September/October 2023 | Issue #5

Tissue World

Magazine

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OPTIMAL ENERGY

A blueprint for industrial decarbonisation - but vital to get the costs right

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IN THIS ISSUE...

Cover: Image showing how creating a balance is vital to gain the best decarbonisation results.

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

PULP & PAPER

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ANDRITZ

As Companies Rely More On Nature To Provide Greener Energy, The Cost Benefit Trade Off Will Become More Crucial Than Ever

Helen Morris, Senior Editor, Tissue World Magazine

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Decarbonisation will need intense monitoring if mills are to get the best results. MarketIssues is an extensive analysis by AFRY's Eduardo De Almeida of the "many identified options" of how to decarbonise. It's clear no one size fits all.

To take just two issues; sourcing electricity, producers are exposed to the carbon intensity of grid electricity in their countries. These could range from 29 grams of CO_2 per kWh in Norway, to 635 grams in Poland, thus putting those in high CO_2 intensive countries at risk of trade cost shortfall.

In his own country, national electricity generation from solar sources can amount to over 40% of overall production. This pushes prices down. "Any company considering installing solar panels," he says, "should bear in mind that they may start to produce electricity during hours when it is very cheap to buy from the grid." As cheap as zero. He warns against the "risk of averages." Such are the fluctuations of various energy sources that a more traditional longer-term judgement based on averages may lead to errors. Profitability, he says, must be simulated hourly.

THE MIDDLE EAST IS AN EMERGING TISSUE SUPERPOWER

TWM's Regional Reports on the Middle East make clear the economic strength and logistical and cultural changes underway.

Coincidentally, the recent G20 Summit in India added further impetus. A Memorandum of Understanding was signed to work towards a new India-Middle East-Europe Economic Corridor. India, Saudi Arabia, the UAE, Israel, France, Germany, Italy, the US, and the EU signed the deal, aimed at ushering in a new era of connectivity with road and rail links through ports connecting Europe, the Middle East and Asia. The rail and shipping route would include fibre optics, clean hydrogen pipelines and economic zones. The ambitious project is expected to counter China's Belt and Road initiative.

QUOTE OF THE EDITION:

On the Middle East, Euromonitor International's Isam Arshad: "As urban lifestyles increasingly bring local consumers to adopt global hygiene norms, tissue products will continue gaining prevalence, simultaneously respecting and accommodating cultural influences."

THE FOOTBALL LEGEND – AND TISSUE ENTREPRENEUR

Francis Lee CBE, a legendary figure from my home patch, Manchester, England, has passed away aged 79. The Manchester City and England forward played in one of the great World Cup games, England against Pele's Brazil in 1970. His company, F.H Lee, manufactured toilet rolls, kitchen rolls, handkerchiefs, cooking foil and cling film using recycled paper, supplying most of the UK's major retailers.

OPTIMAL TISSUE: MAXIMISING FINANCIAL RETURN ON RENEWABLE ENERGY PROJECTS

As carbon intensity of grid electricity can range from 29g to 635g of CO2 per kWh, paper manufacturers are moving towards local renewable generation. Eduardo De Almeida, Manager, AFRY Process Industries Spain, suggests a roadmap to industrial decarbonisation.

Higher energy costs, environmental pressures and legislation are increasingly pushing industrial companies towards decarbonisation. Yet there are many identified options of how to decarbonise operations. Energy use at tissue plants, as with many other industrial facilities, is a significant contributor to greenhouse gas (GHG) emissions. The tissue industry encompasses various processes including the operation of paper machines, drying processes and transportation, which require substantial energy inputs. The type of energy source (e.g., fossil fuels, renewable energy) and the efficiency of energy use can vary among facilities, impacting emissions.

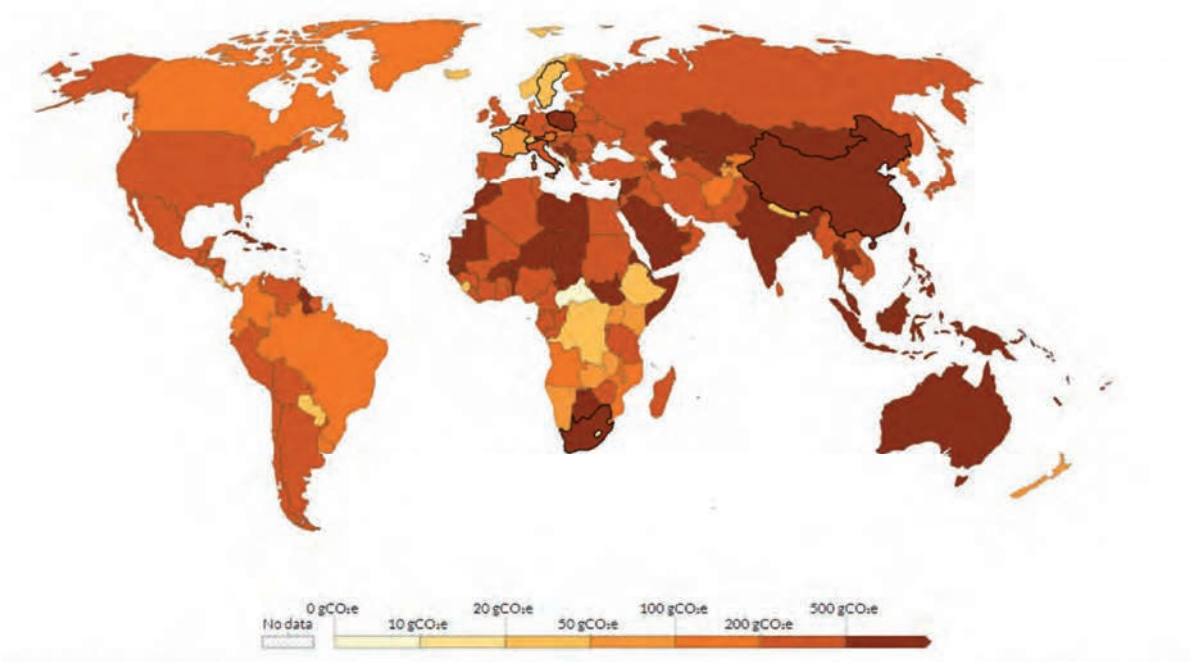
Here we examine how a tissue mill can decarbonise its energy input and sources. A logical option is the substitution of gas-consuming equipment. The industry is seeing gas-fired boilers being replaced by biomass in places where there is good availability. Furthermore, the first electric drying hoods are appearing on the market.

Switching to electric might seem a good way to decarbonise. However, producers are still exposed to the carbon intensity of grid electricity of their countries. In Europe for instance, this may range from 29 grams of CO2 per kWh in Norway to 635 grams in Poland. In a world where legislation

Energy use at tissue plants is a significant contributor to greenhouse gas emissions. The tissue industry encompasses various processes including paper machines, drying processes and transportation.

CARBON INTENSITY OF ELECTRICITY

Carbon intensity is measured in grams of carbon dioxide-equivalents emitted per kilowatt-hour of electricity



Source: Ember Climate (from various sources including the European Environment Agency and EIA).

and consumers require low-carbon products, this puts producers located in high CO2 intensive countries at risk – especially those that export to low carbon-intensive countries.

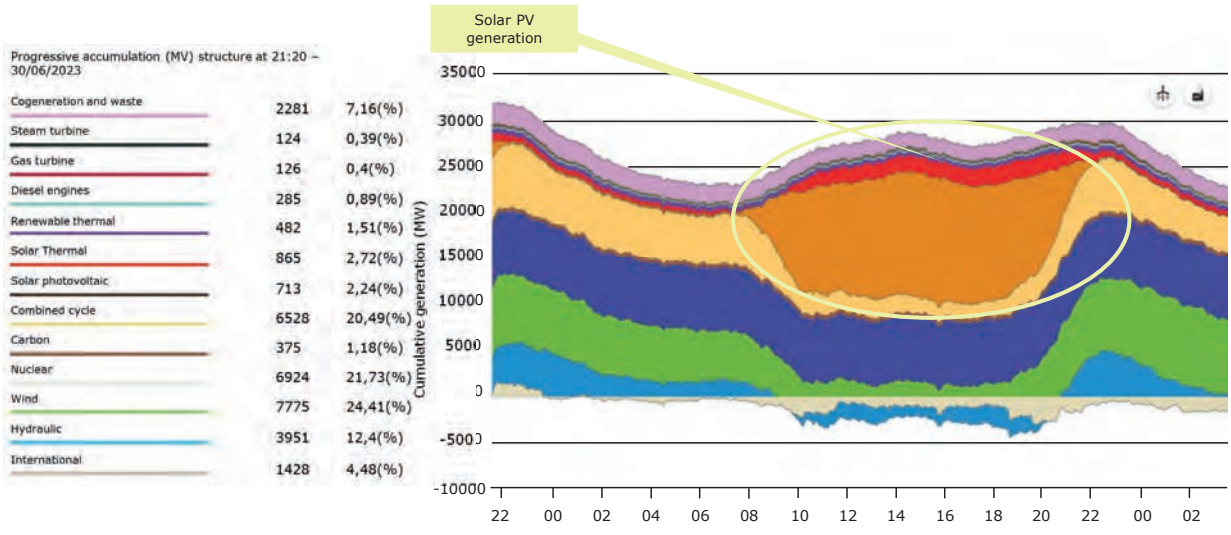
Often green electricity may be sourced, albeit at a higher price than at the "regular" market. As a result, paper-making companies are considering local renewable energy generation as an alternative to buying electricity from the grid.

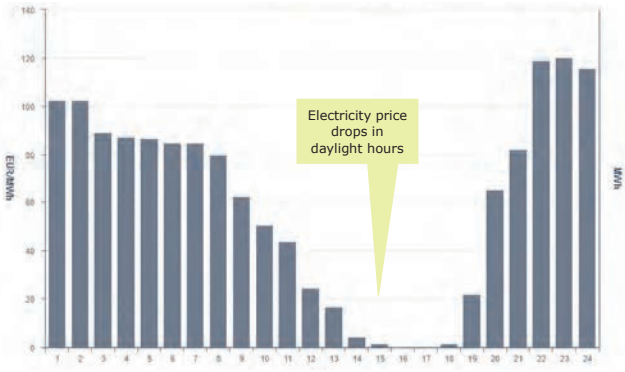
In this article, we'll explore how to size a renewable energy generation system on a tissue mill, using weather and market data from Spain.

THE RISK OF AVERAGES

Many financial analyses are carried out using average yearly forecasts. Given the daily and even hourly volatility of electricity prices, this approach can lead to significant errors. Furthermore, grid energy prices are correlated to renewable energy generation, so any simulation should take this into account. This is illustrated by Chart 1, showing the Spanish electricity market and its power generation.

Below: Chart 1- Power generation in Spain, 01-07-2023
Source: www.ree.es





Above: Chart 2 - Electricity price in Spain, 01-07-2023
Source: www.omie.es

As seen in the chart, at daylight hours electricity generation from solar sources can amount to over 40% of Spain's overall production. This is pushing prices down towards central hours, as seen on Chart 2.

Any company that considers installing solar panels should bear in mind that they may start to produce electricity during hours when it is very cheap to buy from the grid. On this particular day, prices even drop to zero, as often happens during weekends. This shows that profitability should be simulated hourly, and not with long-term averages. Similarly, wind power generation also has correlation with grid electricity prices.

In the long term, as utility companies and end-consumers shift towards renewable energy, this correlation is expected to increase. With that in mind, in this article we will define the key concepts required to size and determine the optimal profitability of an energy decarbonisation project.

Any company that considers installing solar panels should bear in mind that they may start to produce electricity when it is very cheap to buy from the grid. On this particular day, prices even drop to zero

SIZING AND DETERMINING THE ENERGY DECARBONISATION PROJECT

In order to correctly size an energy decarbonisation project there are some key inputs that are necessary:

1. Consumption modality. The consumer may have self-consumption with no electricity export to grid or not. This will be defined by local legislation and technical aspects of the installation.
2. Consumer consumption profile with hourly resolution. This should be obtained with historical data and projected considering any major changes (major CapEx investments, changes in production, etc).
3. Electricity price hourly forecast. Complex modelling of hourly forecasts should be obtained using the generation mix, CO2 and gas price prediction, consumer consumption profiles, international connections, etc. These models must be built upon detailed hourly meteorological simulations, given the correlation previously mentioned. Three forecast scenarios should be considered (high central and low prices), as shown in Chart 3.
4. Local solar and wind generation historical data, which will be linked to the electricity price forecasts.
5. CapEx and OpEx for the solar and wind installations.
6. Financial assumptions, such as inflation, weighted average cost of capital (WACC), project duration, taxes, and others.

After key inputs are available, the simulation can be started. The simulation will consider the above inputs and will assess varying sizing and combinations of solar, wind power generation installation, as well as varying sizes of battery energy storage systems (BESS). This will reflect the hourly energy balance of the plant for the duration of the project (typically a 25-year forecast).

This example assesses the Levelised Cost of Electricity (LCOE), or the overall lifetime electricity price in €/kWh that the customer will obtain averaging their renewable energy generation and imports from the grid.

In Chart 4, it is seen that if the company does not invest in solar PV or wind power (0% renewable share), it will have an energy cost of point 1 over 25 years. In this example, several simulations are carried out using combinations of sizes of solar and wind power plants. Each black dot is the simulation of 25 years considering a sizing combination. The blue curve shows the optimal combinations, or most efficient sizing given a renewable share. The green dot (point 4) is the absolute optimum, showing the sizing of solar and wind that will give the lowest possible levelised cost of energy.

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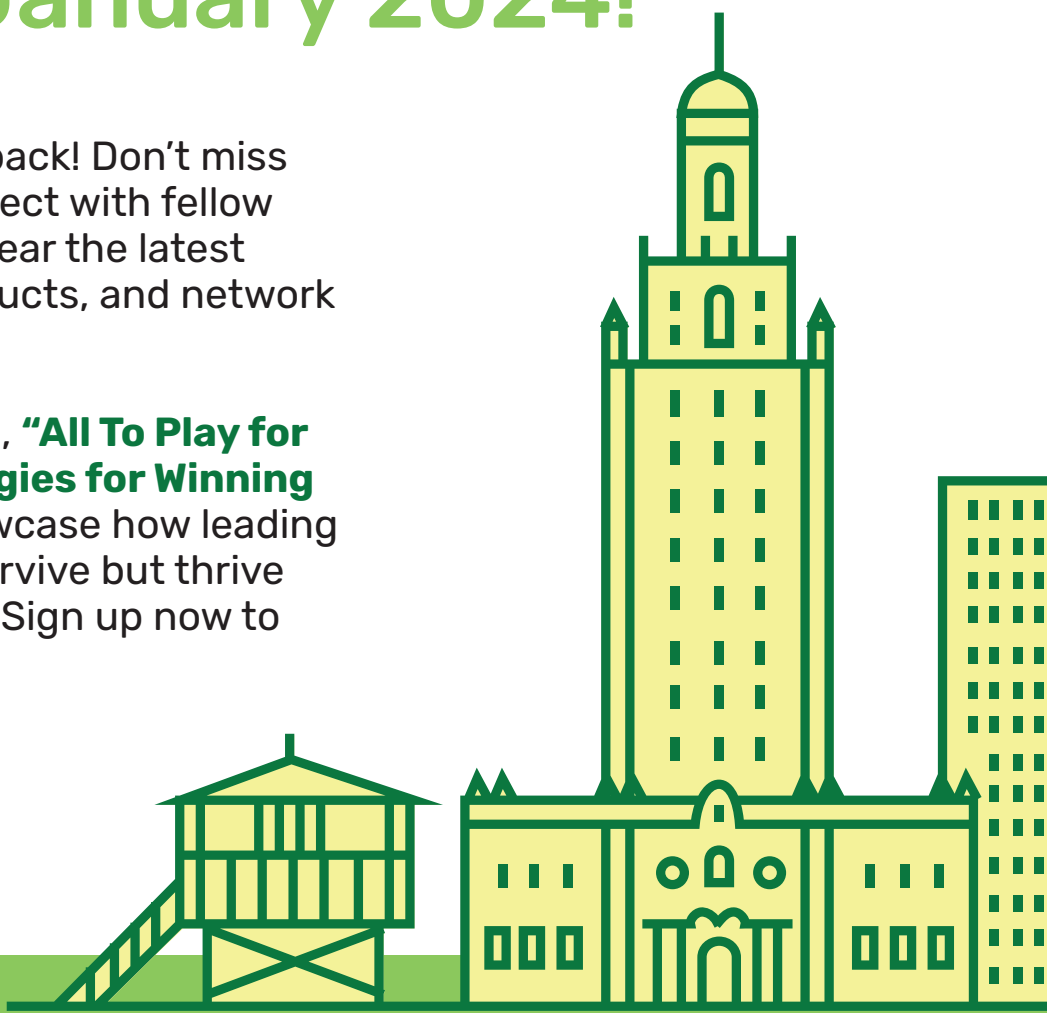

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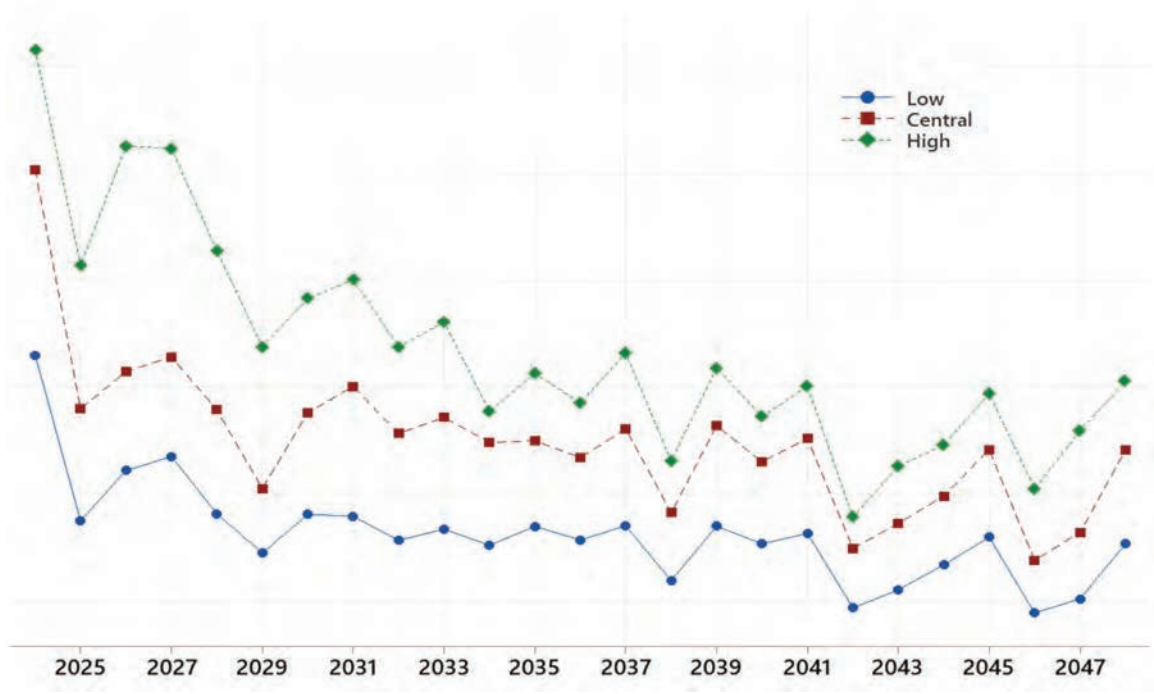
After a certain point, it does not make sense to increase the

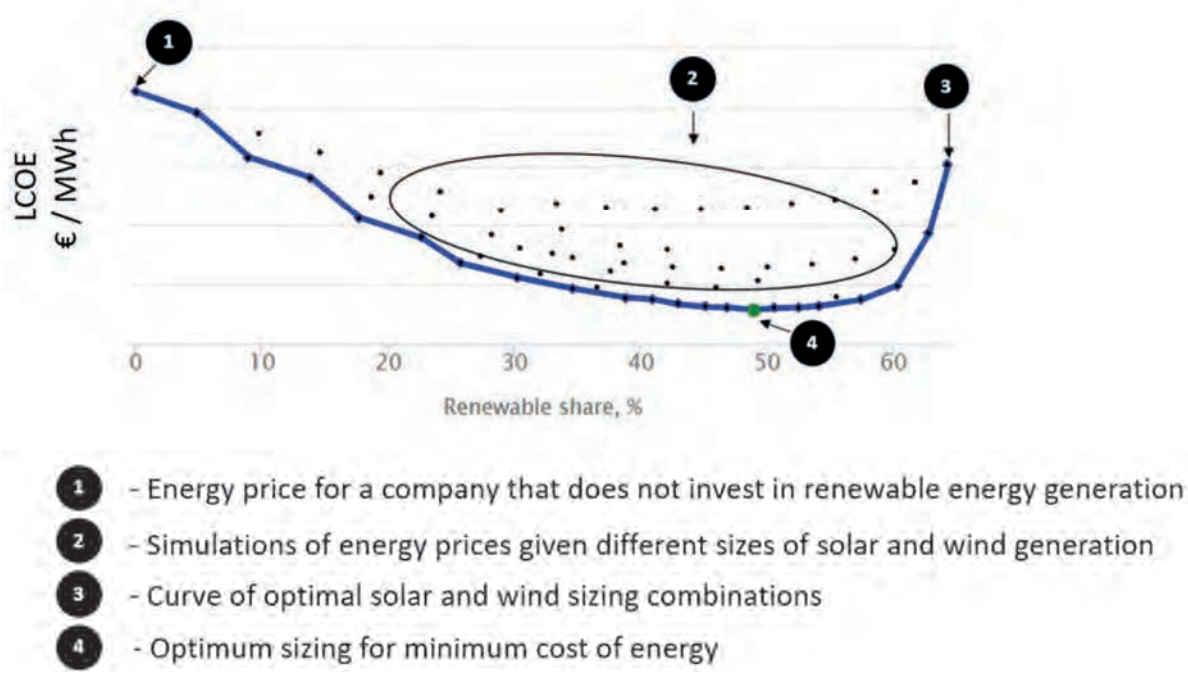


Above: Chart 3 – electricity price forecast (y axis deliberately missing)
Source: AFRY Management Consulting

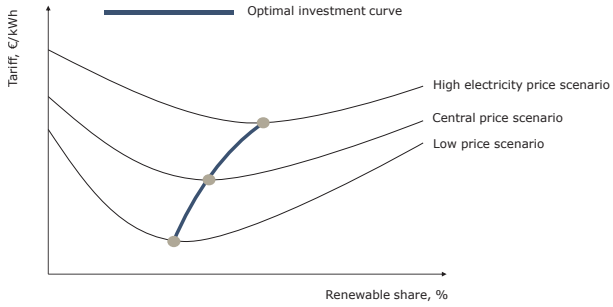
percentage of renewable share in the company. This is because excess energy is curtailed or sold at a low price to the grid. In scenarios where electricity is sold to the grid at a high price, the optimum renewable share could be higher.

