Europe Equity Research
30 September 2024

ESG - The Long View

Biodiversity Investing: Expert views from our call series

As highlighted in our updated cross-assets biodiversity report (see *Biodiversity Reloaded*, V. Martin Heriz & N. de la Gorce, Jul. 2024), biodiversity investing has been one of the most popular ESG themes discussed with investors over the past year and a half, despite arguably remaining challenging to invest in.

In our recent Biodiversity Investing call series, we explored some of the recurring debates, including why investors should care, whether agriculture can truly be "regenerative", and the potential for biodiversity credits. This report compiles our take-aways from the series, which overall increased our conviction on the rising materiality of 'nature' and 'circularity' as multi-year investment themes.

- **Europe maintains its leadership in biodiversity policymaking**: Our expert calls explored two of the most ambitious biodiversity policies worldwide: 1) the EU Regulation on Deforestation-Free Products, which mandates deforestation-free supply chains for seven commodities, and 2) the EU's Packaging and Packaging Waste Regulation, which aims to boost recyclable and recycled plastic packaging in the region.
- **A strong policy push at the international level could accelerate regulations elsewhere**: COP15 in December 2022 was described as a "Paris moment" for biodiversity, and the upcoming COP16 will shed light on countries' national action plans. Countries will also gather at the end of November for the final round of negotiations on a global treaty to end plastic pollution, which remains a major driver of biodiversity loss.
- **Biodiversity credits in the limelight ahead of COP16**: While only a handful of OTC transactions have been executed so far, the World Economic Forum and McKinsey estimate that global demand for biodiversity credits could reach between $1-7bn by 2030, and up to $180bn by 2050. Policies and corporate commitments will be key for this opportunity to materialize, in our view.
- **Structural tailwinds support investments in regenerative agriculture**, and more broadly sustainable products and services in the agribusiness and land use sectors, including increasing weather-related volatility, new regulations, and corporate climate commitments. Experts also all pointed to the role of technology to improve data on the 'sustainability-yield-resilience' nexus.
- **SBTN could accelerate the deployment of "biodiversity-aligned" investment strategies**, by validating as "science-based" environmental targets other than GHG emissions reduction. SBTN has made solid strides on developing its validation methodology for freshwater and land-related targets, which it will test on an initial cohort of 25 companies.

ESG RESEARCH

EMEA ESG & Sustainability Research

Noemie de la Gorce, CFA [AC]
(44 20) 7134-4229
noemie.delagorce@jpmorgan.com

Jean-Xavier Hecker
(33-1) 4015 4472
jean-xavier.hecker@jpmorgan.com

Hugo Dubourg
(33-1) 4015 4471
hugo.dubourg@jpmchase.com

Global ESG Integration & Methodology

Virginia Martin Heriz
(44-20) 7134-5197
virginia.martinheriz@jpmorgan.com
J.P. Morgan Securities plc

Noemie de la Gorce, CFA AC
(44 20) 7134-4229
noemie.delagorce@jpmorgan.com

Table Of Contents

Noemie de la Gorce, CFA [AC]
(44 20) 7134-4229
noemie.delagorce@jpmorgan.com

Executive Summary

Biodiversity investing remains one of the most popular topics of discussion with ESG investors.

As we highlighted in our updated cross-assets biodiversity report (see *Biodiversity Reloaded*, V. Martin Heriz & N. de la Gorce, Jul. 2024), biodiversity investing has been one of the most popular ESG themes discussed with investors over the past year and a half, despite arguably being one of the most challenging to invest in (in our opinion). In our subsequent Biodiversity Investing Call Series, we welcomed ten experts to address some of the recurring questions from investors, including whether companies' claims on regenerative agriculture could be trusted, and what is the growth potential for biodiversity credits.

New regulations are driving the financial materiality of the theme...

Investor interest has been particularly high in Europe, where new regulations have been driving the financial materiality of the biodiversity theme. Our expert events explored two upcoming EU regulations that can be considered as among the most ambitious biodiversity policies worldwide: 1) The EU Regulation on Deforestation-Free Products, which will enter into force at the end of 2024, aims to ban deforestation-linked commodities (palm oil, soy, wood, cattle, cocoa, coffee and rubber) from the EU market by imposing traceability on the full supply chain, and 2) the EU's Packaging and Packaging Waste Regulation, which will introduce a comprehensive set of targets to boost the recyclability and recycled content of plastic packaging in the region.

