100% biomass or renewable gas, and if they buy electricity, it is from renewable sources. These types of tissue mills are typically either integrated to pulp or have highly energy efficient new processes.

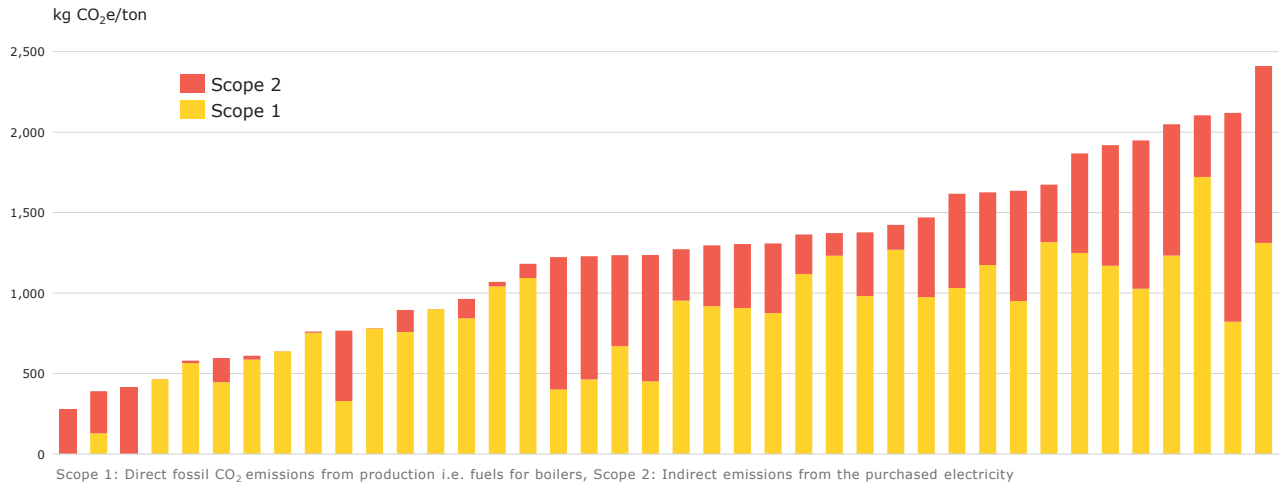
At the other end of the spectrum, the high GHG emitting mills (those >2000 CO2e/ton) depend on fossil fuels such as coal and fuel oil, and they purchase electricity from high GHG emission grid and often run older and smaller scale tissue manufacturing assets.

TISSUE INDUSTRY DECARBONISATION

The main levers for tissue mill operation decarbonisation are renewable energy, energy efficiency, carbon markets, and emerging carbon capture. The biggest impact on tissue operations' carbon footprint can be made by energy decarbonisation, meaning a transition to renewable energy and energy self-sufficiency. Tissue mill energy decarbonisation paths can include investment in biomass plant, cogeneration, waste or e-boilers. Transition from natural gas consumption to use of bio-gas, renewable gas (syn-gas), geothermal energy, or hydrogen, has a high positive impact on GHG emissions in addition to moving to renewable electricity purchases.

Energy efficiency programmes continue to be core to incremental gains in GHG reduction. Energy efficiency gains can come through technology innovation and modernising energy intensive systems such as investing in Steel Yankees or new drying and forming technologies. Carbon offset purchases are an option when other options have been exhausted. And carbon capture, and sequestration, is an opportunity available but not yet fully matured. Tissue companies can use a variety of methods to reduce GHG emissions. Having a clear decarbonisation plan is essential to keep ahead of customer needs, meeting long term global carbon reduction targets and avoid penalties and cost related to GHG emissions.

Figure 3. North American tissue mill GHG scope 1 and 2 emissions benchmark, select cases



Scope 1: Direct fossil CO_2 emissions from production i.e. fuels for boilers, Scope 2: Indirect emissions from the purchased electricity

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