EFFECT OF COST OF ELECTRICITY

This simulation should be repeated for different electricity price scenarios. In scenarios where the price of electricity is forecast to be higher, the optimum sizing will be higher.



Above: Chart 4 – optimal investment curve
Source: GridBridTM simulation



Above: Chart 5 – effect of grid electricity prices on system sizing

As seen on Chart 5, a high electricity price scenario will shift the share of renewable energy to a higher percentage. This is because even if some of the energy is curtailed, the added savings due to reduction of grid energy consumption will compensate these losses. Having all these considerations in mind, an analysis as to how best to optimise a company's decarbonisation strategy can be made.

DECARBONISATION STRATEGY

Once the map of possibilities and optimal sizes is available through simulation, a company must make a choice that is sufficiently profitable whilst minimising risk. The following chart explains how to best approach this. In Chart 6, the following areas are defined:

1. No-investment LCOE range. This is the range of electricity cost that a company may observe in the next 25 years. That is, a company that has 0% renewable energy generation on-site will be fully exposed to grid electricity price variation.
2. Investment decision range. This considers the range of renewable share between low and high grid electricity price scenarios. For minimal LCOE, the company's R.E. share should be sized within this range.
3. Investment tariff range. This is the rane of electricity tariff that a company may observe in the next 25 years, considering that it has a renewable share between the optimum for a low price and a high price scenario.
4. Low risk zone. This is the range of sizin for which a company will ensure that LCOE will stay under grid price. In scenarios where companies have a large renewable share, there is a risk that their LCOE will be above grid prices if they drop. By staying within the low-risk range, this risk is minimal.
5. Opportunity-risk. Companies that have a low renewable share may miss the opportunity to lower costs further.

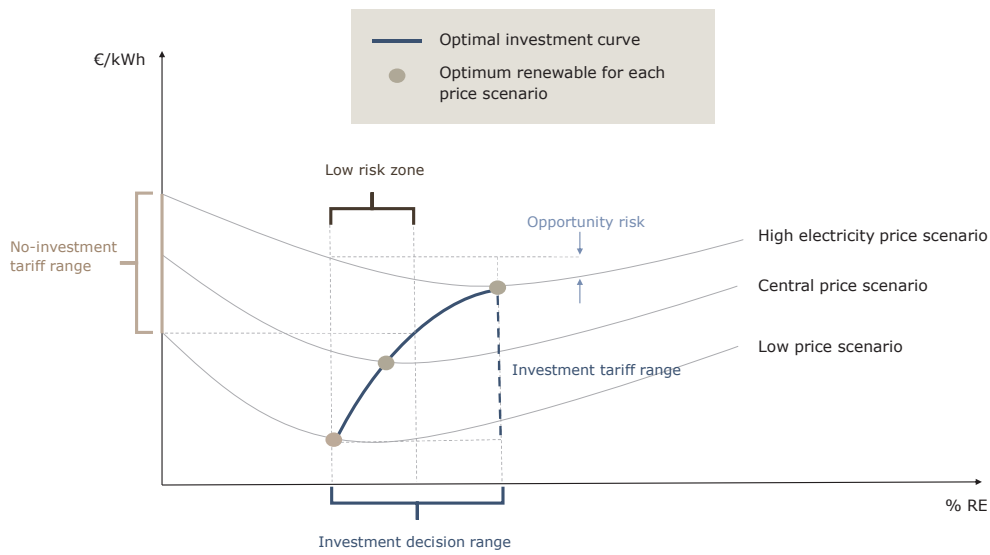
AN IMPORTANT NOTE – KNOW YOUR OBJECTIVES!

This study has been focussed on a sizing for minimum LCOE. Similarly, this study could have been carried out for maximising profits or minimising CO2 emissions. The same concepts are applicable, but optimal sizing will differ depending on the company's targets.

CONCLUSIONS

Investing in renewable energy generation for self-consumption is a good opportunity for decreasing cost and carbon footprint of companies. However, sizing must be calculated very carefully. The company's consumption profile, energy markets, weather patterns must all be considered, and simulated on an hourly basis.

Once available, this information should be used for making a decision that provides good profitability at a risk that is understood and in line with the company's strategy.



Above: Chart 6 – Sizing strategy vs price scenarios

GLOBAL NEWS UPDATE

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

Target 100% renewable energy by 2030: K-C's Scottish-based onshore wind farm was officially opened by Màiri McAllan, Member of the Scottish Parliament for the Clydesdale constituency and Cabinet Secretary for Transport, Net Zero and Just Transition

UK

K-C OPENS £75M WIND FARM; ANNUAL EMISSIONS REDUCTION OF 55,625 MTCO2E FORECAST

Kimberly-Clark (K-C) has officially opened its South Lanarkshire, Scotland-based onshore wind farm that will supply around 80% of its UK electrical power needs.

The farm is the largest wind asset owned by Octopus Renewables Infrastructure Trust (ORIT). K-C has a Power Purchase Agreement for the energy generated.

As K-C's first wind farm project outside of North America, the 50 MW 12-turbine Cumberhead facility will supply the company with approximately 160,000 megawatt hours (MWh) of renewable energy every year. The business said this will result in a total emissions reduction of 55,625 MTCO2e per year.

Dan Howell, Vice President and Managing Director at Kimberly-Clark UK & Ireland said: "Energy transformation is a key priority for us if we are going to deliver on our ambition to be using 100% renewable energy by 2030 in the UK and Ireland.

"When people ask what 'fully decarbonising our operations' looks like in practice, showing

them a brand new 12-turbine wind farm is a pretty powerful answer."

The green power will be used by K-C's manufacturing facilities across the UK, making up almost 80% of the electricity needs for its Barrow, Flint and Northfleet manufacturing facilities.

Between them, the sites produce nearly 1bn Andrex toilet rolls, over 150,000,000 boxes of Kleenex tissues, and almost 136m packs of Huggies baby wipes annually, alongside other personal care products for the UK market and B2B products such as WypAll and Scott.

Oriol Margo, Sustainability Leader, Kimberly-Clark EMEA added: "As we close in on our ambitious goal to move solely to renewable energy, we continue to invest in the future of the planet, our business and the FMCG industry as a whole, and hope to encourage other organisations, big and small, to do the same along the way."

This project is part of Kimberly-Clark UK & Ireland's wider sustainability strategy and its ambition to move to 100% renewable energy by 2030.

To deliver this, the company is also working with Octopus on developing on-site solar power as well as green hydrogen.

By 2026, Kimberly-Clark's UK and Ireland (scope 1 and 2) operational emissions are expected to be reduced by up to 85% from the 2015 baseline, ensuring the company is on track to meet its sustainability targets by 2030.

MEXICO

PAPEL SAN FRANCISCO BOOSTS CAPACITY WITH SEVENTH TM INVESTMENT

Mexico's Papel San Francisco has responded to increased customer demand by investing in its seventh Valmet-supplied tissue production line.

TM10 will add 30,000tpy to the company's current production of toilet tissue, kitchen towels and napkins, and will be installed at the company's mill in Mexicali.

Start-up of the Advantage DCT 100TS machine is planned for the second quarter 2025, and it will have a width of 2.8m and a design speed of 2,200m/min. The value of the order was not disclosed.

Dario Palma y Meza Espinoza, Operational Director, Papel San Francisco, said: "To meet the increasing demand of tissue products we need to grow our capacity.

"The previously installed tissue lines from Valmet have served us well and allow us to run at maximum speed to get the output we need.

"Our operators are familiar with the machine concept, and it is easy to operate. Therefore, it was a natural choice to select an Advantage DCT line again."

Valmet's scope of supply will also include an OptiFlo headbox and cast alloy Yankee cylinder, and the machine will feature a ViscoNip press, an AirCap hood and the WetDust dust system.

Papel San Francisco started up its first tissue machine in 1982 and now operates seven tissue machines with annual capacity of 210,000 tons.

Five Valmet lines are in operation, started up between 2006 and 2020, while TM9 is currently under delivery and will start up in 2024.

EGYPT

HAYAT EGYPT TO BOOST CAPACITY BY OPENING TWO FACTORIES BY 2024

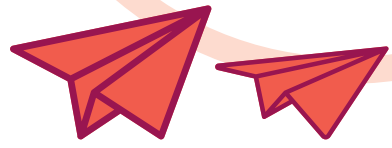
Hayat Egypt has announced investment plans worth $55m which will see it open two tissue and non-woven production facilities by the end of 2024.

The company has invested $550m in the Egyptian market to date, inaugurating five production facilities and introducing nine of its brands including Molfix, Bebem Natural, Molped, Papia, and Familia to the Egyptian consumer market. It added that future investments are estimated at $210m.

Mustafa Tuncay, Regional Vice President of Hayat Middle East and Africa, said: "Over the years, we have relentlessly worked to transform Egypt into the exportation hub of Hayat in the region, leveraging its unparallel potential.

"With a positive outlook, we are forward-focused

Papel San Francisco started up its first tissue machine in 1982 and now operates seven tissue machines with annual capacity of 210,000 tons.



on further expanding our local operations, investing more, and introducing new production lines, all while maintaining the highest levels of quality."

Hayat Egypt's facilities are based in Egypt's 6th of October City industrial park, where its hygiene plant produces baby diaper and feminine care products, and at the industrial park North-West of the Suez Economic Zone in Ain Sokhna where the company produces tissues, non-woven and polyethylene products, face masks, flexible packaging, and sanitary napkins.

The company said these assets also position it as the exportation hub of the Middle East and Africa region, and also Europe, the Far East, and the Americas, including the USA with products worth $150m exported from Egypt to 58 countries worldwide and an additional $200m targeted for 2025.

Şenol Keserlioglu, General Manager of Hayat Egypt, said: "At Hayat Egypt, we strive to offer high-quality and innovative products at competitive prices to cater to the diverse demands of all family members nationwide.

"With a robust and growing portfolio of assets in Egypt, we not only fulfil local demand but also export our products globally.

"As we embark on our second decade of business in Egypt, we reiterate our commitment to the local market through solid expansion plans that enhance the capabilities of our factories and introduce the latest innovations in personal health and home care".

Hayat Egypt has also recently launched its latest generation of products into the Egyptian market including a new generation of Molfix with Channel Technology, which the company said provides "three times faster absorption and remarkably enhanced softness", and through its Papia brand it introduced the first four-layer tissues in Egypt.

The company is a subsidiary of Hayat Kimya headquartered in Istanbul, a leading global FMCG company headquartered in Türkiye and the largest tissue manufacturer in the Middle East, Eastern Europe, and Africa.

KP Tissue Chief Executive Dino Bianco: "Our AfH segment delivered a fourth consecutive quarter of positive Adjusted EBITDA to maintain its growth momentum."

NORTH AMERICA

KRUGER PRODUCTS REPORTS MARGIN RECOVERY IN Q2 RESULTS

Canadian tissue manufacturer Kruger Products has reported "margin recovery and strong top-line growth" in its second quarter results as it continues to ramp up production capacity to meet customer demand.

Revenue increased 17.3% to C$466.3m in Q2 2023 compared to C$397.5m in Q2 2022, a result the business said was primarily due to the impact of selling price increases implemented across all segments and regions during 2022, as well as a favourable sales mix and higher sales volume in the Consumer business.

Revenue was also favourably impacted by foreign exchange fluctuations on US dollar sales.

Adjusted EBITDA increased 365.8% to C$55.0m in Q2 2023 compared to C$11.8m in Q2 2022, while net income increased C$50.0m to C$14.5m in Q2 2023 compared to a net loss of $35.5 million in Q2 2022.

The company said that while the "significant inflation" experienced during 2022 has moderated in the second quarter of 2023, manufacturing input costs remain higher than the year ago quarter.

Freight rates were lower compared to Q2 2022 as supply constraints and inflation moderated, although warehousing costs increased because of additional logistics network costs.

Dino Bianco, Chief Executive of KP Tissue, which holds a 13.5% interest in Kruger Products, said: "We are pleased that margin recovery, along with improved sales volume and a better mix in our Consumer business, generated strong Adjusted EBITDA of C$55.0m in the second quarter of 2023.

"Ongoing cost management initiatives,

including productivity gains and cost controls, also contributed to increasing profitability.

"In addition, our AfH segment delivered a fourth consecutive quarter of positive Adjusted EBITDA to maintain its growth momentum.

"As a result, our financial performance in the second quarter normalised versus a more challenging market and operating environment in the same period last year."

He added that in the second half of 2023, the company anticipates "a more favourable landscape as input costs trend downwards, TAD Sherbrooke and the Sherbrooke Expansion Project continue to ramp up production capacity to meet customer demand, and margins are restored to their pre-pandemic levels."

For the third quarter of 2023, Bianco added that as commodity and other input costs begin to decline, the business will focus on maintaining its margins whilst also continuing to reinvest in the business.

Adjusted EBITDA in Q3 2023 is expected to be in the range of Q2 2023.

K-C PULLS KLEENEX TISSUE FROM CANADIAN MARKET

Kimberly-Clark (K-C) has exited the Kleenex consumer facial tissue business in Canada but confirmed its Kleenex professional facial products and Kleenex consumer hand towel products will remain in the market.

The Kleenex consumer facial tissue business was removed from Canada as of August 2023.

Todd Fisher, Kimberly-Clark Canadian Vice President and General Manager, said the decision "was incredibly difficult for us to make".

He said: "We have been operating in a highly constrained supply environment, and despite our best efforts we have been faced with some unique complexities on the Kleenex business.

"This decision is one that will allow us to shift our resources to better focus on other brands in Canada and meet the needs of our consumers with continued innovation and value."

The company's Kleenex professional facial products and Kleenex consumer hand towel products will remain in the Canadian market as well as other brands including Cottonelle, Viva, U by Kotex, Poise, Depend, Huggies, Pull-Ups and Goodnites.

GP CONFIRMS SHUTDOWN OF DAY STREET MILL ON 8 SEPTEMBER; BRAWNY PROJECT EXPECTED TO START-UP 2024

Georgia-Pacific (GP) has confirmed operations at its Day Street Mill ended on 8 September following its announcement last year that it would close the 122-year old facility.

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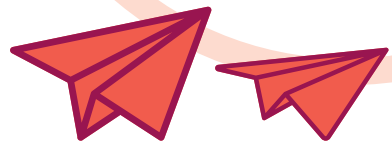

In March 2022, the company announced it would close the Green Bay Day Street facility with the loss of 190 jobs due to a "combination of changing customer demand, bath tissue upgrades and investments at other GP facilities, and less competitive assets at the Day Street mill".

Tissue manufacturing at the site ended mid-May and the final parts of the mill will now be shut down in September 2023.

The company said the decision does not affect its other operations in Green Bay.

A spokesperson for the company also told TWM that "most of the affected Green Bay Day Street employees who didn't retire as a consequence of the shutdown are now working at other GP facilities in the area."

GP bought the Day Street Mill as part of its acquisition of Fort James Corporation in 2000.

Koch Industries then bought GP in 2005.

BRAWNY PROJECT AT GREEN BAY BROADWAY TO BOOST GP'S RETAIL CONSUMER TISSUE AND TOWEL BUSINESS

In August last year, GP officially broke ground on its $500m expansion project in Green Bay, Wisconsin.

The investment will create at least 100 new jobs to operate the new complex, in addition to the mill's 850 current employees.

A TAD machine is being built at the site, and once up and running it will produce thousands of tons of paper that will be converted into millions of cases of Brawny paper towels and other premium

Cascades has announced a repositioning of its tissue papers operating platform which included the progressive closing of its tissue plants in Barnwell, South Carolina, and in Scappoose, Oregon.

private-label brands.

The Green Bay Broadway mill currently operates seven paper machines and several converting operations to make bath tissue, paper towels, napkins, and facial tissue for retail and AfH use.

The capital investment at the company's Green Bay facilities has totalled more than $700 million since 2006.

The project is expected to be completed in 2024.

CASCADES TO CLOSE ST. HELENS, OREGON, TISSUE FACILITY

Cascades has announced the closure of its second tissue machine at its St. Helens, Oregon site, resulting in the complete shutdown of the plant.

The end of operations will be effective at the beginning of October and some 75 employees have been affected by the announcement.

In May, the company announced a repositioning of its tissue papers operating platform which included the progressive closing of its tissue plants in Barnwell, South Carolina, and in Scappoose, Oregon, as well as the shutdown of one of the two tissue machine at the St. Helens plant.

With the closure of the second tissue machine at St. Helens, the company will completely shut down the facility.

Cascades said the announcement "further simplifies the company's operational platform by concentrating the majority of its tissue product operating activities at core, geographically well-positioned sites that offer opportunities for future development."

Jean-David Tardif, President and Chief Operating Officer of Cascades Tissue Group, said: "Over the past few months, market conditions on the West Coast and a significant decline in demand in this region for brown recycled products specifically manufactured at the facility have compromised the long-term financial viability of the plant.

"Consequently, we made the decision to end the plant's operations."

The annual capacity of the machine is 50,000 short tons of brown 100% recycled tissue paper.

The company said the tons are not integrated into its network, so the closure will "have no impact" on the company's other operations.

CLEARWATER REPORTS "STRONGER THAN EXPECTED" Q2 RESULTS

Clearwater Paper has said it expects continued strength in its tissue business in the coming quarters as it reports stronger than expected results.