...With the upcoming international negotiations on biodiversity and plastic acting as potential catalysts for further regulations worldwide.

While Europe has been leading in biodiversity policymaking, regulations could accelerate elsewhere owing to a strong policy push at the international level. COP15 in December 2022 was described as a "Paris moment" for biodiversity and nature, given it resulted in over 190 countries signing the Global Biodiversity Framework (GBF), which sets an ambitious objective of halting and reversing global biodiversity loss by 2030. At the upcoming COP16 (scheduled between October 21st and November 1st 2024), countries will need to present their national action plan to meet the objectives of the GBF and agree on a monitoring framework, making it a litmus test of their commitment to biodiversity. Countries will also gather at the end of November for the final round of negotiations on a separate international agreement to end plastic pollution.

Biodiversity Credits in the limelight ahead of COP16

A biodiversity credit can be defined as a certificate that represents a unit of positive biodiversity outcome. Biodiversity credits could help monetize nature conservation and protection activities, and channel further investments towards biodiversity projects. While only a handful of OTC transactions have been executed so far, with prices ranging from $2 to $100 per unit, the growth potential could be significant: according to the World Economic Forum and McKinsey, global demand for biodiversity credits could reach between $1-7bn by 2030, and up to $180bn by 2050. Policies and corporate commitments will be key for this opportunity to materialize, with TNFD adoption potentially a powerful catalyst.

Noemie de la Gorce, CFA [AC]
(44 20) 7134-4229
noemie.delagorce@jpmorgan.com

Regenerative agriculture: technology will be key to improve data on the 'sustainability-yield-resilience' nexus

Aside from preparing for new regulations on deforestation, companies with large FLAG (Forestry, Land, and Agriculture) emissions have also increasingly reported on their initiatives towards regenerative agriculture, which can be defined as "*an outcome-based farming approach that protects and improves soil health, biodiversity, climate, and water resources*". Our experts pointed to structural tailwinds supporting investments in regenerative agriculture, and more broadly sustainable products and services in the agribusiness and land use sectors, including increasing weather-related volatility, new regulations, and corporate climate commitments. Discussions on sustainable agriculture also all pointed to the importance of data and technology to improve knowledge on linkages between land sustainability, resilience, and yield (so-called 'sustainability-yield-resilience' nexus).

SBTN could accelerate the deployment of "biodiversity-aligned" investment strategies.

As discussed in our recent report on climate transition data, the Science-Based Target Initiative (SBTI) has been increasingly used by investors as a framework to select assets in climate portfolios. The Science-Based Targets Network (SBTN) is an initiative similar to SBTi for environmental targets other than GHG emissions reduction. SBTN has made solid strides on developing its methodology for validating companies' freshwater and land-related targets, and aims to launch a validation methodology on science-based target for oceans in 2025. We expect SBTN could eventually contribute to the development of "biodiversity-alignment" investment strategies by helping investors to identify assets with ambitious environmental targets outside the climate sphere.

Noemie de la Gorce, CFA AC
(44 20) 7134-4229
noemie.delagorce@jpmorgan.com

Fireside chat with SBTN: First science-based water and land targets move into sight

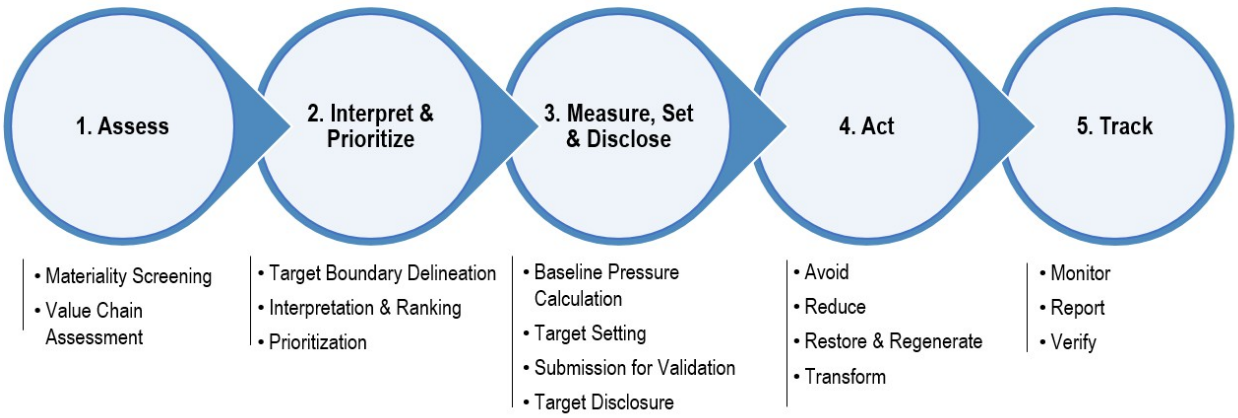
The below reproduces a Flash Note published on Sept 6th: here.