In the second quarter, the company reported net sales of $525m, down from the $526m reported in the second quarter of 2022.

Net income was $30m compared to $15m reported in the second quarter of 2022, and adjusted EBITDA was $71m compared to the second quarter of $63m.

For the first six months of 2023, net sales were $1.1bn, a 3% increase compared to net sales of

Tissue demand remained strong: "We had a stronger than expected second quarter," Arsen Kitch, Clearwater President and Chief Executive

IS MAKING ADJUSTMENTS TO YOUR YANKEE COATING WORTH THE RISK?

In many mills, the Yankee coating is a legacy application that hasn't been significantly changed in years. It's viewed as too risky to mess with—particularly with market demand and internal pressures pushing you to make more tons more efficiently. As such, mills often eschew upgrading the Yankee coating in favor of wet end or converting changes. Even with these approaches adding value, by avoiding a potential short-term disruption of a Yankee coating trial, you may have locked in sub-optimal Yankee coating conditions for the long term.

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With Buckman's proprietary lab testing approach, you'll see how we stratify chemical products and predict performance based on key properties, such as wet tack, set speed, nip robustness, hardness, and softness at certain temperatures. Using our database of tissue machine run parameters correlated to key Yankee coating properties, you can identify the best-possible process conditions for your choice of Yankee coating package.

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High-quality requirement: (L-r) Marco Dalle Piagge, Sales Director Tissue Toscotec, Fabio Bargiacchi, Sales Manager Toscotec, Tareeq Al Moasherji, Chief Executive GPM, Ghaleb Alhadhrami, Projects & Development Manager GPM, Ahmed Kasim, Plant Manager GPM, Enrico Fazio, Sales Director P&B Toscotec.

$1.0bn for the first six months of 2022.

Net income for the first six months was $54m compared to net income for the first six months of 2022 of $31m.

Arsen Kitch, President and Chief Executive, said: "We had a stronger than expected second quarter, with solid operational performance and lower than expected costs for key inputs such as pulp, energy, and transportation.

"Tissue demand remained strong, while paperboard was soft as consumer spending slowed and customers continued to manage inventories.

"We continued to focus on cash flow generation and were able to reduce our net debt by $25m."

In the company's retail tissue division, volumes sold were 78,672 tons in the second quarter of 2023 compared to 76,604 tons a year earlier.

For the first six months of the year, retail tissue volumes sold were 155,520 tons, an increase of 2% compared to 152,030 tons year-on-year.

Kitch added: "We expect continued strength in our tissue business in the coming quarters, with projected strong demand and lower input costs driving improved margins.

"We also anticipate that our paperboard volumes will improve in the second half of this year as compared to the first half. We will continue our focus on cash flow generation through strong operating performance and managing inventories by matching supply with demand."

KUWAIT

GPM INVESTMENT TO BOOST HIGH-QUALITY FACIAL TISSUE CAPACITY

Gulf Paper Manufacturing (GPM) has invested in a Toscotec-supplied forming section rebuild of PM2 to be installed at its Mina Abdullah mill in Kuwait. The project aims to improve the machine's paper formation and basis weight cross direction (CD) control through an approach flow system upgrade and the installation of a state-of-the-art TT Headbox. The new headbox will be designed to match the high-quality requirements for facial tissue in the Middle Eastern market.

PM2 produces tissue from 100% virgin fibre and the rebuild is scheduled for the end of 2023.

Ghaleb Alhadhrami, GPM Projects & Development Manager, said: "With Toscotec's rebuild of our PM1 packaging paper machine in 2019, which delivered a major dryer section rebuild, we achieved a substantial production increase, reduced sheet breaks by over 80%, and improved paper quality especially in the moisture profile and hand feel. We are confident that Toscotec will deliver on this new upgrade of our tissue machine as successfully as they did two years ago.

"This new headbox and approach flow system are also fit for a future rebuild into crescent former configuration."

Established in 1978, GPM is owned by two families

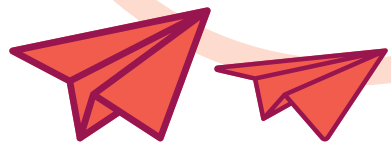
of Kuwaiti entrepreneurs and was the first company to start manufacturing paper in the Gulf region in 1981. It now operates three production lines at its Mina Abdullah paper mill in Kuwait: PM1 produces packaging grades using 100% recycled paper; PM2 manufactures tissue from 100% virgin pulp; the third is a tissue converting line. The company's current capacity is 70,000 tons, with 70% of its packaging grades being destined for export to GCC countries and Saudi Arabia, and the domestic market accounting for approximately 30% of its business.

POLAND

VELVET CARE TO HALVE CARBON FOOTPRINT WITH CHP INVESTMENT

Polish consumer tissue producer Velvet Care has said it will halve the carbon footprint of its Klucze-based tissue factory after announcing plans for a PLN63m gas-fired combined heat and power plant (CHP). The investment will save 69,000 tonnes of annual CO2 emissions, compared with 151,000 tonnes in Scope 1 + 2 emissions in 2022. That figure includes both direct emissions and indirect emissions related to purchased energy. Chief Executive Artur Pielak said: "This investment is an outstanding example of how we can improve our bottom line while also caring for the environment. The new installation will mean we buy significantly less electricity from outside, so we can make the same amount of tissue as we did last year while being responsible for just half the CO2 emissions."

Velvet Care has said it will halve the carbon footprint of its Klucze-based tissue factory after announcing plans for a PLN63m gas-fired combined heat and power plant (CHP).

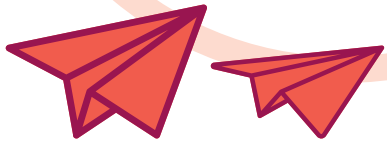


The company has already cut emissions and water usage per tonne of output by half since 2013, while increasing tissue production by four times. Once up and running the power plant will generate 16.7 MW of electricity for the factory as well as 23.3 MW of heat for the tissue drying process.

Poland's National Fund for Environmental Protection and Water Management will provide a subsidy of around 50% of the cogeneration unit's project value. The Velvet Care group is a leading Central European producer of consumer tissue products.

It has three paper machines, and the group operates a total of 18 converting lines, manufacturing toilet paper, kitchen towels and hygiene facial tissues for the Central European and other international markets. Its investments have helped it increase sales fivefold from PLN260m in 2013, when the company was taken over through a management buyout from Kimberly-Clark.

Suzano has increased its hardwood pulp prices by up to $50 per ton in Asia, Europe, and the Americas, effective from September.



BRAZIL

SUZANO ANNOUNCES PRICE HIKE

Brazilian tissue manufacturer and pulp producer Suzano has increased the price of its hardwood pulp prices by up to $50 per ton in Asia, Europe, and the Americas. Effective from September, the hike will be the first of the year for the American and European markets and the third consecutive increase for the Asian market. The company was contacted for comment.

A DYNAMIC TISSUE MARKET DESPITE POLITICAL AND SOCIAL BARRIERS

In one of the world's fastest-growing regions, the industry is strategically poised for expansion with populations and disposable incomes increasing. Bruce Janda, Senior Consultant of Fisher International reports.

The Middle East stands as a prominent birthplace of human civilisation, with shared linguistic and religious origins. However, enduring differences and disputes that have simmered for centuries and even millennia continue to hinder the development of pan-regional cooperation across many business sectors. Tissue is one of those.

It is politics, rather than geography, that dictates economic collaboration and trade within the region. Therefore, an analysis of tissue demand and production in the area must take into consideration these factors. The component countries of the Middle East are not well defined and vary by political instead of geographic definitions. Statistical sources use several different definitions. This report considers Bahrain, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Palestinian Territories, Saudi Arabia, Syria, UAE, and Yemen.

Table 1 summarises key differences in the region derived from the World Factbook. Economic and trade rate data is more difficult to obtain in closed societies. Some of these figures are the best estimates of the source noted. In this case, the Palestinian Territories are broken separately as Gaza and West Bank. Data shown in the table are mostly 2023 estimates and go no earlier than 2021, except as noted for Syria and Yemen.

The disparity between rich and poor countries in the Middle East is shocking and probably the result of the current and historic conflicts. Despite this, tissue demand and production continue to increase. Several factors that drive the growth of the tissue industry in the Middle East include:

- The growing population and disposable income. The Middle East is one of the fastest-growing regions in the world, and the population is expected to reach over 600m by 2050. This growth is accompanied by an increase in disposable income, making tissue products more affordable for more people.

- The increasing awareness of hygiene and sanitation. There is a growing awareness of the importance of hygiene and sanitation in the Middle East. This leads to increased use of tissue products for personal hygiene and cleaning.

- The rising demand for tissue products from hotels, restaurants, and other businesses. The tourism industry is increasing, driving the need for tissue products from hotels, restaurants, and other companies. However, it's important to acknowledge some headwinds that impair the development of a robust regional tissue sector, such as:

- Lack of access to recycled paper. The Middle East lacks robust access to recycled paper, a primary raw material for tissue production. This forces tissue manufacturers to rely on virgin wood pulp, which is more expensive.

- Competition from imported tissue products. Some global tissue manufacturers are setting up production facilities near the Middle East to take advantage of the growing market. This is increasing competition for local tissue manufacturers.

We last discussed this region in 2021 during the pandemic. And since then, the Russian invasion of Ukraine has further divided the area and boosted energy exporters. A map of the Middle East region is shown in Figure 1, with tissue mills shown as pin markers. Egypt is an African tissue maker but continues to be part of the cultural and economic ties of the Middle East.

Tissue imports into the region are shown in Figure 2. Turkey and Indonesia are significant sources of tissue imports, with smaller amounts from China and Italy. Egypt is counted as a producer in the region, but it would be a substantial source on this supply chart if broken out separately.

Tissue product exports from the Middle East are shown in Figure 3. The enormous export contribution of Egypt tends to overshadow the other producers. A study of the intra-Middle East tissue trade would be complicated enough to merit a separate article. However, except for Egypt, relatively little tissue is exported from the region.

Egypt, Iran, UAE, and Saudi Arabia are the overwhelming heavyweight producers in the region. Iran and Saudi Arabia have also announced significant new tissue projects that are to come online in 2024-25. However, Lebanon, Israel, and Jordan have lost capacity over the trend period shown. Iraq discontinued production in 2012. The trend of tissue machine count changes is shown in Figure 4. Note the forecast increase in 2024. The number of machines can be misleading as the new machines coming in tend to be much larger and faster than the old ones that were shut down.

The region's tissue fibre use for each finished product is shown in Figure 5. Some eucalyptus and other tropical hardwoods are used in the consumer grades. Relatively little recycled fibre is used, except in commercial bath. Some producers have work underway to increase the use of low-cost recycled fibre.

The exact breakdown by finished tissue product is shown in Figure 6. Here, the coloured bar segments represent each country's tissue production mix. Most countries tend to make the same product range, but Iran specialises in absorbent liners and creped wadding.

The quality of the Middle East's tissue machine fleet is shown in Figure 7. The size of the bubble for each country represents the relative production capacity. The X-axis represents the average technical age, and the Y-axis represents the average machine width. This tends to track well with average machine

Figure 1: Middle East Tissue Map

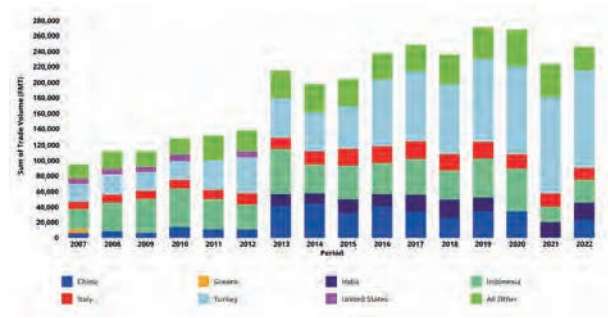


Figure 2: Middle East External Tissue Imports Trend

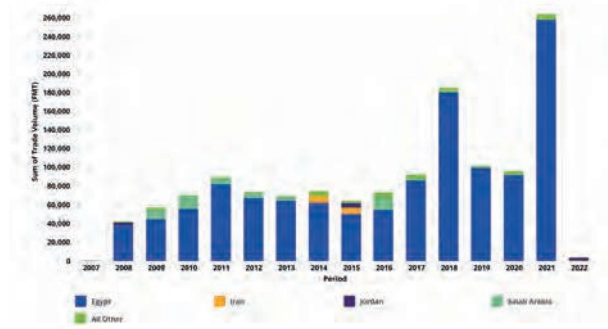


Figure 3: Middle East Tissue Exports Trend by Country

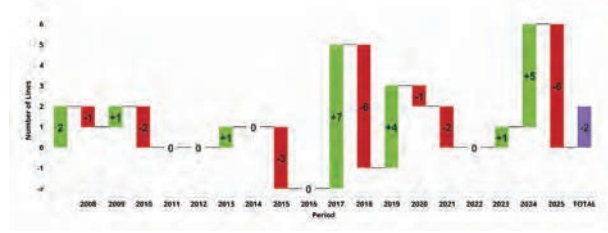


Figure 4: Middle East Tissue Machine Fleet Count Changes

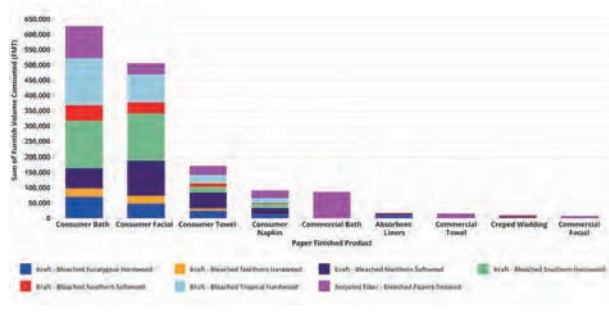


Figure 5: Middle East Tissue Furnish by Finished Product

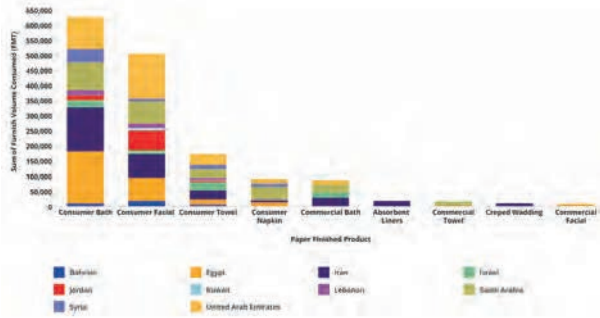


Figure 6: Middle East Tissue Finished Products - Production by Country

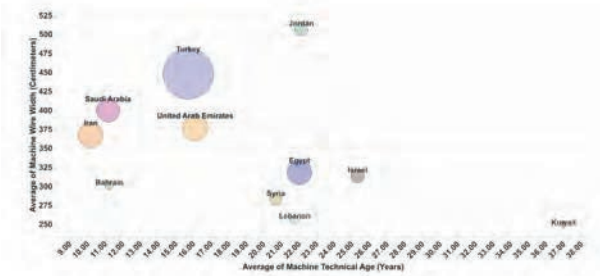


Figure 7: Middle East Tissue Machine Quality Compared to Turkey

speed in most cases. Turkey is the leading tissue exporter on the border of the region and was included here for comparison. Saudi Arabia and Iran are poised to become bigger bubbles with younger and wider machines. Kuwait appears to be in a weak position.

The average cash cost for tissue production is shown in Figure 8. Turkey, Italy, and Indonesia are established tissue exporters to the Middle East and are included to help define their competitive position in the region. Surprisingly, many countries within the region have similar production costs and are not far behind Indonesia, the cost leader. Turkey and Italy are slightly higher, but they may well provide preferred product performance.

The tissue machine average viability by country is shown in Figure 9. This FisherSolve Viability Index provides a proprietary viability ranking based on each tissue machine's future expected relative competitive position based on capital required, cost, size, and technological age. Now, the region's tissue production shows more differences. The UAE, Saudi Arabia, Iran, Egypt, and Bahrain are all in the lowest viability zone with low-risk Turkey and Indonesia. Jordan and Syria are in an elevated risk zone with Italy. Israel, Lebanon, and Kuwait are relatively high-risk and require investment to keep pace.

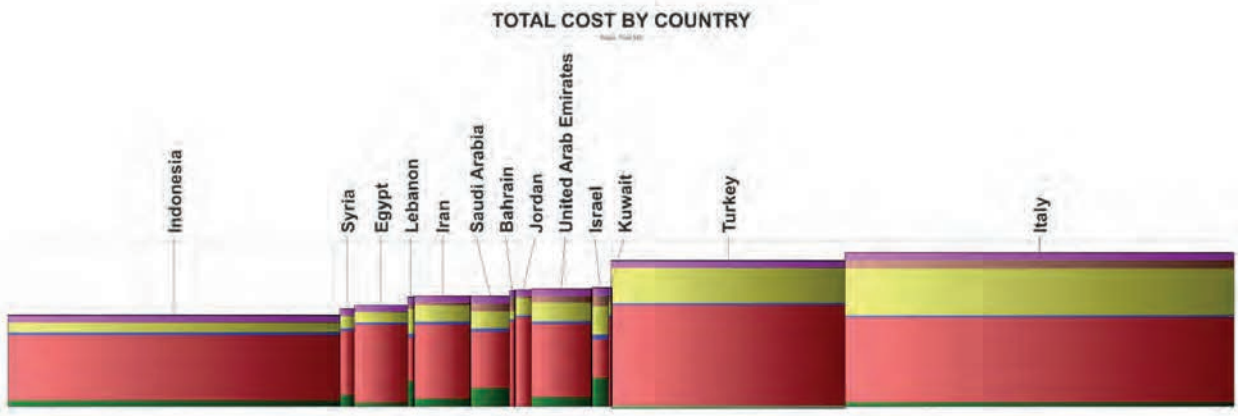


Figure 8: Middle East Tissue Comparison - Average Cash Costs

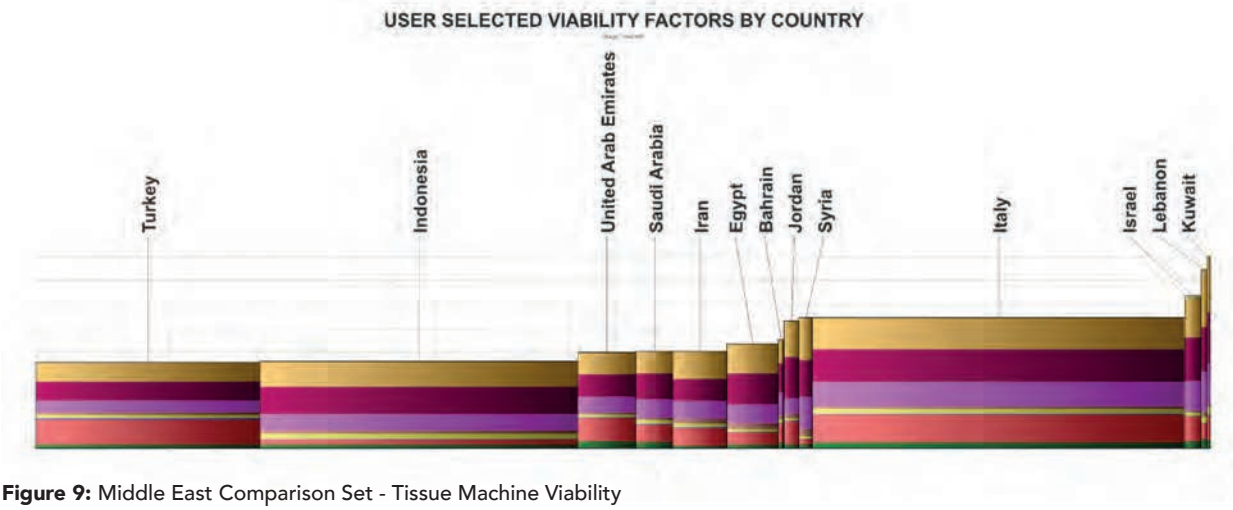


Figure 9: Middle East Comparison Set - Tissue Machine Viability

Figure 10 provides a view of carbon emissions per ton of production for the comparison set. This chart was based on a cradle-to-gate methodology and includes the carbon content of raw materials. Kuwait and Israel stand out as high emitters, followed by Jordan, Syria, Saudi Arabia, Lebanon, and Bahrain. All the others have some differences in emission composition but possess very similar emission totals. The new Saudi Arabian projects may help change this.

Overall, the tissue industry in the Middle East is a dynamic and growing market despite the political and social barriers. Further peace movements could help accelerate this growth. While the industry is encountering certain challenges, it is also strategically poised for expansion. Through sustained investment and innovation, the tissue industry in the Middle East has the potential to emerge as a significant contender in the global market. As concentrated investments steer the future, not all countries involved in tissue production will maintain their prominence. Instead, attention is shifting towards smaller producing nations including the United Arab Emirates, Iran, Saudi Arabia, Egypt, and Bahrain.

The recently proposed India-Middle East-Europe Economic Corridor (IMEC) could significantly impact tissue demand and production in the Middle East region. The IMEC would create a free trade area between the three regions, lowering tariffs and other trade barriers. This could benefit tissue consumers with lower prices and more choices while increasing competition for the local tissue industry. It is challenging to forecast specific effects, such as security concerns that may impede the participation of all the countries in the region. This region was once closely connected by rail lines before World War I under the rule of the Ottoman Empire. Some of these rail lines are still visible in the desert areas.

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

Overall, the tissue industry in the Middle East is a dynamic and growing market despite the political and social barriers. Further peace movements could help accelerate this growth.

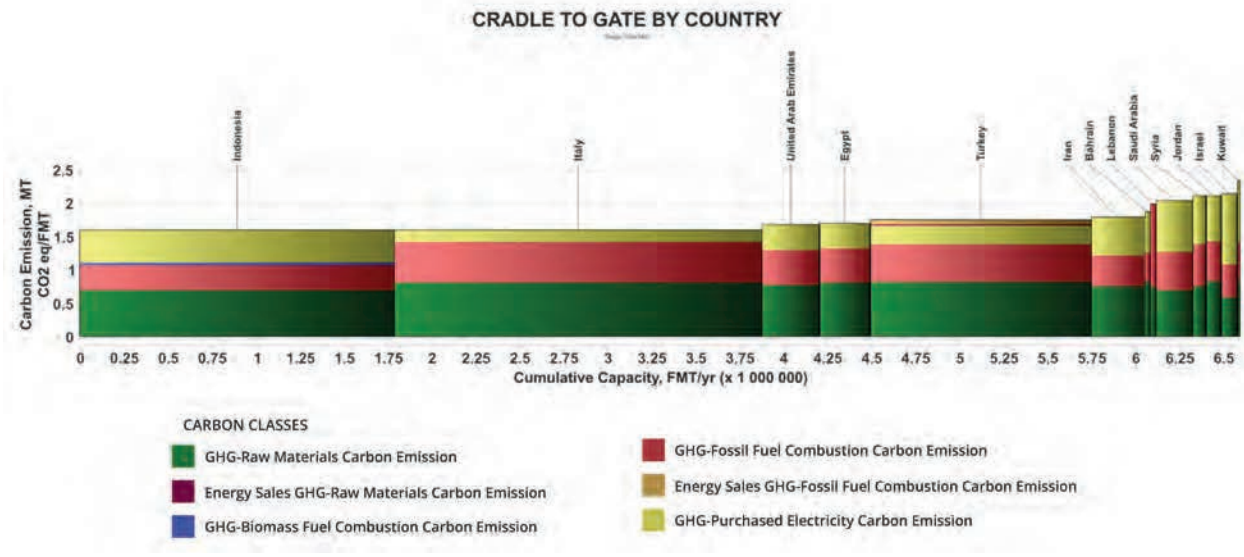


Figure 10: Middle East Benchmark Carbon – Cradle to Gate

THE MIDDLE EAST'S 'TRANSFORMATIVE' TISSUE JOURNEY GATHERS PACE

Retail value growth at 5%. Urbanisation driving cultural change. Increased awareness of vital sustainability. Strategic emphasis on local production driving domestic manufacturing. Rising e-commerce. Isam Arshad, Dubai-based Consultant, Euromonitor International, assesses key drivers in the developing market.

Tissue retail value growth has maintained a 5% in 2022, slightly accelerated by inflation from previous year's 3% while volume growth post around 3% in 2022, consistent with previous years' levels.

In recent years, the Middle East region, particularly the Gulf Cooperation Council (GCC) countries such as the UAE, Saudi Arabia, and Qatar, has experienced a transformative journey in the tissue market.

Driven by factors such as economic growth stemming from oil wealth, economic diversification, and robust infrastructure development, the region's urbanisation has ushered in busier lifestyles and more intensive hygiene practices, supporting resilience in demand for tissue products.

The Middle East tissue retail value growth has maintained a 5% in 2022, slightly accelerated by inflation from previous year's 3% while volume growth post around 3% in 2022, consistent with previous years' levels.

INFLATION-LED VALUE SENSITIVITY AND HEALTH EXPECTATION PROMPT PORTFOLIO SEGMENTATION AND VALUE-CREATION INNOVATIONS

Inflation has introduced a range of challenges and business strategic shifts in the Middle East's tissue market. On the one hand, price increases driven by inflation have prompted consumers

Source: Euromonitor International Tissue and Hygiene research, published February 2023

across key Middle Eastern tissue markets such as UAE, Saudi Arabia, and Oman to gravitate toward more affordable options; on the other hand, to justify price increases manufacturers have focused on value-added product innovations such as eco-friendly tissue products, to meet the sweet spot of budget tightening and health vigilance.

For example, Majid Al Futtaim, a large Middle Eastern retail group, sells its own private-label brand of tissue products through Carrefour hypermarkets, where they have expanded product lines to include scented and hypoallergenic options, catering to consumers with specific sensitivities and preferences. The Middle East's leading tissue manufacturer Napco has adapted its strategy to include premium tissue products, such as "Sanita Platinum" range of tissues which offer additional softness and luxury to customers seeking a more upscale experience.

Meanwhile, retailers' shelf space optimisation to maximise tissue products' visibility and accessibility, as demonstrated by notable local retail chain Lulu Hypermarket's eye-level tissue shelf placement in high-traffic areas, has also contributed to the category's expansion and diversification.

LOCAL DRIVE FOR ECONOMIC DIVERSITY AND SUPPLY CHAIN RESILIENCE DRIVES PRODUCTION LOCALISATION

A strategic emphasis on local production has emerged as a response to inflation and supply chain challenges.

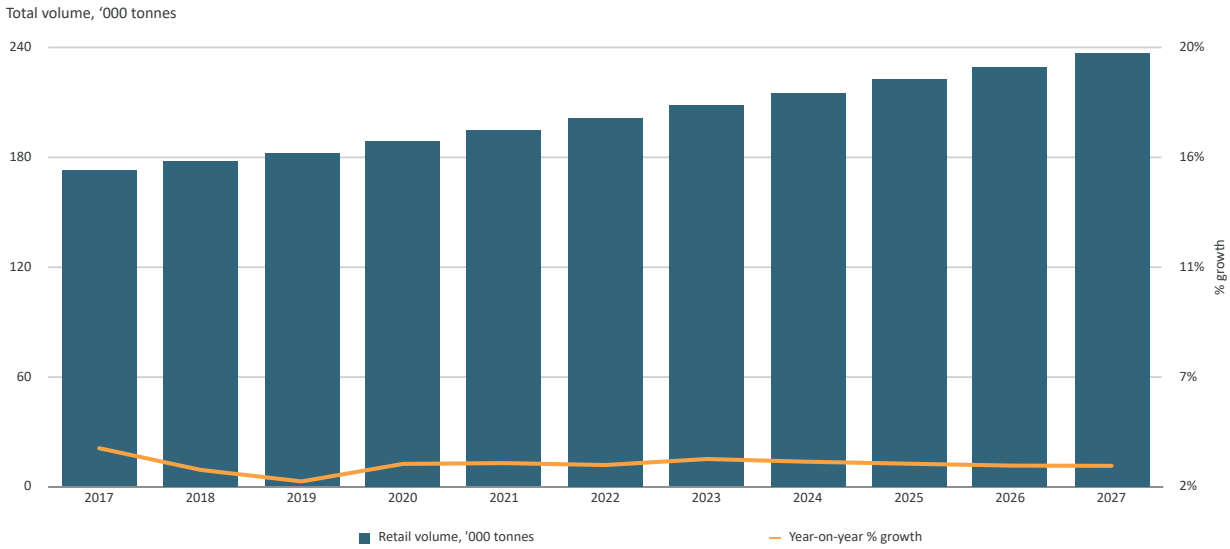
The Middle East's focus on economic diversification and enhanced supply chain resilience has driven investments in domestic manufacturing facilities. This trend not only reduces dependency on imports but also creates local job opportunities, stimulates economic growth, and facilitates the local transfer of technology and know-how. Localisation has led to adjusted raw material sourcing and supply chain integration that further contribute to increased and more efficient adaptability to local preferences and market demand, as manifested in local production expansion and supply chain energy efficiency investment by Fine Hygienic Holding (FHH), a leading hygiene and paper products manufacturer in the Middle East.

CULTURAL EVOLUTION, DIGITAL TRANSFORMATION, AND SUSTAINABILITY DRIVE FUTURE TISSUE DEMAND

Historical cultural practices, primarily rooted in water-based hygiene traditions influenced by religion and custom, are changing due to urbanisation and modernisation. As urban lifestyles increasingly bring local consumers to adopt global hygiene norms, tissue products have increased and will continue gaining prevalence, simultaneously respecting and accommodating cultural influences.

The rise of e-commerce is also expected to further drive the expansion of the tissue product market in the Middle East, most notably in Saudi Arabia and UAE, as it taps into the consumer desire for convenience, visuals and transparency offered by detailed product descriptions and peer reviews. Both pureplay e-commerce marketplaces like Saudi Arabia-based Noon and retailers such as UAE-based LuLu Hypermarket have implemented such digital features to improve reach and accessibility of various tissue products and gain consumer insights

Retail Tissue: Middle Eastern Tissue Industry 2017-2027 in Retail Volume



Source: Euromonitor International Tissue and Hygiene research, published February 2023

to inform further digital engagement and product positioning strategies.

Of all tissue products, paper towels in the Middle East have most heavily leveraged and benefitted from digital expansion, allowing the segment with broader visibility online, bulk promotions and room for variety expansion.

Finally, sustainability emerges as and will remain one of the pivotal drivers in reshaping the tissue market in the Middle East in the long term. In the UAE, according to "Euromonitor International Voice of the Consumer: Sustainability Survey, 2023," nearly 42% of local consumers believe climate change will impact their own life more than it does now and more than a quarter of consumers want to have a positive impact on the environment through everyday actions, with shopping a one dimension of actions. Such sentiments bid well for the sustainability push.

FHH, for example, has diversified its tissue products portfolio to include sustainable options such as "FINE Green" line of tissue products made from 100% recycled paper, catering to environmentally conscious consumers. Similarly, Hayat Kimya, a global tissue manufacturer with a Middle Eastern presence, has launched "Papia" brand tissue products made from responsibly sourced ingredients with third-party verifications.

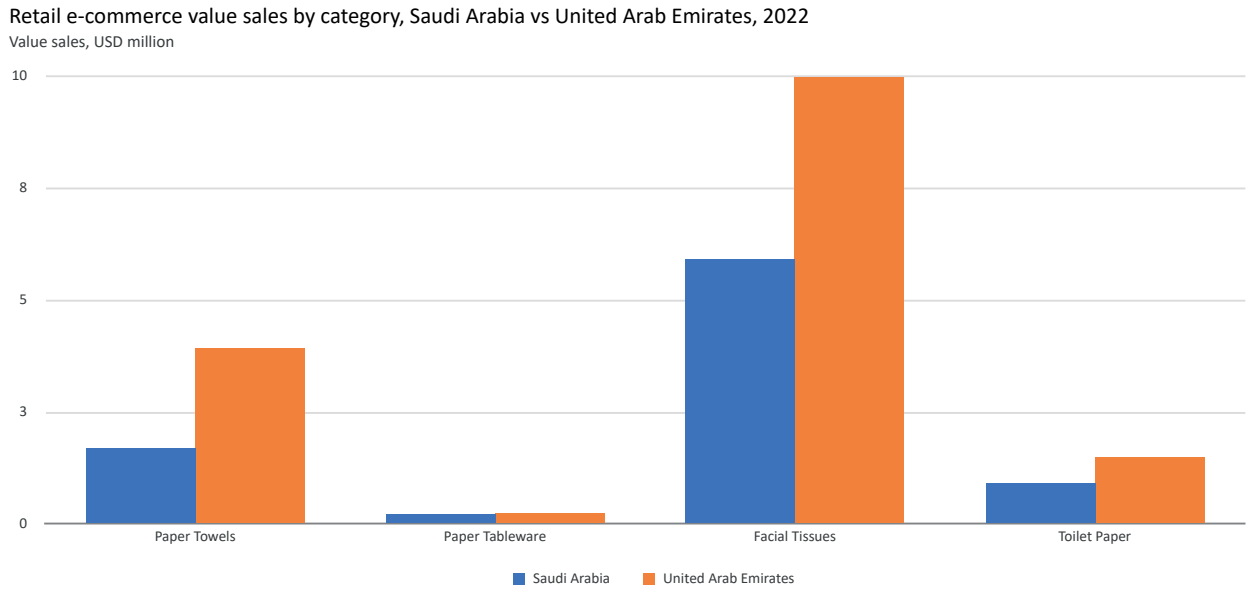
Paper towels in the Middle East have most heavily leveraged and benefitted from digital expansion, allowing the segment with broader visibility online, bulk promotions and room for variety expansion.

AfH tissue sees partial recovery

More broadly, beyond retail tissue the recovery in tourism and hospitality industry in the Middle East, particularly Saudi Arabia, UAE, Oman, Kuwait, and Qatar, has driven the rebound in the AfH tissue demand.

Though the demand has yet to reach pre-pandemic level in absolute terms, these nations' expanded investment in tourism and urban development is expected to drive long-term demand for tissue products in commercial spaces, hotels, airports, and entertainment venues.

Over the forecast period the HoReCa sector will be a key driver of AfH tissue sales in the Middle East. While the HoReCa sector is vital,

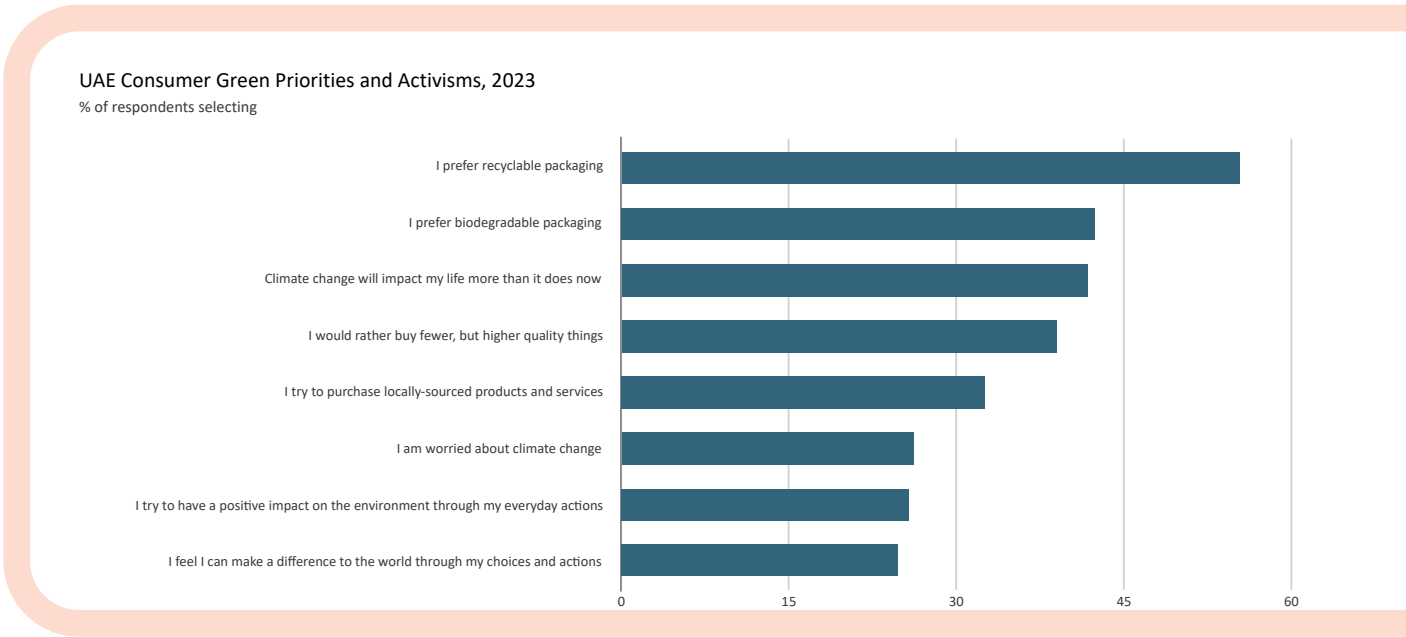


Source: Euromonitor International Tissue and Hygiene research, published February 2023

other sectors such as healthcare, offices, and public spaces also contribute to AfH tissue demand and, depending on how consumers and businesses behave, will shape tissue product and packaging design, as well as positioning.

Notably, the shift towards telecommuting and flexible work schedules brought on by the pandemic is already driving some manufacturers to modify their products to better serve companies with a hybrid staff of local and remote workers. For example, Middle Eastern tissue manufacturer Sanita Dania has developed smaller, more portable tissue packs for remote workers who need tissues when working from home or on the go. Growing business' desire to enhance hygiene at public spaces by reducing physical contact has encouraged tissue players such as Napco and Emirates Paper Mills to release touchless paper towel dispensers alongside compatible paper towels.

Overall, the future of the tissue sector in the Middle East will most likely be determined by a combination of customer preferences, digital and supply chain improvements, sustainability drive, and broader economic and cultural trends. The manufacturers that are able to adjust to these shifts and provide products that are in line with the ever-evolving requirements of their target audience are likely to find success in this fluid market.



Source: Euromonitor International's Voice of the Consumer: Lifestyle Survey, fielded January and February 2023

WITH GLOBAL TISSUE CONSUMPTION PROJECTED TO DOUBLE IN TWO DECADES, ONE KSA COMPANY IN A RAPIDLY DEVELOPING REGION REVEALS AMBITIOUS PLANS TO SHARE THE MARKET GROWTH

The newly announced India-Middle East-Europe Economic Corridor (IMEC) will add even greater incentive to the rising young population and tourism boom fuelling growth. For the Middle East Paper Company the decision to diversify into tissue is paying off. Senior Editor Helen Morris spoke to Chief Commercial Officer Ahmed El Fazary.

"Very ambitious growth plans": Chief Commercial Officer Ahmed El Fazary, MEPCO

At the G20 Leaders' Summit in September, India's Prime Minister Narendra Modi officially acknowledged the scale of possibility for growth in the Middle East when he announced the Indian Middle-East Europe Economic Corridor (IMEC).

A new acronym was created, and with it confirmation of how vital the region's trading bloc will continue to be over the coming years.

The IMEC economic corridor is designed to link India, the Middle East and Europe, and will solidify the region's historic position as a primary trade route. The Kingdom of Saudi Arabia (KSA), the UAE, India, France, Germany, Italy, the US, and the EU have signed the deal, which will comprise two separate corridors: the east corridor will connect India to the Arabian Gulf and the north corridor connecting the Gulf to Europe.

The transnational shipping and railway corridor is expected to counter China's Belt and Road initiative, moving goods from India to UAE's Fujairah Port on to Israel's Port of Haifa via Saudi Arabia and Jordan. From Haifa Port, goods from India and other Asian countries will be shipped to Europe.

It will also, undoubtedly, substantially increase demand and smooth supply chains for tissue and towel products across the region.