On September 4th, we hosted Miriam van Gool, Finance Sector Engagement Lead at the Science Based Targets Network (SBTN), for a fireside chat on the future of corporate biodiversity targets. A replay of the event will be available for two weeks; please contact your J.P. Morgan representative to get access. Our takeaways include: 1) we expect the SBTN validation of corporate targets for nature could ultimately become a key selection criteria for biodiversity-focused and broader sustainable funds, similar to the SBTi validation of climate targets; 2) SBTN has made solid strides on developing and testing its methodology for freshwater and land-related targets; and 3) the organization's upcoming priorities include validating the targets on an initial cohort of 25 companies, launching guidance for financial institutions, and proposing a methodology for science-based targets for oceans.

#1. SBTN: an initiative similar to SBTi for environmental targets other than GHG emissions reduction. Founded in 2019, the Science-Based Targets Network (SBTN) shares many commonalities with the Science-Based Targets Initiative (SBTi), including their founding members (CDP, WWF, and WRI, among others) and mission of grounding corporate targets into best available science. However, their scope differ, with the latter focusing exclusively on climate change and GHG emissions, and the former considering the other drivers of biodiversity loss, including pressures on freshwater, land, and oceans. As discussed in previous Research, we expect SBTN could contribute to the development of "biodiversity-alignment" investment strategies by helping investors to identify assets with ambitious environmental targets outside the climate sphere.

#2. SBTN has developed a five-steps approach for companies to set science-based targets for nature, starting with an assessment and prioritization of material nature-related impacts and dependencies across the value chain. In our view, this process shares strong similarities with the LEAP (Locate, Evaluate, Assess, and Prepare) framework of TNFD, though with greater emphasis on target-setting and monitoring. SBTN has tested steps 1-3 with 17 companies so far, including ABI, alpro (part of Danone), Carrefour, GSK, H&M, Holcim, Kering, LVMH, Neste, Nestle, Tesco, and UPM. Ms. Van Gool indicated that an additional 150 companies are preparing to submit targets through SBTN's Corporate Engagement Program, with 25 selected for the next stage of the validation process. The organisation is also planning to release guidance for financial institutions by the end of this year.

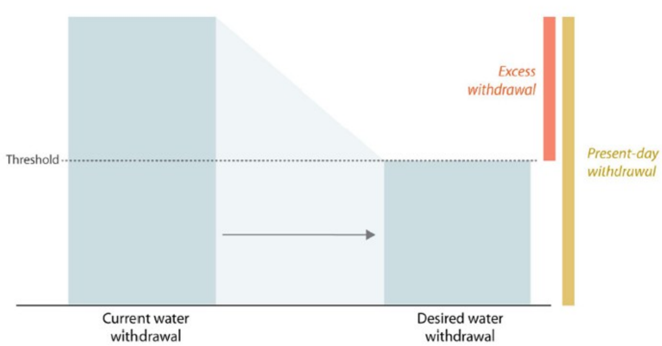
Figure 1: SBTN's five-steps approach to target setting



Source: SBTN

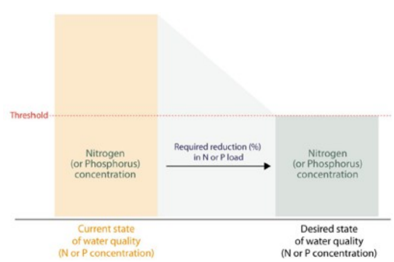
#3. SBTN has made solid strides on developing validation methodologies for freshwater targets. The organization has elaborated an approach for 1) water quantity, and 2) water quality targets, with the latter currently focusing on the loads of nitrogen (N) and phosphorus (S) to water bodies. To be validated, targets need to improve a company's performance on water metrics in line with sustainable levels, which should be defined at the basin-level based on consultation with local basin management authorities and water resources management agencies. If local thresholds are unavailable, companies can revert to global thresholds, using the Hogeboom model for water quantity and the McDowell model for water quality. Reduction rates in water withdrawal and pollution should be based on the assumption of an "equal contraction of efforts", similar to the absolute contraction approach used by SBTi.