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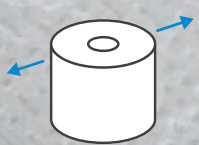

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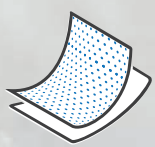

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One such company ready to target that potential is Saudi Arabia's Middle East Paper Company (MEPCO). TWM first spoke to the company's Chief Executive Sami Safran in December 2021, where he discussed the tissue growth that had led to the business diversifying into the market and signing for its first tissue machine. At the time, KSA's tissue consumption was forecast to accelerate in the medium term with per capita consumption jumping to 300,000tpy, aided by population growth and high income per capita. The company – by trade a vertically integrated containerboard and paper manufacturer, producing products serving the world's packaging, construction, furniture, and paper core industries – had just broken ground on its new 132,000m2, SAR338m ($90.13m) tissue plant in King Abdullah Economic City (KAEC).

The KAEC – a megaproject announced in 2005 by the former king of Saudi Arabia, King Abdullah bin Abdulaziz Al Saud – is located along the coast of the Red Sea around 100km north of Jeddah, the country's commercial hub and the location of MEPCO's headquarters.

As of May 2023, the site is also now home to MEPCO's first tissue production machine: a 60,000tpy Toscotec-supplied AHEAD 2.2L double-width machine. At the time of start-up, Adel Alfar, Operations Director at the Juthor plant, said that despite some challenges during the pandemic, the business has "successfully managed to deliver the test run and the commercial launch according to the scheduled timeline very smoothly and efficiently, producing premium quality tissue products."

The line has a maximum design speed of 2,200m/min and is equipped with a shoe press TT NextPress of upgraded design, a third-generation TT SYD Steel Yankee Dryer, and high efficiency TT Hood-Multigen with integrated cogeneration air system. Its drying section uses CHP-produced thermal energy both to generate the steam used in the Steel Yankee Dryer, and to achieve the correct drying temperature of hot air circulating in the hoods air system. As a result, the tissue machine will rely entirely on the CHP system for paper drying and won't require any additional gas consumption and associated greenhouse gas emissions.

Safran had explained that the investment was due to "a noteworthy gap" between supply and demand of tissue products in Saudi Arabia. Demand for products by local consumers continued to be supported by a natural growth in population and also in per capita consumption, as well as the social transformation taking place recently with increases in tourism and an influx of pilgrims.

Importantly, in 2021 Saudi Arabia was also the largest importer of tissue in the whole of the Middle

On schedule producing premium quality tissue: The team at MEPCO's Juthor plant after the successful 60,000tpy Toscotec-supplied AHEAD 2.2L double width machine start-up.

East, importing more than 150,000tpy of tissue from abroad. Safran had said the company was "determined to change that situation. We think big, and have an ambitious vision to realise. We have also chosen a location so it's possible to expand further into tissue."

With the tissue machine now up and running, TWM spoke to MEPCO's Chief Commercial Officer Ahmed El Fazary from his office in the KAEC. The company's $100m investment into tissue means that +10% of MEPCO's total volume is now for the tissue market, and while there are no converting plans "for now … we definitely have very ambitious growth plans. The group's dominant strategy is to grow our waste management, containerboard and tissue sectors."

Egyptian-born El Fazary adds that based on statistics for Saudi Arabia, there's still a substantial gap between consumption and production: "As of 2023, a gap of 170,000 tonnes is currently being imported into the country, and this is the reason we decided to go into the tissue market," he says. "We still see room for further expansion to fulfil local demand and we are seeing a huge growth potential in demand in the area."

He cites RISI Fastmarkets' data platform, which has reported that the global consumption of paper and paperboard totalled 408m tons in 2021, and now in 2023 it is 430m tons. "Consumption is projected to continue rising over the coming decade to reach 476m tons by 2032," he says. "Global tissue consumption is 43m tons, representing 10% of the total paper industry consumption. But in two decades, that 43m tons is expected to grow by 100%. Global demand for tissue is expected to continue increasing annually over the coming decade, reaching 55m tons by 2032.

With that in mind, El Fazary says tissue consumption in Saudi Arabia is growing "the fastest among global markets. The Saudi population is 37m and is young and growing. Economic conditions are healthy and very promising, which very much drives growth in demand for tissue."

With two tissue machines starting up in 2023 – Saudi Paper Group is also planning to start-up a Toscotec-supplied TM in 2024, which El Fazary describes as "a nice race" – does he think there will soon be overcapacity that means the business will be pushed to export? "No, but one of our core strategies is to diversify our markets and accordingly we will keep a certain percentage of sales for export, along with the fact that being exposed to exports keeps the company agile and on top of its game with all market or industry developments."

Tissue trends in KSA have seen "a major shift" following the changes to the country in the past few years. He explains that the dominant tissue product is facial tissue, but that the business is already seeing that shift. "AfH is increasing rapidly as we see more and more people getting takeaways and eating out. KSA is really opening to tourism, which as a key driver of AfH means we are seeing increased demand for all tissue and towel products. And interestingly, this growth is not just in the dominant facial market but also in toilet paper, napkins, and others. It's not so much that KSA is changing habits as that the country is becoming more open, it's easier to get visiting visas, more tourists, more restaurant visits… more tissue! It will be even more recognisable in the future."

While inflation is "not so much a hot topic here, it's controllable," he says that as a consumer himself a lot of commodities have dropped costs lately, as well as finished goods. "However, in the tissue sector the country is seeing an uptick in private label products, they are becoming a lot more popular especially in the AfH markets."

In terms of energy, he adds that natural gas prices "dropped tenfold" from August 2022, dropped back "almost to normal." And the business continues to make strides forward for energy and environmental efficiencies, using, he says, 100% pulp that is FSC-certified. "We are keen to highlight the sustainability efforts we as a business and the paper industry as a whole is making. Tissue is making advances to use raw materials from controlled forests. We do believe that the sector is in the core of the circular economy."

In KSA, not everyone is yet as conscious of FSC as other world regions, but increasingly more and more customers are requiring it. "From our position we also try to bring awareness to it. We were the first to acquire FSC here for our containerboard products, where at our MEPCO facility we produce our own steam and electricity and recycle 70% of our water requirements. We produce a sustainability report alongside our Annual Reporting."

The recently announced IMEC corridor also holds vast potential: "The Arabian Gulf and India already have strong trade relations and the new corridor should work as a strong catalyst to further strengthen the trade between both exponentially fast-growing economies/regions," he says. "The north corridor will also be a game changer in connecting the East to the West. No doubt that this will subsequently have extremely positive implications on the tissue industry in KSA, through the faster cost-efficient logistics infrastructure enabling Saudi producers to sustainably reach larger diverse markets using clean energy. Above and beyond, this could open the door for larger industry consolidations and integrations across regions."

MIDDLE EAST REGION'S LARGEST TISSUE MANUFACTURER TARGETS "IMMENSE POTENTIAL FOR GROWTH AND SUCCESS."

As one of the leading global companies in the FMCG sector, in 2023 Turkish-headquartered Hayat announced investment plans worth $55m which will see it open two tissue and non- woven production facilities by the end of 2024 in Egypt. Here, TWM interviews Mustafa Tuncay, Hayat Vice President, Middle East and Africa Operations, to get the latest on the company's Middle Eastern vision.

"As an international company, we keep an eye on potential markets," Mustafa Tuncay, Hayat Vice President, Middle East and Africa Operations

TWM/1: COULD YOU GET ME UP TO DATE WITH YOUR BUSINESS?

"As Hayat, which is one of the leading global companies in FMCG sector, we are the largest tissue manufacturer in the Middle East, Eastern Europe, and Africa, and the world's fourth largest baby diaper manufacturer.

"We have been monitoring innovation since day one in the business and have kept on upgrading machinery as well as continued investments in the "smart factory" infrastructure in all of its production premises. This infrastructure provides a common platform where the factories "speak to each other," which enables precise recording of raw material management, momentary follow up on the production efficiency and intervention. Hayat distinguishes itself from others with being innovative, environmentally-friendly and with its sustainable manufacturing approach. Trigeneration technology is one significant example to this approach. Our dedication and innovative attitude allowed us to convert natural gas into electricity, heat, and cold water, to be used in the tissue production process. We produce our own energy using trigeneration technology, achieving energy efficiency rates of up to 80%.

"We are also conscious of the importance of ensuring energy efficiency and reducing carbon emissions to protect our planet. We follow an energy-efficient approach in our production facilities that we call "produce locally – consume locally". We implement

High quality products: the company has reinforced its commitment to sustaining and expanding its operations

special engineering solutions to minimize the amount of water used in our production processes and to reuse it in accordance with our quality standards.

"We are committed to sustaining and expanding our operations and investments in Egypt, as it is one of the key markets for our company in the Middle East region and on a global scale, given its immense potential. There, we are implementing an approach to improve the efficiency of water utilisation in our tissue factory. Furthermore, our production capacity in Egypt, on an annual basis, is 60,000 tons for tissue.

"Hayat Egypt has been present and fully operating in the local market for more than 10 years. As a key market for Hayat, we have invested a total of $550m to date and we still have very ambitious expansion and growth plans for the Egyptian market. We plan to invest an additional $55m by the end of 2024 as we plan to open two factories specialising in non-woven products and tissues. These new investments are expected to add 150 direct employment opportunities for the country."

TWM/2: HOW HAS YOUR GROWTH STRATEGY IN THE IOCAL MARKET CHANGED DURING THE PAST YEAR OR SO?

"Hayat has organically grown through expanding investments in Turkey and abroad in the past decade. As an international company, we keep an eye on potential markets, but we also continue our investments in our existing campuses where we see fit. Our investments showed us that there is a high demand for high quality parent reels and finished goods. We understand consumer needs and meet their demand with our investments.

"In the Middle East, the investment landscape in Egypt is favourable, promising and holds immense potential for growth and success. Egypt has witnessed remarkable economic growth and stability in recent years, driven by strategic economic reforms and pro-business policies implemented by the government.

"We have been present in Egypt for more than 10 years now with key milestones including the opening and operating of five production facilities, creating more than 1,600 direct job opportunities, and constantly expanding our portfolio of products launched in the local market. We are committed to the Egyptian market, and we are confident that we are on a growth trajectory with robust expansion plans."

TWM/3: WHAT FURTHER PLANS DO YOU HAVE TO GROW IN 2024 AND OVER THE NEXT FEW YEARS?

"Hayat continues to grow, leveraging its agility, providing the right, the same quality products satisfying customers' timeline, seasonal and instantaneous needs. We expand investments in our subsidiaries and also re-built our existing infrastructure, to keep our pace as a global player in tissue sector.

"We are planning to invest in Egypt an additional $55m until the end of 2024 with the opening of two factories specializing in non-woven products and tissues. Hayat Egypt's future investments are estimated at $210m; the collective future investments of the company are expected to add 500 direct employment opportunities."

Tourism boom: Egypt is expecting 15m tourists by the end of 2023, resulting in increasing demand for the company's AfH brand Focus

TWM/4: WHAT TISSUE TRENDS ARE YOU SEEING GENERALLY IN YOUR LOCAL MARKET AND MIDDLE EASTERN COUNTRIES WHERE YOU EXPORT?

"As tissue brand companies, we should seek to understand our consumer and offer ways to satisfy their needs, integrating innovation and technology in our DNA. Understanding market needs, consumer insights are very important for a sustainable business. From this point of view, with our innovative tissue products, we facilitate consumers' lives.

"In Morocco, we plan to launch Papia toilet paper with the warm up technology. This new technology will make the toilet paper softer and simplify consumers' lives.

"In Egypt, Papia toilet paper is 40% thicker and enriched with lotion, providing additional benefits to consumers. With this innovation, we offer one of the softest toilet papers to the consumers in Egypt.

"Our AfH category brand, Focus, is produced in Egypt where we have observed a nearly 30% increase in tourist numbers. Egypt is expecting 15m tourists by the end of 2023. If the number of tourists continues to rise, we anticipate a sustainable demand for Focus since we sell it to hotels and restaurants, which are frequented by the majority of tourists visiting Egypt.

"For the private label market in Egypt, customers are trying to reduce costs due to economic instability in the country. If economic stability is achieved, we expect to see the private label business emerge once again in Egypt."

TWM/5: HOW IS YOUR COMPANY DEALING WITH INFLATION PRESSURES?

"Economic challenges can arise and fluctuations in foreign exchange rates are not uncommon in any country.

"As a Turkish company, we remain utterly committed to the market, employees, and consumers. We believe that challenges present opportunities for growth and innovation. We are committed to harnessing these opportunities and leveraging our experience and expertise to navigate through them."

TWM/6: HOW HAS TISSUE BUYING CHANGED IN THE PAST FEW YEARS FOLLOWING COVID-19?

"The Covid-19 pandemic has caused various changes in consumer behaviour. There was an increase in demand for tissue products due to concerns and restrictions, leading to a tendency to stockpile. During this period, there was a temporary increase in consumer habits.

"However, as time passed, people's shopping behaviour went back to normal and thus tissue purchases returned to normal levels. There was also an increased demand for alternative products such

as hygiene products and wet wipes. These trends are expected to continue in the future, as hygiene and cleanliness remain important factors. Market conditions, general public health awareness and other factors may influence consumer habits."

TWM/7: WHAT DEVELOPMENTS ARE HAPPENING IN REACTION TO THE ENERGY CRISIS?

"Hayat produces its own energy, reducing its carbon footprint and providing added value to the economy. Efficient use of energy helps restore the greenhouse gas balance in the atmosphere by reducing the amount of greenhouse gases released in production and consumption. Reducing energy consumption with highly efficient equipment contributes to a sustainable future while also reducing production costs. Hayat aims to be the most energy-efficient producer in the sector by making improvements in all its processes to enhance energy productivity.

"We have a highly sensitive approach to energy efficiency. In this regard, we are committed to both developing the most efficient methods through our own engineering studies and focusing on the implementation of the latest global technologies. With this goal, we utilise trigeneration, which converts natural gas into electricity, heat, and cold water for use in our production processes. We produce our own energy using trigeneration technology, achieving energy efficiency rates of up to 80%. Thus, with a single energy input, we meet all the energy needs in the production processes and administrative operations of our smart factories."

TWM/8: WHAT FURTHER PLANS FOR ENVIRONMENTAL CHANGES HAVE YOU MADE?

"We are exploring renewable energy options, such as solar power. To achieve this, we are conducting research to generate zero-emission electricity using solar panels on the roofs of our factory buildings. This approach will allow us to reduce our energy costs while also minimizing carbon emissions."

TWM/9: ARE YOU SEEING AN INCREASE IN GROSS SALES OF TISSUE AND TOWEL PRODUCTS?

"We see an increase in volume sales of tissue and towel products in the Egyptian market. We also forecast that it will continue growing in the next few years."

Changes in consumer behaviour following Covid-19: Hayat says they saw an increase in demand for tissue products in Egypt

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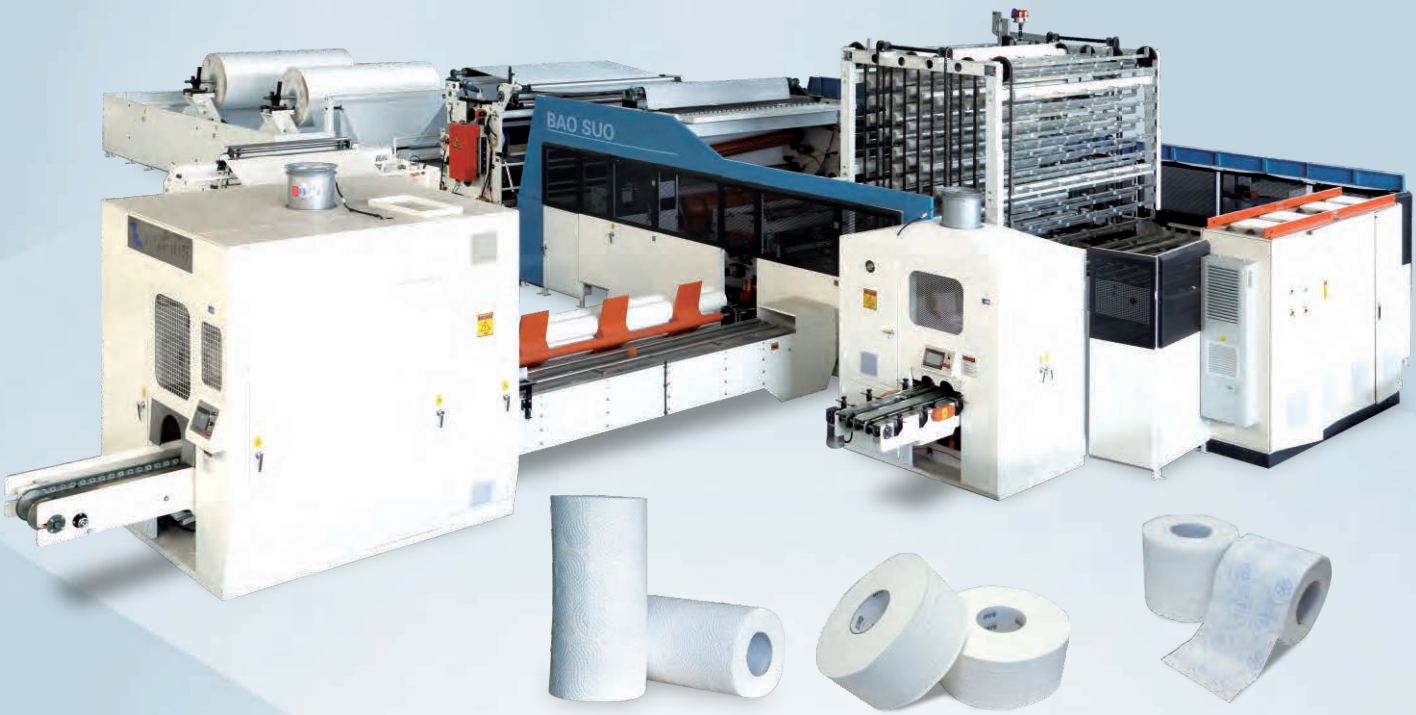
YD-PL450SE Non-Stop Rewinding Line



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JUST WHAT THE DOCTOR ORDERED

"Dr. K" – as he is known professionally – is a Swedish doctor who lives in the UK. Here, he talks about his fondness for bulk-buying tissue and kitchen towel products (a personal preference that started well before Covid-19) and the benefits of packing luxury toilet paper when travelling abroad.

I didn't know it until recently, but it turns out I was well ahead of the crowd when it came to how I purchase loo roll.

At the start of the outbreak of Covid-19, stockpiling toilet paper was making headlines around the world – but it wasn't news to me! I have been a member of wholesaler Costco for the last two decades and have a routine where I buy high-quality loo roll, kitchen towel and medical roll products in bulk. Not only does it mean that I can buy quality products at a better price, but it also means I never run out.

For my NHS surgery I buy Tork towel. It's multitasking and can be placed in a dispenser, so it's easily on hand in case of emergencies. I also buy blue roll in bulk, they must contain at least 400+ sheets so they don't run out quickly. Both products are very absorbent, and the bright blue of the blue roll means they're eye catching as a hygienic product for any patients.

I also bulk-buy loo roll and tissues for my surgery and for my home. At home, we have Kirkland's Signature Kitchen Roll Towel, which is indispensable. I buy four of the packs of three in 2ply and it is always on our kitchen mantel, it's so handy to have around for cooking spills. A roll also takes centre place on the dining room table when we have friends over for a feast or a BBQ. We cook a lot of BBQs, and they are great to use to rest the meat on once they're cooked.

I also like the kitchen towels where the tear section is at half the width of a normal sheet, meaning there is less waste of the kitchen roll. We have a lot of these in Sweden, but I don't see so much of them in the UK. For loo roll, it has to be Andrex. It's a classic brand, high-quality, and I buy the 16-roll family-pack in groups of three for my home and for the surgery. And of course, Tork toilet tissue products from my native Sweden.

I don't really consider the environment too much when buying these products, I look mostly for a bargain on a good-quality product. I've travelled a lot in my time and lived abroad in different countries. I had never thought about it before TWM contacted me, but you see a difference in toilet paper products around the world. In Scandinavia and the UK, these types of products are very high quality. However, in some countries the products are not such good quality. My solution here is to take full advantage of my stockpiling – I pack a couple of Andrex loo rolls in my suitcase, so I can have the same quality product when holidaying abroad.