Figure 2: Simplified overview of the methodology for calculating reduction in basin-wide water withdrawals



Source: SBTN's technical guidance on freshwater, version 1.1 - July 2024 (link)

Figure 3: Simplified overview of the methodology for calculating reduction in basin-wide water pollution



Source: SBTN's technical guidance on freshwater, version 1.1 - July 2024 (link)

#4. SBTN has also made strong progress on land-related targets, including 1) No conversion of natural ecosystems, and 2) Land footprint reduction for large agricultural companies. Companies can complement those targets by so-called "landscape engagement", which involves protecting and restoring areas equivalent to c.10% of a company's land footprint. For 1) No-conversion targets, SBTN has set a cutoff date to no later than 2020 and target dates between 2025 (for commodities in scope of the EU Deforestation Regulation) and 2030. Sectors that have inherent land impact such as

Mining and Infrastructure are expected to apply their no-conversion targets to critical habitats, areas of high conservation value, or Key Biodiversity Areas only. For 2) Land footprint reduction targets, SBTN requires companies to reduce their absolute land footprint by at least 0.35% p.a to contribute to the global objective of reducing agricultural land by 500 million hectares by 2050. Companies can also set intensity targets per kg of agricultural product, with an annual reduction rate of at least 1%.

#5. SBTN aims to launch a validation methodology on science-based target for oceans in 2025. Ms. van Gool indicated that three types of targets will be in scope, including 1) targets aiming to avoid and reduce overexploitation, 2) those aiming at protecting marine ecosystems, and 3) targets focusing on the protection of endangered, threatened, and protected marine wildlife from wild capture fishing.

Noemie de la Gorce, CFA AC
(44 20) 7134-4229
noemie.delagorce@jpmorgan.com

Deforestation-free supply chains: Achieving full traceability remains a pain point

The below reproduces a Flash Note published on July 11th: here.

On July 10th, we hosted Jenny Walther-Thoss, Senior Sustainability Consultant at Berndt+Partner Consultants and member of the Round Table of Sustainable Palm Oil (RSPO), and Ryan Wiener, Director of Wiener Impact Private Ltd and previously Global Head of Sustainable Development at Halcyon Agri, to take stock of companies' progress on implementing the EU's upcoming deforestation regulation. Our key takeaways include: 1) European companies are legally responsible for achieving "deforestation-free" supply chains and can be fined up to 4% of their EU turnover for non-compliance, 2) Full traceability remains difficult to achieve in supply chains dominated by smallholder farmers, such as rubber, cocoa and coffee, and 3) Companies are likely to favour regions with lower deforestation risks and higher levels of certification in their procurement decisions until scalable traceability solutions fully emerge.

#1. The EU Regulation on Deforestation-Free Products (EUDR) aims to ban deforestation-linked commodities from the EU market: Under the new regulation, traders and companies that source specific commodities (namely palm oil, soy, wood, cattle, cocoa, coffee and rubber) and derived products will need to evidence that those are "deforestation-free", with additional due diligence applying to commodities sourced from high-risk countries (the list of high-risk countries still needs to be published). Downstream companies such as food producers and retailers will be legally responsible for ensuring that their supply chains are "deforestation-free" and could be fined up to 4% of their turnover generated in the EU in case of non-compliance. See here for more detail on the regulation.

#2. The EUDR imposes traceability on the full supply chain based on geolocation instead of paper trail: Attempts to achieve deforestation-free supply chains are not new, with companies historically relying on a combination of supplier self-assessments, third-party certifications and audits. EUDR introduces an obligation for companies to have traceability of the commodities they purchase up to the farm, and be able to provide the exact geolocation of those farms, which goes well beyond existing industry practices according to previous JPM Research (see here). The regulation also requires companies to ensure that farmers follow national laws on health & safety and human rights, which can prove difficult in supply chains with higher reliance on smallholder farmers such as rubber, cocoa, and coffee.

#3. Achieving traceability over the most upstream part of the supply chain remains challenging given it often involves multiple farmers and 'middle-men' in charge of collecting the commodities before they reach factories. For example, Mr. Wiener indicated that 90% of rubber is produced by about 6m farmers worldwide, who each have two hectares of farmland in average. Traceability becomes easier once commodities enter factories, with most agricultural supply chains already applying segregation between certified and non-certified commodities.