Ahead of the trend: Stockpiling tissue and towel products is second nature

"THESE TIMES ARE DEFINITELY EXCITING" – WITH KEY ISSUES RANGING FROM THE NEW ERA OF ADVANCING AI, DATA CONTROL, FLEXIBILITY, AND LOCALISATION

Leading converting machinery suppliers discuss their development plans for the years and decades ahead. A Special TWM Report.

TWM/1: HOW IS ARTIFICIAL INTELLIGENCE (AI) CHANGING YOUR BUSINESS, AND WHAT OPPORTUNITIES AND CHALLENGES ARE THERE FOR THE TISSUE INDUSTRY GENERALLY IN ADAPTING AND ADVANCING WITH AI?

Cristian Giuliani, Vice President, Global Hygiene Engineering, BW Converting Solutions: "We have a pragmatic approach to machine learning and smart machines. Many patterns of machine behaviour are already known and analysed - and can be used in a focused way to simplify and guide machine setup, adapt process controls, and notify the operator when they need to perform a task.

"The SmartTouch HMI already has several of these advanced functionalities embedded and more are being developed every month. The point is to use operator time in the most efficient way and guide them proactively. PCMC is also expanding on the set of adaptive machine controls (using dedicated feedback and sensors to detect what's happening and how to respond) available to the operator to improve usability, product quality and uptime.

"These times are definitely exciting, and we can see the next big steps in machine learning implementation are within reach in the next couple of years for PCMC equipment – but with a potential big challenge: accessibility to the "data from the converting floor," since many converters are hesitant to share data outside of their organisation."

Sergio Tonarelli, Chief Sales Officer, Futura: "AI will have an impact in areas where the human mind sets limitations. For example: every product run will have hundreds of variables not only related to the process settings or paper characteristics but also deeper data like power consumption, motor absorption, dust generation, building temperature, outside temperature etc. All these parameters will influence production. AI can record all these every second of the run and create a database. This will produce several conditions that will eventually repeat themselves in time and at that point we will have a model for the machine to auto adjust.

"We are right at the beginning of the AI journey with converting. Within our own operation, we have started to implement autolearning at Plusline which will result in automatic setting solutions. Maintenance is another important area for AI implementation. It will become normal for a machine to tell you, for example, that last time you waited too long to replace a bearing. Next time, if you replace it at the optimum moment, you will avoid a stoppage and having to wait for the spare part.

"Customers are certainly talking about AI more and packaging is a particularly relevant application. But for AI to be truly effective it needs to be implemented across the whole mill as part of an integrated production process."

Carlo Berti, Chief Business Officer, Gambini: "We are known for having a future-oriented vision. Gambini has a leading Research & Development department and has made major innovations in the tissue industry over the years. Exciting scenarios are arising with AI. But these scenarios at present are embryonic.

"We strongly believe that our industry needs tangible results, not just name-dropping the most

hyped technologies. Therefore, we have a full-width pilot line (2.850mm) on which we can do reliable and realistic testing. This pilot line is in our TissueHub in Lucca, Italy, and is available to be rented and used by customers.

"However, we will only effectively integrate AI into our processes when it is able to bring concrete evidence and results to our customers, including in the field of development. Our TissueHub and its technicians are receptive to any new technology and ready to integrate innovations to bring effective and practical solutions."

Simone Barsanti, Strategy and M&A Director, Körber Business Area Tissue: "The benefit of AI lies in the opportunity for continuous improvement, thanks to the data and information gathered by machinery. Change is happening now, and the market must be ready to handle it. The tissue business is no exception and AI will be able to give us great satisfaction, in multiple areas: from automation to safety, with innovative solutions that improve the daily work of our customers. However, great challenges also await us, such as, for example, the development of new skills both in the application of AI and in the management and normalisation of the data used, all of which Körber Business Area Tissue has been investing in for some time."

Andrea Tomei, Area Sales Manager, MAFLEX: "That is a tough question. AI is a new tool, like all new stuff it requires time to be confident with and learn how to use it in the right profitable way.

"At MAFLEX, a few years ago we started working to implement AI in our machinery with the PEGASO smart supervision system. MAFLEX lines are now able to collect a huge number of data and videos. All these numbers are "managed" by AI to get information useful for MAFLEX and our customers.

"Just to give you an idea AI can be used to easily set up and tune the line, to optimise production, and to define preventive and predictive maintenance programs. Our software department is continuously working in identify all possible benefits of using AI in MAFLEX tissue converting lines."

Enrico Ruglioni, European Sales Director, Maxima: "The real impact of AI on our business, as OEM, is yet to come but, for sure, it will happen and in a much shorter time than we may expect. The advancing of AI in the long term will result in a remarkable improvement in the converting process regulation and, the real challenge, will be to find the right compromise between AI and Human Intelligence keeping in mind that, in the end, without Human Intelligence no AI would exist!"

Marco Calcagni, Sales & Marketing Director, Omet: "AI is creating significant opportunities for OMET and will have a profound impact on our future business.

"Among the many possibilities offered by this innovative technology, the enhancement and improvement of production with consequent optimisation of production processes and waste reduction stand out. There is also more precise defect detection in quality control compared to standard human inspection, maximum product customisation to meet the needs of a wide range of customers, predictive maintenance, thus predicting machine failures to reduce downtime, and the creation of interactive tools to provide immediate responses to operators in case of difficulties in operator training.

"However, in this project there are also challenges to address, such as the initial costs associated with acquiring the necessary hardware, software, and training. The issue of privacy is also relevant as the management of sensitive data requires a dedicated and robust security system.

"Furthermore, the market itself poses a challenge, as not everyone is ready to embrace these new technologies and the inevitable evolution associated with AI. We are at the dawn of this transformation and must keep up with the ongoing changes."

TWM/2: IN 2023, WHAT FEATURES DISTINGUISH YOUR CONVERTING TECHNOLOGY, AND HOW DO THEY IMPROVE PRODUCTIVE EFFICIENCY?

Giuliani: "BW Converting Solutions has always valued safety and continues to partner with our customers to produce the safest lines available with the most user-friendly interactions relative to the safety functions. From the first concepts to the physical machine, we consider safety. With this method and mindset, safety won't interfere with productivity and, in fact, can enhance it.

"Another area we excel in is the automation of machine interactions. With the vision towards "lights out" converting operations, the latest PCMC tissue developments have been achieved to support the capability of automating most interactions. We have been moving forward to reduce required interactions to a minimum and cutting critical path items that can disrupt operations.

"Our innovative unwind tension control and web handling system, the Servonip feature on the Omnia embosser laminator, the Smartflow, ABS and ABC technologies on XCut, the SmartTouch HMI, the Accelerate remote support packages are just some examples."

Tonarelli: "Futura's timescales when it comes to innovation have always set it apart. We are improving our technology all the time, of course, but Futura is renowned for looking to the industry's needs and aspirations five or 10 years from now, rather than only the immediate future. This is why we are looking at completely automated processes which can raise production significantly while reducing the number of operators required, whose role will evolve to be safer, more highly skilled and gender neutral."

Ruglioni: "Each machine, and the entire line in its entirety, has been conceived and developed keeping in mind flexibility.

"Every single setting that the converting line will require must be as simple as possible so that it can be accomplished by the operator running the line day-by-day and without the necessity of involving maintenance staff. Changing embossing pattern? New core size? Different paper web width? Just one click away."

Berti: "Flexibility is Gambini's distinguishing feature: the market recognises this and hence rewards us. In terms of technology, flexibility is the key point for most of our lines and their components. An embosser such as TouchMax allows rapid changeover of patterns, enabling variability in production.

"The innovative wet embosser AirMill offers three different uses that lead to different results of the final product. The different possible combinations between these two give rise to even more flexibility, empowering customers to manufacture a wide range of products in a time and cost-effective way. Flexibility is therefore a mindset for us.

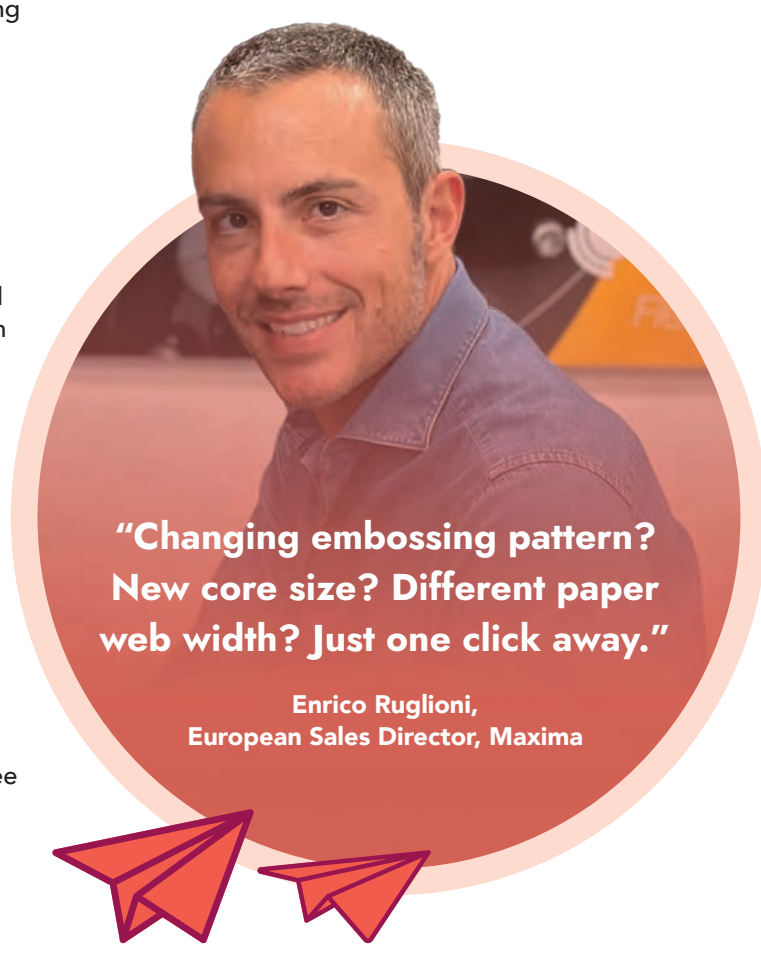
"We identify with our customers and, first and foremost, with the end consumer, to discern which needs a tissue-maker has to deal with. Our lines are designed to be assembled with extremely flexible and adaptable components so that we can achieve the maximum in terms of variety and efficiency."

Barsanti: "All our machinery as well as our most innovative technologies are designed to allow our customers full control of both processes and quality of the finished product.

"Growing trends towards automation and, at the same time, energy saving, are creating fertile ground for a new evolution through the design of simple, versatile, and lower energy impact machinery in order to offer customers a complete technology package under the banner of production efficiency."

Tomei: "I think the right word to refer to MAFLEX is 'adaptive.' The company is adaptive with respect to market change and different customer requirements. We are always focused on intercepting market trends and in fulfilling customer different specifications.

"MAFLEX tissue converting line are adaptive. The modular design that we've adopted as philosophy allows us to tailor the converting line for each different customer factory.



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We believe in responsibility.
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"MAFLEX rolls are adaptive. Our technology gives customers the chance to make with the same line a wide range of output rolls. They just need to put the recipes and the ingredients MAFLEX tissue paper converting line will do the rest to get the expected final tissue roll.

Calcagni: "OMET has already initiated a process of integrating AI, developing tools such as the cutting-edge SFERA platform. This platform will enable production line operators to obtain immediate responses to all potential issues that may arise during the production process. Thanks to continuous learning, this system will be trained to provide increasingly precise and reliable responses, even to individuals with limited qualifications.

"Regarding the enhancement of production efficiency, we are also working with AI to implement predictive maintenance. A sensor system allows us to continuously monitor the wear and tear of all machine components, preventing unplanned downtime.

"In addition to the realm of AI, OMET has developed new technologies and secured innovative patents in the field of folding systems, both for napkins and interfolded products like facial tissue and towels. These advancements position us at the forefront of the machinery market for folded product manufacturing."

TWM/3: IDENTIFY ONE AREA OF TECHNOLOGY IN WHICH YOUR CONVERTING SYSTEMS REALLY STAND OUT.

Giuliani: "Typical converting lines often unnecessarily destroy bulk at the unwinds, during paper transport through the line and in the rewinder. Even a seemingly small amount of caliper reduction is a significant waste and has an impact on final product appearance and specifications.

"It's clearly not an easy task to meet product quality and customer targets while trying to optimise energy and fibre consumption. One way we've been able to achieve this is with best-in-class web handling and winding. Minimising stress on the web while in transit through a converting line not only preserves the native caliper of a sheet, it also reduces the frequency of web breaks. This can be profoundly impactful on structured sheets such as TAD and QRT, but also on low-weight LDC recycled tissue papers.

"PCMC's Paragon rewinder excels at perfecting the wound product properties. Thanks to the patented revolutionary wind nest, Paragon preserves the roll bulk, with 30% less nip force on the winding belt and the centre drives engaged with the product for 65% of the time even when running at 60 logs/minute.

"Thanks to these and other proprietary technologies Paragon can outperform a conventional converting line with an increase in productivity of up to 25%."

Tonarelli: "It comes back to automation, and I shall focus on two solutions: first, our new unwinder designed so that the automated Andromeda crane can pick up a roll and bring it to the unwinder, where the splice is then executed without the operator entering the machine or in fact any external intervention. We shall be demonstrating this at our open house during MIAC.

"The second example where we are redesigning processes to make them more operator friendly/free and efficient is the changing of the upper embossing roll without requiring a paper break. In Europe in particular, the upper embossing roll often needs to be changed as often as twice a day. Once you eliminate the threading which follows a paper break, this could typically save one hour per day."

Berti: "Embossing is our signature. It is in this specific paper-converting process that we want to leave the most recognisable mark of Gambini technology.

"Over the years, we have invested most of our resources to study, test and propose innovations in this step of the process. We have come to realise that the moment of embossing is crucial in converting to the point that it is a game-changer even in the

paper mill, during the paper-making phase. This is revolutionary.

"Embossing is an extremely sensitive activity: depending on how the tissue paper is treated, the results can change radically. The use of water is our greatest discovery. Water, so historically important in paper-making, finds an unprecedented use in paper-converting (in tissue embossing, to be precise) that is as unexpected as it is surprising.

"Using an AirMill, nozzles moisten with water the paper, which then comes into contact with hot rolls. A process that can increase volume, preserve strength, or give paper a textured look. It's a phase of the process which simply did not exist before AirMill. We've not just invented a new piece of machinery; we've invented a new category of equipment: wet embossers.

"Armed with these convictions, we have spent additional energy to make sure that the processes before and after embossing deliver the best results, as well. Thus, we invested in the G1 rewinder, which can preserve the extreme quality of AirMill paper, and thus in a complete line where quality reigns supreme.

"Embossing is also a visible signature for our customers: the texture that can be seen and touched on the final products. That's why we created TouchMax, which supports three embossing rolls for fast and efficient product changes. Embossing is undoubtedly the Gambini signature."

Barsanti: "Körber's solutions are a recognized excellence in the tissue world: starting from our top of the line, such as Constellation, ITF, ViZion, and Catalyst, to the MY family and SAM (self-adjusting machine) products, which support the operator in the use of converting lines.

"Right now, we are seeing a great deal of interest in sustainable innovation, so Körber is investing in new solutions that can manufacture glue-less, core-less and plastic-free products, that is, 100% sustainable."

Tomei: "MAFLEX's converting system is fully automated. From the control panel the operator can configure the line to automatically switch from high embossed kitchen rolls, to ply embossed toilet, to maxi rolls or auto-cut rolls.

"The line machinery will respond to the different settings very quickly, reducing the line downtime and so no crane and no screw tightening are required."

Ruglioni: "Choosing a single area is a really hard challenge, but being "forced" to make a choice I should point out minimum two areas: embossing (our MF series of embossers/laminator) with our automatic change of steel rollers (for different patterns) and cliché roller as well (to work with different paper widths) and printing (with our PRINTECH in two and four colours), with our state of the art printing machine that combines a completely gearless approach with a printing quality and precision that really stands out and, somehow, even exceeds the usual "boundaries" of flexo printing and no compromise in terms of flexibility and versatility."

Calcagni: "The key to our converting systems lies in the folding units, which can be mechanical with grippers, vacuum/mechanical with grippers and suction, or fully vacuum.

"Thanks to innovative concepts, such as the retractable comb and suction control systems, adjustable based on paper width and material type, OMET machines can process a wide range of materials with optimal performance. The machines are no longer limited by the type of fabric to be transformed.

"Another strength of OMET is its exceptional modularity and flexibility, distinguishing its production lines. Thanks to these features, it is possible to configure the machines according to customer and market needs, while also having the ability to modify and adapt them later on."

TWM/4: WITH THE ENERGY CRISIS, WHAT TECHNOLOGIES ARE YOU IMPLEMENTING TO IMPROVE YOUR CUSTOMER'S ENERGY EFFICIENCIES, AND WHAT ARE YOUR PROJECTIONS

FOR TRENDS AND NEEDS HERE IN 2023-2024?

Giuliani: "We think that allowing our customers to make products with the same feel and shelf presence with less fibre and no extra energy input on the converting end, instead of adding extra energy in the form of heat, is extremely impactful.

"The starting point is always robust equipment designed with long life expectancies and the support to back it up, adding on top of this the elimination of hydraulics from the entire converting line, the reduction of compressed air usage, the extensive use of direct drive transmission instead of belts and high efficiency motors and drives."

Tonarelli: "In this respect it is important not to look at the line in isolation but also the building, the infrastructure associated with it and the energy efficiency of the entire value chain.

"One way in which we reduce the size of (and of course capital expenditure on) the building, for example, is to incorporate the crane in the converting line, which is one of the defining features of the Andromeda system. This lowers the roof height and reduces the energy cost for managing the air quality and temperature in the building, not to mention the cost of construction and the carbon footprint associated with excess construction materials.

"Another way we can save energy is by reducing the footprint of the line – literally the floorspace it occupies. Plusline integrates wrapping, bundling, layer forming and palletising in such a way that the footprint can be reduced by 15 linear meters compared with a conventional solution.

"Another contribution to energy efficiency in the value chain is reduced glue consumption. By ply-bonding with the glueless Hydrobond system, users can eliminate the cost and energy of transporting typically 1m³ of glue per day per line and this really adds up. It is also an example of how we need to look at our entire supply chain when assessing and seeking to reduce our impact, particularly with the introduction of science-based targets for climate change.

"In the next year and beyond, it will be the overall efficiency of the line which is the greatest determining factor in its energy consumption per unit of tissue produced."

Berti: "The revolution of introducing water into the processing system is also this. Water leads to unexpected and excellent quality results, and it also allows for cost and energy consumption savings.

"First, by setting the AirMill to preserve paper strength, the same converted product can be obtained saving costs at the paper mill: less expensive fibres are needed to make jumbo reels.

"By using the AirMill to make textured paper – to get what we call a Comparable-TAD (or C- TAD) paper – the energy savings are even more obvious. In fact, an AirMill-equipped converting line can be placed downstream of a conventional tissue (LCT) paper machine: this implies huge savings in the building time, in the buying costs and in the operational expenses, compared with those of a TAD or a hybrid (structured) paper machine. The cheapest and fastest way to bring a textured paper roll to the market.

"For instance, an eTAD machine consumes about 3,200 kWh/ton, while a solution consisting of an AirMill installed inside a converting line after a standard LCT paper machine consumes totally only around 2,350 kWh/ton (paper machine ≈ 2,000 kWh/ton + AirMill ≈ 350 kWh/ton).

"This solution is also extremely flexible, as the use of the AirMill can be bypassed and production can be varied, while hybrid equipment is designed to make just one type of paper."

Barsanti: "Körber is on the front line against the energy crisis. Specifically, we have implemented systems on our machines to reduce energy consumption, such as energy efficiency class A motors, LED lights, regenerative motors, and advanced

folding technologies such as ITF Change. Our goal is to reduce the energy impact of our lines by 30%, an ambitious challenge that we will strive to meet."

Tomei: "The first step to reduce energy loss is to select the right converting line for the customer.

"Working shoulder-to-shoulder with our customer would help in selecting the best line configuration for the expected production and not waste power. In addition to this all our lines are equipped with high efficiency electrical and electronics devices to reduce current absorption. Mechanical components, pneumatic and hydraulic devices are selected to reduce energy loss. Finally, all MAFLEX line module can be equipped with the MAFLEX Energy Regenerative System (MERS). MERS recovers the kinetic energy of the line, otherwise wasted in the form of heat, transforming it into electric current which is fed into the electricity grid. Our goal is zero waste."

Ruglioni: "When sizing and engineering our converting solutions we always put special attention on this topic which is coming more and more critical for economic and environmental reasons. This approach is reflected into different precautions that space from an extensive use of regenerative units to an intelligent cooling system for our electrical cabinets. Each detail matters."

Calcagni: "The use of highly advanced electronics has led to a significant reduction in consumption, both in terms of motors and the entire pneumatic system. The main developments have been focused on reducing energy consumption in the drying process, where the adoption of air recovery and recirculation systems has resulted in a substantial decrease in consumption compared to previous technologies. Furthermore, there has been significant progress in vacuum pump circuits, significantly reducing air consumption and, consequently, the energy required to generate vacuum compared to old technologies."

TWM/5: WHAT NEW TISSUE TRENDS HAVE OCCURRED IN 2023, AND WHAT FORECASTS DO YOU HAVE FOR 2024?

Giuliani: "From the product perspective, we have seen several new plant fibre-based (bamboo, straw, miscanthus, etc) toilet and kitchen towel rolls on the market. Such products can now be found in supermarkets, online and as direct to consumer sales with attractive paper or biofilm packaging. We think this is a trend that will continue also in 2024 and beyond, along with the push for fibre-efficient products in general. We've been privileged to support the growth of consumer coreless products in Europe, and we're seeing hopeful signs of its adoption in the Americas.

"From the technology perspective, the trend towards smarter and more automatic machines will only accelerate, with customers demanding increased flexibility, reduced learning curve and, at the same time, easy to maintain equipment."

Tonarelli: "The Futura R&D programme is based on creating innovative technology relevant for the manufacturing environment not just tomorrow but in five to 10 years' time. This means we have in mind the "lights-off" facility, where very little manual maintenance and intervention is required. The market is set to change, with output efficiency becoming more important than constant product changes. We have always prided ourselves on the flexibility of our technology, but more output with less input must be the ultimate goal of an industry seeking to be relevant in a world where resources, including skilled human resources, are limited. We are aiming at something a bit different from the current tendency to bring product differentiation for the sake of it rather than really thinking about efficiency and end-user benefits. The importance of a touch-free process will be more widely acknowledge, for example. Once consumers are aware that they can demand a product for hygienic use which is untouched by human hand, will they accept anything less? The days of reject product being manually re-introduced to the line must be numbered.

"The market is set to change, with output efficiency becoming more important than constant product changes."

Andrea Tomei,
Area Sales Manager, MAFLEX

"Thinking again of the end-user, I am confident to say we have the best tail sealing system in the world, to make the consumer's experience much better when they open a roll product. Process efficiency and real end-user benefits – those are our focus for the decade to come, and summarise what will really matter in the future."

Berti: "Attention to the finished product is the starting point of our work. This is because our customers' choices are driven by the needs of the consumer. Therefore, our technologies also cannot prescind from this.

"The satisfaction of our customers proves this. In 2023 we designed entire lines anticipating production needs or installed components on existing competitors' lines, proposing the desired solution. Our technologies think about the final consumer. And so, they think about those who need to satisfy this consumer, acting as breakthrough keys to optimising production, in every sense of the word. By lowering costs, speeding up processes, and above all, preserving the excellent quality that our components can ensure. We could not achieve these results without extremely flexible technologies and an open mind that allows us to see endless possibilities in our industry.

"This is how water came into converting. As a revelation that allowed us to take another step forward towards end-consumer satisfaction."

Barsanti: "In a constantly evolving market environment such as the tissue industry, the push toward sustainability also involves machinery manufacturers meeting a market demand that is increasingly focused on value for money and energy savings. This year, digitisation is taking centre stage with a view to boosting plant performance, reducing waste and efficiency losses. We expect 2024 to maintain the same trends in a market where demands increasingly focus on sustainable products and energy-efficient machinery."

Tomei: "This year, I've felt that there are more paper tissue rolls than fishes in the sea! By that I mean that any customer wants to make its own rolls, and it is quite impossible to find the same recipe repeated.

"For MAFLEX this means to continue investing in converting line flexibility and easy toolless changeover of the hardware. Moving forward from 2023, in 2024 and beyond I think paper mills and paper converters factories will be local. Countries that are now importing ready-made tissue products will build up paper mills and tissue converting factories. This to reduce the pollution impact of transportation but also to make the right product for the right market."

Ruglioni: "The distinction between Consumer and AfH products is getting thinner and thinner and, because of that, the same line is often asked to produce a wide range of products that previously were converted into dedicated lines. This trend implies that flexibility is even more important than in the past, and some machine units have now been asked to extend their "limits" to accommodate a wider range of products specifications without having a rigid distinction between these two market segments."

Calcagni: "Throughout 2023, we observed the consolidation of investments made in previous years, during which we provided strong support to our customers to enhance the efficiency of their production processes. For 2024, significant investments are expected, particularly in the folded products sector. These investments will be primarily driven by the growing preference of end-users for the ease of use of folded products compared to roll-based ones. Additionally, we anticipate a reduction in transportation costs as a larger quantity of material can be transported in the same space, which has a positive impact on energy costs. Furthermore, we anticipate that many converting companies will increase their production capacity by implementing increasingly automated technologies, phasing out older technologies."

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Every detail has been meticulously designed for increased production, accessibility, maintainability, and fast set-up. Take a virtual tour at **visionG3.com**.

HOW MUCH DO YOU VALUE SAFETY, SUSTAINABILITY AND EFFICIENCY?

William Nelson, President, E80 Group North America, states a case for full scale material handling automation as an answer to today's challenges.

Would you ever imagine putting in a new production line without automatic end-of-line packaging (wrapping, bundling, case packing), or for that matter decide it's more efficient to palletise by hand? Imagine what that would look like from a personnel staffing perspective, not to mention the efficiency of a human stacking product for eight hours a day – coffee and restroom breaks not withstanding! Think about the toll such labour takes on the individuals engaged in a high-pressure, high-output, repetitive tasks standing day in and day out at the end of a modern rewinding line. Good luck! So, what's the difference once the product is packaged and palletised?

From the end of production lines, a swarm of fork trucks transport finished goods to a warehouse and then to a shipping bay – time after time after time. Isn't this just an extension of the previous high-pressure, high-output, unsafe and repetitive tasks we talked about at the end of a production line? What benefits do manpower bring to these tasks? What risks are inherent in fork trucks racing around a facility, crossing paths with each other, honking horns at intersections and blind corners?

These questions are obvious provocations, but really, can we shift our thinking a little bit towards a safer, more sustainable, highly predictable solution? Can we consider a new paradigm in which automation of all material flows is part and parcel of any plant design?

Over the past three distribution editions we have explored how automation technology can be deployed as the final frontier of efficiency, how both internal and external logistics energise productivity, and the economics of automation working equally for small, medium, and large producers.

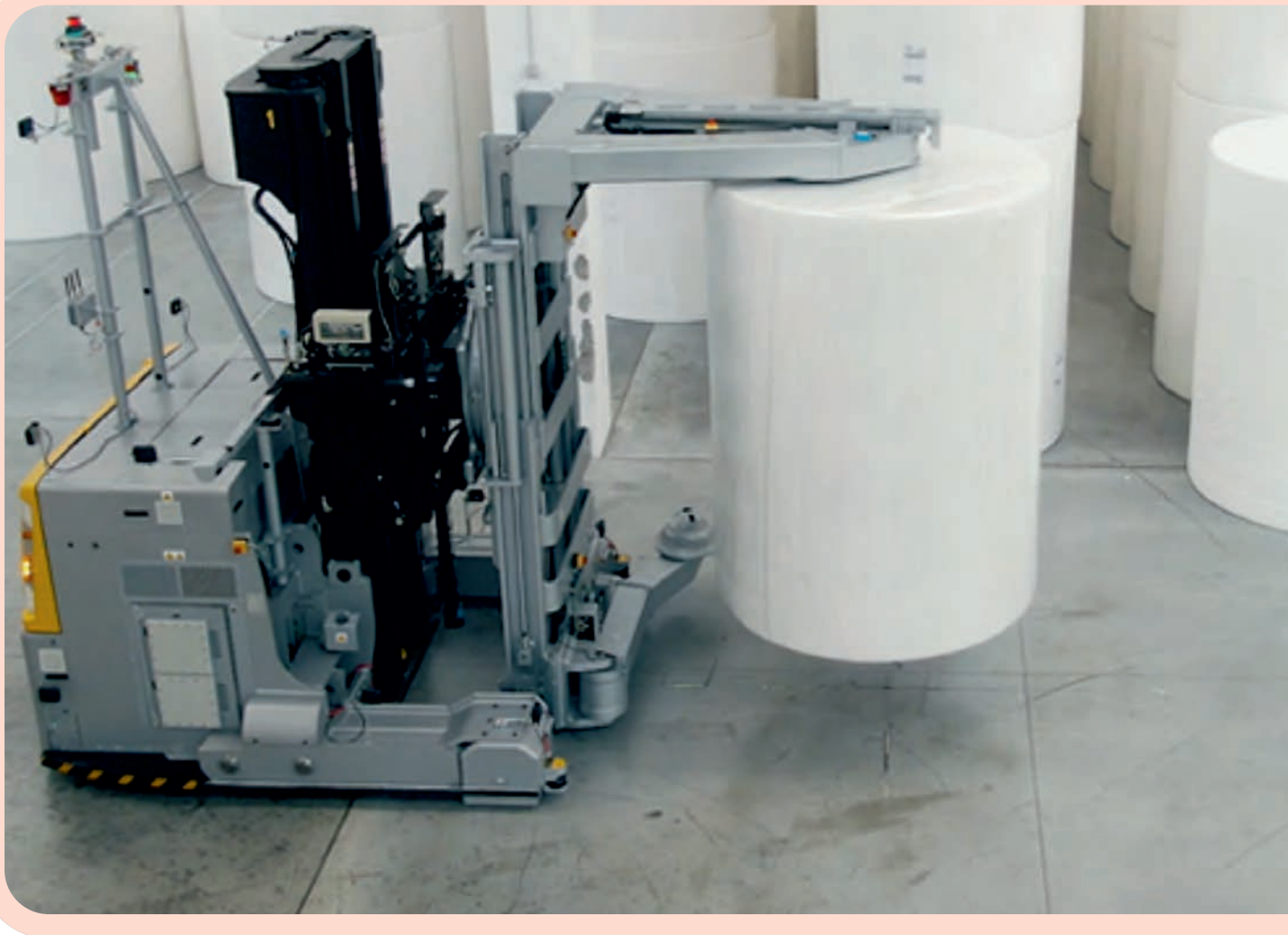
We'd like to discuss in this edition a further evolution in the marketplace: Automation is a Must, not an Option. We'll talk about all the different options available in the production and distribution space as well as some new technological developments that provide nearly infinite product mix capabilities to support market future needs. Let's go with the flow of material movements within an ideal factory.

RAW MATERIAL HANDLING

As a start, an ideal factory excels in the efficient management of raw materials. Employing innovative raw material storage solutions such as the Double Deep storage system, maintains impeccable order within its inventory, and reduces space required. This enables seamless monitoring and streamlined management of stock, ensuring precise, timely deliveries to production lines—exactly where and when they are needed for optimal operations. Raw material handling with automation ensures:

- Total traceability to reduce waste and bottlenecks.
- Deliver on-demand to production line, at the right place and at the right time.
- Inventory control and auto-replenishment.

These benefits apply also when it comes to parent roll handling. Based on roll characteristics, space availability, and WH methods, you have four options



Parent roll handling thanks to the Unicorn LGV, patented by E80 Group, an automatic handling system designed for tissue.

that are capable of handling all known parent roll weights and dimensions on the market today:

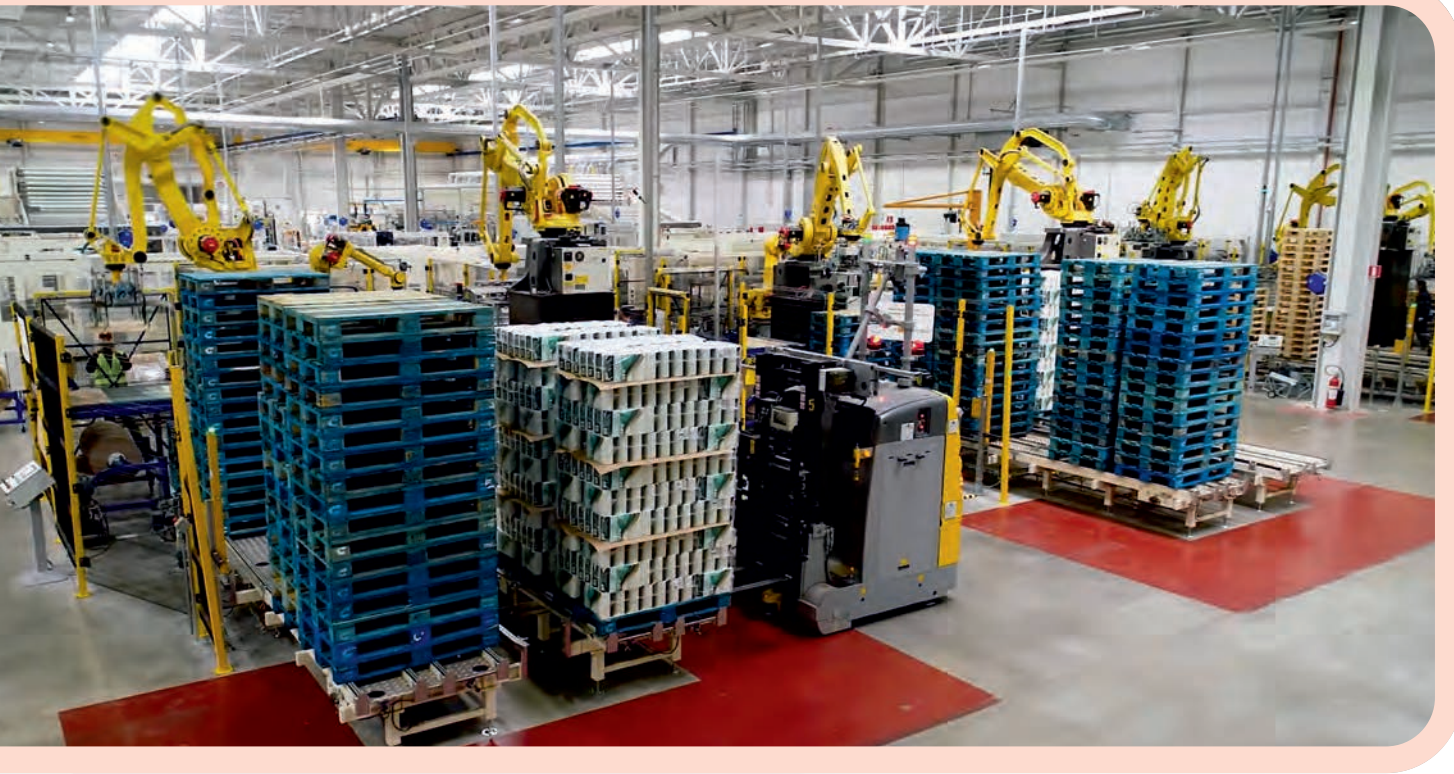
1. LGVs with clamps
2. Prong LGVs

And two completely new technologies that prevent any damage to the paper and save space respectively:

3. ANT PR-LGV
4. UNICORN LGV

Elephant LGV, with clamps. Time-tested and proven concept allowing stacking up to three levels, delivery of parent rolls, and pick up of cores over about 100 systems installed just in North America, the Elephant is proven to reduce roll waste by up to 2% over manual handling as well as provide important functions such as back-to-back roll placement, which is favoured by insurance carriers. Efficient stacking optimises the use of warehouse space by up to 7% and reduces the risk of fire by minimising the "chimney" effect.

An ideal factory excels in the efficient management of raw materials. Employing innovative raw material storage solutions maintains impeccable order within inventory, and reduces space required.



End-of-line Robot Systems such as robotic palletisers, stretch wrappers, and robotic labellers seamlessly integrate with LGVs.

ANT, designed to interface directly into the unwind stand of the converting machine to deliver full parent rolls and return used cores. This concept provides increased safety as the operator does not have to interact in the parent roll handling process, in addition to being highly maneuverable and space-saving.

Unicorn LGVs, the next-generation laser-guided vehicle (LGV) specifically developed to lift, move, and deposit jumbo rolls weighing up to five tons and of three metres in diameter both vertically and horizontally. Patented by the E80 Group, this LGV prevents damage to the paper by automatically inserting two chucks inside the core and avoiding any contact with the external surface. Efficient stacking optimises the use of warehouse space by up to 7% and reduces the risk of fire by minimising the "chimney" effect.

FINISHED GOODS HANDLING

At the end of the production lines, robotic palletisers integrate seamlessly into finished goods handling systems, including LGVs and ANT, providing a wide range of options based on your finished good warehousing strategy.

BLOCK STORAGE is a standard in finished goods tissue handling, allowing up to four levels stacking heights for all products, including display pallets and unit load of cased products. It is the simplest and lowest cost solution from an infrastructure point of view.

DRIVE-IN racking has successfully been employed in the tissue industry, while it is widely used in the beverage and food industry up to 11 metres. It provides for higher density in a vertical sense.

ASRS provide for the highest density utilisation of space. All product types can be stored independent of dimensions. One key benefit of high bay storage is speed in preparing outbound shipping loads and flexibility to mix loads.

TOWARDS DISTRIBUTION CENTRES OF THE FUTURE

Global distribution centres (DCs) have to deal with a significant increase in logistical challenges, driven by heightened market competition and increasing customer demands for enhanced service quality. The trends underscore a growing range of products focused on achieving quicker and more efficient time-to-market, alongside the proliferation of innovative distribution channels, including advanced last-mile delivery solutions. The role of integrated supply chain systems and the digitalisation of intralogistics processes is pivotal in ensuring business success.

One example of innovation for pallet customisation is EAGLE TRAYS, a solution that tackles the issue of multi-shape and multi-size picking by implementing innovative robotic systems capable of preparing pallets with non-homogeneous products. The system is a combination of software and hardware, both developed in-house. The

software allows the customer to select the right SKUs to build the pallet with the maximum stability.

The reality is that on a single pallet you could have a box of tissue, a bundle of towels, a box of facial tissue, and a case of diapers all prepared for a small retailer. The system intelligently selects the configuration of the pallet based on stability factors, meaning a safer product for end consumers.

The ability to configure a more stable pallet offers benefits beyond retailer convenience, including reduced shipping costs. There's less damage to the product and better utilisation of the pallet itself. If you optimise the pallet footprint, then you can also optimise the loads on the truck, leading to fuller trucks for better utilisation of your vehicles.

All of this is made possible through the interaction of different automated vehicles and machinery to carry out tasks with high precision and speed. In our vision of distribution centres of the future, we see a web of automation that handles materials, coordinates movements, and optimises processes seamlessly.

Global distribution centres have to deal with a significant increase in logistical challenges, driven by heightened market competition and increasing demands for enhanced service quality.

Finished Goods Block Storage System with LGVs.

Finished goods handling thanks to Laser Guided Vehicles.

STREAMLINING OPERATIONS WITH SMART SOFTWARE

In the ever-evolving landscape of automation, software plays a pivotal role in orchestrating seamless intralogistics. E80 proprietary Software Platform is designed to manage high-volume LGV fleets and robotic systems, dialoguing with customer's ERP and ensuring the integrated and automated flow of materials throughout your plant. It acts as the conductor of this intricate symphony, communicating with production lines, palletisers, and wrappers, while coordinating warehouse movements from receiving to shipping.

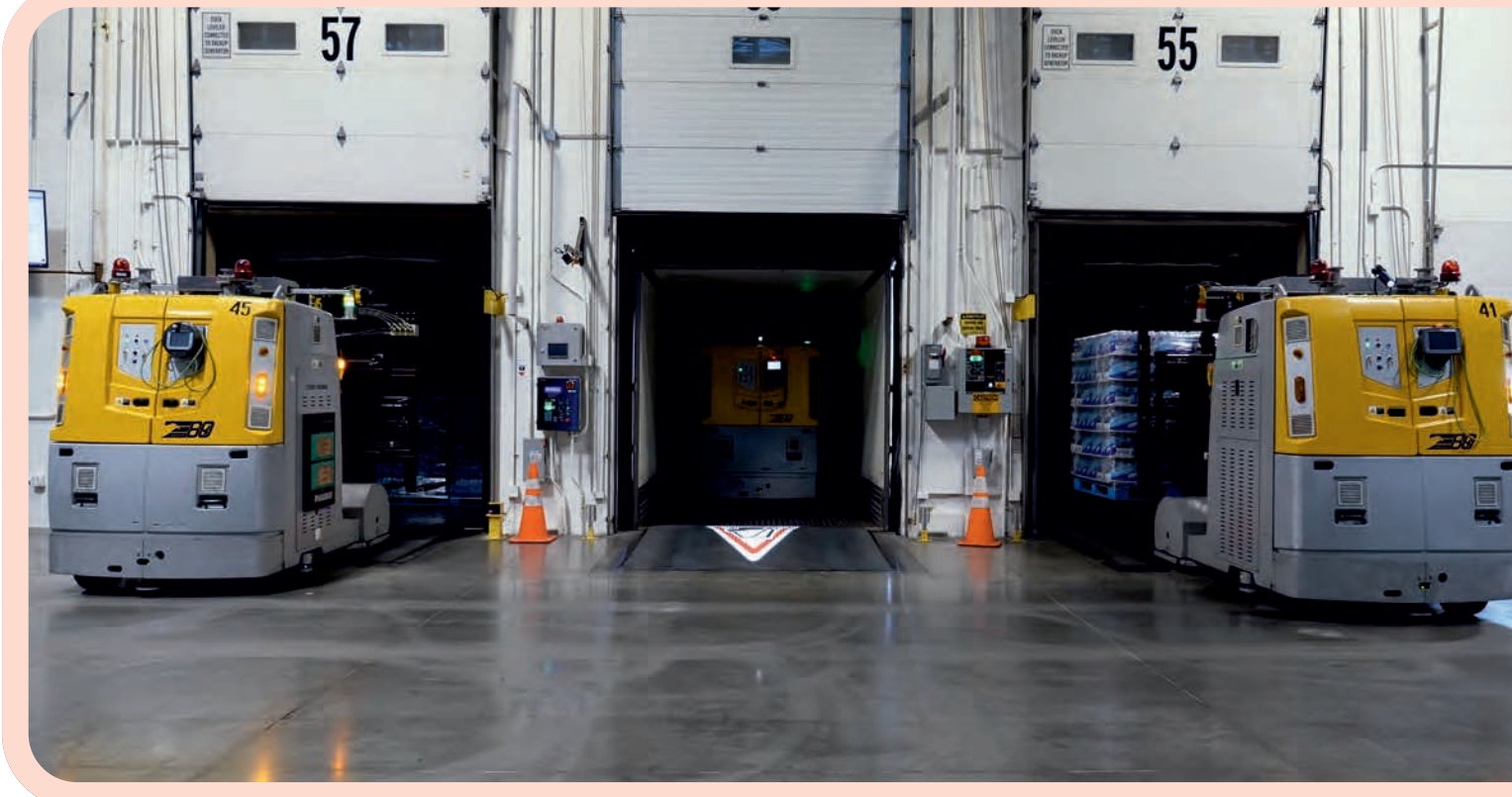
This smart decision-making software not only optimises resource utilisation but also provides real-time performance monitoring, predictive traffic management, and intelligent route selection. With a single durable interface, it guarantees efficiency, safety, and total product traceability, ensuring that your operations are faster, safer, and more sustainable. As the digital economy reshapes distribution, embracing integrated automation and smart software solutions becomes not just an option but a necessity for businesses looking to thrive in the modern era.

We return to our original question: how much do you value safety, sustainability and efficiency?

As we have seen, there are endless possibilities to discover about automation. And it's the only way you can be future-ready, enhancing efficiency from the inside out, and continuously making your operations faster, safer, more sustainable, and more profitable.

You can work hand and hand with your supplier to develop custom solutions made just for you. E80 Group is investing in logistics concepts of the future at its welcoming InnovE80 collaborative Hub – downtown Chicago – a creative home to shape the future of your business.

This article was written for TWM by William Nelson, President, E80 Group North America.



Automatic loading of the trucks with LGVs.

GLOBAL TISSUE GIANT GEARS UP FOR A NEW ERA IN PRODUCTION AND CONSUMPTION

Fundamental restructuring has been a feature of 2023 across various regional operations for Essity. Here, TWM talks to Matthew Urmanski, North American Vice President Sales & Marketing for Essity's Professional Hygiene business, to get the latest on the company's plans in North America.

The past six months have been a particularly strategically important period for Swedish-headquartered Essity. Key points to include: the "continued high sales growth and higher margins" reported in its half-year report; fully exiting its business from the Russian market; securing £2.2m from the UK government to trial the use of hydrogen power at its paper manufacturing plant in north-west England; announcing an ongoing strategic review of its ownership in Asian hygiene company Vinda, and its Consumer Tissue Private Label Europe division, with the aim of reducing Consumer Tissue's share of the company's total sales.

In North America, Essity also announced it will be implementing restructuring measures in its Professional Hygiene division that include the closure of two production plants in New York state. Essity's paper mill in South Glens Falls has now been closed, while its converting facility in Greenwich and its warehouse and distribution centre in Saratoga Springs will remain open likely through to the end of the year. Restructuring costs are estimated to amount to approximately SEK1.2bn, and the company said the measures are expected to have a low single-digit negative impact on volume in the second half of 2023 and full-year 2024.

At the time of the announcement in July, the company confirm that it was continuing to improve profitability by focusing production and sales on its "more innovative and value-creating customer offerings." Now in October 2023, Matthew Urmanski, North American Vice President Sales & Marketing for Essity's Professional Hygiene, explains to TWM that Essity's tissue business in North America is "solely a professional hygiene business", and with sales of $1.4bn in 2022 it represents about 40% of the company's professional hygiene business globally. The business includes dispensing systems, paper towels, bath tissue, napkins, skin care, wipers, and the Tork Vision Cleaning IoT solution, which Urmanski says is a data-driven system that enables customers to identify when dispensers need to be refilled and areas needed to be cleaned.

Tork, Essity's professional hygiene brand, is the global leading professional hygiene brand and serves customers across the full spectrum of commercial and public environments such as offices, airports, stadiums, universities, manufacturing sites, health care facilities, restaurants and more. Urmanski adds that with Tork Xpressnap as "the market-leading napkin dispensing system in the US," the market has "strongly responded to the introduction of the patented Tork PeakServe Continuous Hand Towel System, which delivers the highest capacity paper towel dispenser in the market." With three dispenser formats (including for recessed) and two options on refills, he says it is a

Net Zero by 2050: Essity's plant in Middletown, Ohio, where a water-tube natural gas-fired boiler has been installed, an important step towards its environmental commitment

hand drying solution with "the highest capacity on the market", helping customers manage user needs and cleaning staffing by ensuring fewer runouts and more people served between refills.

With global professional hygiene headquarters in Philadelphia, Essity now has US tissue manufacturing sites in Alabama, Kentucky, New York (through 2023), Ohio and Wisconsin.

TRENDS IN NORTH AMERICA IMPACTING AFH MARKET

Urmanski explains that the outlook for professional hygiene in North American is strong, and in some cases returning to pre-pandemic levels or higher. For example, US airplane travel – and therefore airport traffic – is edging closer to pre-pandemic levels. According to the World Economic Forum from December 2022, air travel has picked up this year following Covid-19 disruptions in 2020 and 2021. However, weekly seat capacity on commercial passenger airlines is still some way below 2019 levels. There are still significant regional differences in how airlines have recovered following the pandemic. According to data from OAG, weekly seat capacity on commercial passenger airlines averaged 90.7m in 2021, up from 61m during the same period in 2020 but still some way below the 2019 level of 110.9 million. The gap is gradually closing, however, and global capacity exceeded 100 million for the first time since the pandemic hit for a couple of weeks this summer.

In comparison in Asia, while capacity remains far below pre-pandemic levels in large parts of the region, especially in terms of international flights, capacity in North America is very close to 2019 levels – restaurants are rebounding, filling tables, and increasing take-out and delivery orders as consumers return to their pre-pandemic behaviours.

Urmanski adds that one area that still offers some uncertainty is the return to the office. While more employers are enforcing return-to-work mandates, there is still a significant percentage of office workers on a hybrid schedule, and in office two to four days versus five days per week pre-pandemic. The office sector's recovery will continue to depend on evolving work-from-home trends. On the other hand, the hospitality sector has benefitted from a strong rebound fueled by pent-up demand from consumers.

Other trends the North American tissue market is continuing to see is a heightened public concern for hygienic and clean facilities. The pandemic has left the public hyper-aware of their surroundings, and consumers expect facilities to maintain high cleaning and hygiene standards to reduce the spread of germs. According to a 2021 survey commissioned by Essity, 73% (https://www.torkusa.com/torkcampaigns/safer-choice-to-airdryers) of public

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restroom attendees use paper hand towels to avoid touching different surfaces in public restrooms. And what many end customers don't recognise is that nearly seven in 10 users prefer paper hand towels instead of air dryers. These end-user trends are an important piece of information for distributors to be mindful of.

Lastly, Urmanski says the company is seeing shifts in customer sustainability priorities. "During the pandemic, sustainability was de-prioritised as many companies faced a challenging economic time. Now companies – especially Fortune 500s – are reprioritising their sustainability commitments and are looking for a professional hygiene supplier that understands their current and future expectations to meet sustainability targets."

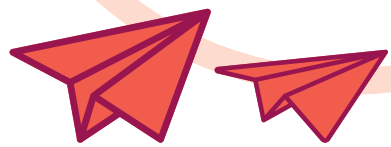
He adds: "At Essity, we are moving from a linear way of thinking about how we make, use and dispose of product to a circular approach focused on how we make, use, reuse, recycle, recover as a resource for new product and circle again.

"Looking at how we set our targets – and that we do so as a part of a larger agenda, working with customers and partners to meet their sustainability expectations.

"This shift also means that we are approaching things differently. Recovering resources (while reducing waste), ensuring good hygienic practices (while reducing negative impact on climate) and partnering up to make it happen (while ensuring safe recycling across). In many industries, sustainability is becoming increasingly important and can be a deal breaker in the decision-making process, for professionals and consumers. Looking at the professional hygiene category, we see several key developments that are shaping Essity's own sustainability efforts and offer:

- 88% of PH category customers say that a sustainable approach includes environmental, social, and ecological elements.
- 46% Consider the product's effect on the environment when purchasing hygiene products.
- 78% of employees wants their employer to do more to create an eco-friendly office.
- 66% of people select a company for their sustainability reputation and actions when looking for a new job.

"At Essity, we are moving from a linear way of thinking about how we make, use and dispose of product to a circular approach focused on how we make, use, reuse, recycle, recover as a resource for new product and circle again."



ESSITY 2023 ECO OFFICE SURVEY DATA FROM ECO OFFICE SURVEY

Essity conducted an external online survey in May and June of 2023 of 2,500 US office workers (sample was comprised of 500 decision makers, and 2000 non-decision makers based on job title) and found:

- 76% believe their office to be eco-friendly, with a third (33%) saying their employer has done a lot to increase eco-friendly initiatives over the past two years.
- 77% say it is important for them to have a system to separate waste in their office. With 82% feeling it is important that paper products used in the restrooms and breakrooms at their workplace are eco-friendly.
- 38% think their employer should make further / more eco-friendly changes to their building, with 43% wanting them to carry on as they are now.
- 65% say a company's eco-friendly reputation and actions impact their decision when finding a new job. 11% say this doesn't impact their decision at all.

Sustainability, energy efficiencies, plastic reduction, etc.

TORK CARBON NEUTRAL DISPENSERS

Reducing carbon impact is required to reduce climate change from global greenhouse gases. To support this, in October Essity's professional hygiene business in North America launched Tork Carbon Neutral Dispensers to reduce and offset carbon for the entire life cycle of selected soap, toilet paper and hand towel dispensers. A selection of 11 existing Tork brand innovative dispensers in

the US (and 15 in Canada) will be carbon neutral. Carbon emissions have already been reduced by using purchased renewable electricity in the production, and the remaining carbon emissions are offset with verified credits from climate projects. The Tork brand has selected different certified and regularly monitored projects from ClimatePartners that direct resources to low-income countries and help communities mitigate and adapt to climate change.

"In addition, Tork dispensers go beyond carbon neutral certifications as the selected dispensers also help reduce consumption with verified reduction claims and they have Easy to Use certification from the Swedish Rheumatism Association, as well as ADA compliant.

Urmanski concludes: "Essity´s work with corporate social responsibility is setting high standards related to business ethics, labour law, working environment and human rights. We act as a credible and reliable partner for our customers and an attractive employer and a good member of society. We pride ourselves on our SBTi commitment for net zero emissions by 2050, our support of six of the United Nations Foundation's Sustainable Development Goals and our barrier breaking work to secure hygiene for all.

"We have been awarded many recognitions for our work by Ecovadis (Platinum 2023), Corporate Knights (Top 100 Most Sustainable Companies), CDP A rating (Carbon Disclosure Project), Financial times (diversity leader 2023) and many others."

CLOSING DOWN ESSITY'S LAST COAL FIRE BOILERS

Emissions and pollution have a negative impact on biodiversity. Reducing greenhouse gas emissions and the carbon footprint of its operations has been a major focus for Essity for many years. The company has committed to achieve net zero emissions of greenhouse gases by 2050 and has Science Based Targets for Scope 1, 2 and 3, encompassing both its own operations and its suppliers' value chain. It has raised ambitions for existing Science Based Targets and is working on scope 1, 2 and 3 (waste reduction).

Essity has a clear strategy and plan for how it will achieve these targets and the most important priorities have been identified. These actions will encompass the entire value chain, from raw materials, production, distribution, and consumer use to the management of used products. Essity has joined the UN Global Compact's 'Business Ambition for 1.5°C.' The climate targets are aligned with the ambitions of the Paris Agreement to reduce global warming. The initiative is supported by the CDP, World Resources Institute (WRI), WWF and UN Global Compact.

To act in this area, Essity recently replaced three vintage coal-fired boilers at the tissue mill in Middletown, Ohio with one water-tube natural gas-fired boiler as an important step to the global commitment to reach Net Zero by 2050. The Essity Middletown paper making facility hosts a wet crepe towel machine, as well as a dry crepe bath tissue machine, and produces approximately 100,000 tonnes annually, 100% of which is made from recycled materials, then converted in Harrodsburg, Kentucky. This project took two years to complete and the company claims it will save approximately 40k tCO2 (equivalent to one car´s emission to drive 250 times to the moon and back).

The boilers were the last of their kind within Essity's global manufacturing network and also the largest CO2 reduction effort to date.

This project aligns with CO2 reduction roadmaps that have been developed for Essity manufacturing sites in North America that include both capital and non-capital projects to reduce the footprint in emissions and energy usage. Roadmaps are aimed at validating the use of best-in-class manufacturing practices and developing and implementing capital grade projects for sites that achieve targeted reductions in CO2 emissions and an overall reduction.

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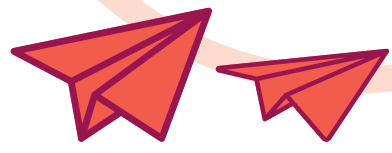

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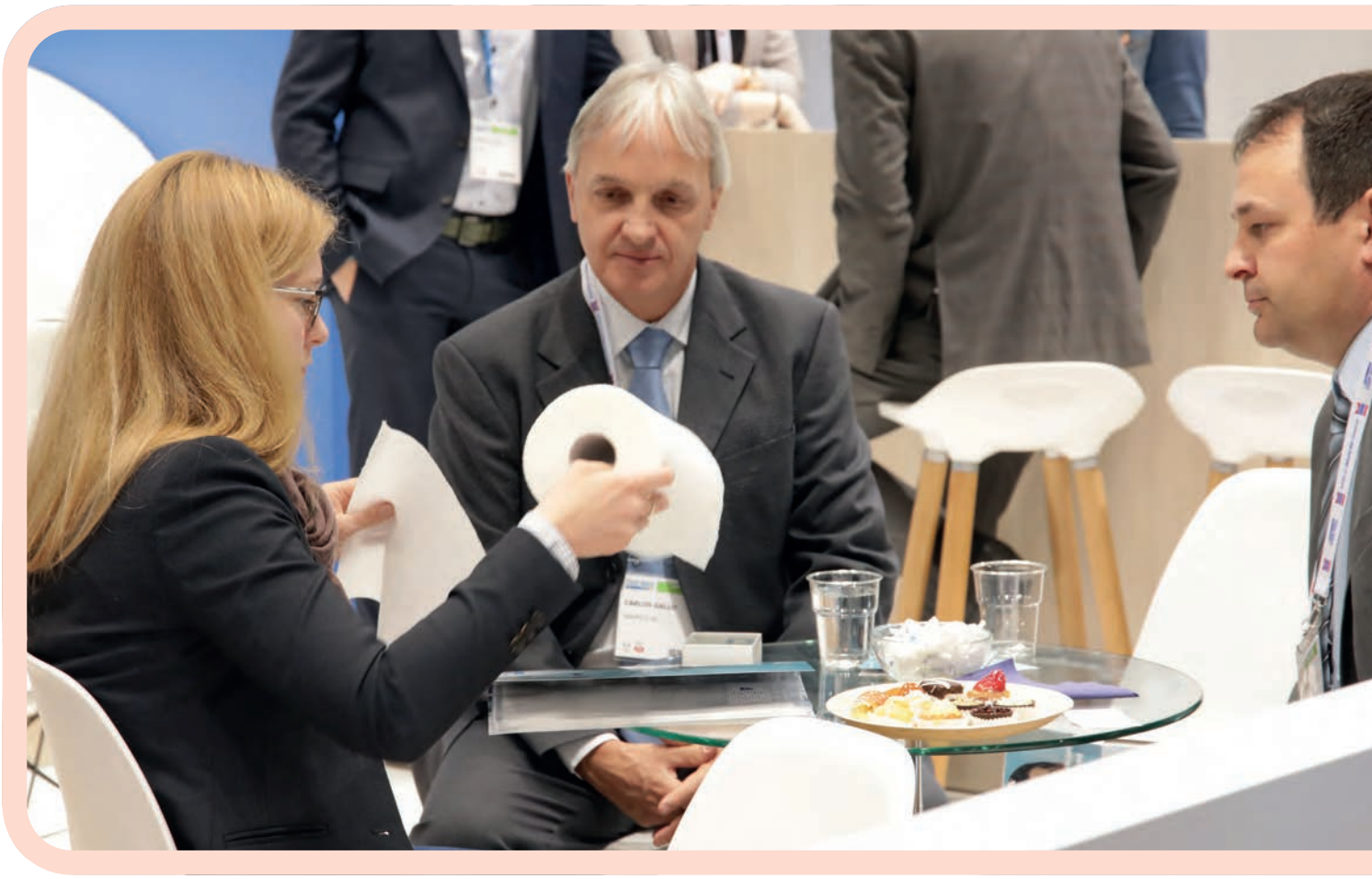

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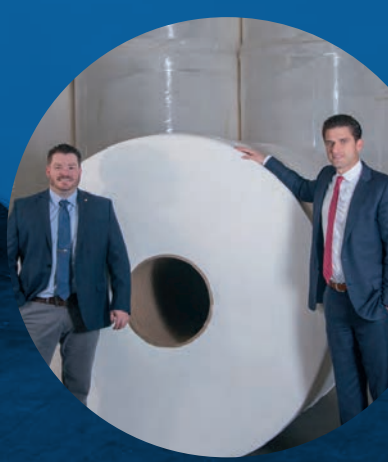

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