Noemie de la Gorce, CFA AC
(44 20) 7134-4229
noemie.delagorce@jpmorgan.com

#4. Technological solutions are emerging while certifications are racing to adapt. Companies typically rely on internal systems and external software services (e.g. Koltiva in Indonesia), with open-source data also helpful to conduct a first risk assessment (e.g. Global Forest Map). According to our guest speakers, companies may continue to rely on sustainability certifications offering an "identity-preserved" chain of custody to comply with EUDR, although they cannot delegate their legal responsibility to certification schemes. Our guest speakers also indicated that moving to an identity-preserved model often requires reducing reliance on middle-men, which is challenging but can ultimately result in better prices for farmers. While those solutions fully emerge, companies are likely to favour regions with lower deforestation risks and higher levels of certification in their procurement decisions.

#5. The enforcement of EUDR is likely to be delayed by at least six months. While the regulation officially enters into force on December 30th 2024, the EU regulators may allow a technical delay of at least six months. Ms. Walther-Thoss sees limited risks of the regulation being repealed, although the EU could decide to limit the number of high-risk countries and associated due diligence requirements to limit compliance costs for corporates. She also sees limited risks of EUDR being enforced differently across the EU given it is a regulation and not a directive and thus does not require to be transposed into national laws. National authorities will enforce the rules by taking samples of products on the market, conducting laboratory tests to determine the origin of the products and reviewing due diligence documentation.

Exploring innovative solutions in sustainable agriculture: Takeaways from our expert event

The below reproduces a Flash Note published on Sept 12th: here.

On September 10th, we hosted Ashley Fieglein Johnson, President and CFO of Planet Labs, David Bennell, Strategic Advisor at the Transformational Investing in Food Systems initiative, and Sean Coyle, CEO of Origin Enterprises Plc, to explore scalable solutions towards more resilient and sustainable food systems. Our takeaways include: 1) Growing focus on soil preservation combined with increasing weather-related volatility and new regulations, provide structure tailwinds to sustainable products and services in the agribusiness and broader land use sectors; and 2) Advanced technologies such as satellite imagery will play a key role in delivering sustainable outcomes while preserving yields and food security.

Focus on Origin Enterprises Plc (part of J.P. Morgan SMID universe, covered by Eduardo Lecubarri)

Origin Enterprises provides technically-led solutions that allow customers to enrich their land so that it can achieve “its true potential”. The company has historically operated in the U.K and Ireland, and recently expanded into Central Europe and LATAM through acquisitions. It is structured into two main divisions: 1) An Agriculture business, which provides all the major products and services to optimize crop production and soil health, and 2) A Living Landscapes business, focused on enhancing recreational spaces, enhancing biodiversity, and restoring ecosystems.

While ecological and environmental services have historically been underappreciated in the agribusiness and broader land use sectors according to Mr. Coyle, he highlighted some structural tailwinds, including the growing focus of farm customers on soil preservation, increasing weather-related volatility, as well as new regulations, particularly in Europe. At the company-level, Mr Coyle highlighted three key growth drivers:

1. **Sustainable agronomy**: Origin Enterprises has been changing the product set of its agricultural business, transitioning away from traditional chemistry applications towards newer biological products, and pivoting its advisory services to farm customers with an enhanced focus on bespoke soil resilience strategies. The company has also developed new fertilizer blends, which achieve the same yield output as traditional fertilizers while reducing nitrogen content by 20%.
2. **Smart farming**: Origin Enterprises leverages data to guide farmers on the correct application of their products to maximize both yield and environmental outcomes, with the timing of application increasingly material in a context of growing weather volatility. They also provide precision farming techniques such as variable rates of seeds and fertilizers.
3. **The emerging “nature economy”**: Origin Enterprises provides ecological and land conservation services as part of its living landscapes business, which the company

Noemie de la Gorce, CFA [AC]
(44 20) 7134-4229
noemie.delagorce@jpmorgan.com

expects to grow to 30% of group profit by the end of FY26 vs.15% currently.

Origin Enterprises was the first company in the U.K to develop a "green list" of crop protection products that are less damaging to the environment and have less chemical content compared to traditional chemistry. For the past four years, the company has also provided a carbon ratings on all its fertilizers.

Focus on Planet Labs (Not Rated)

Planet Labs (Planet) is an Earth Observation company, which aims to democratize access to satellite data by making it affordable and easy to use. With a fleet of hundreds of Earth Observation satellites, Planet captures daily images of the globe, enabling it to provide images of cloudy areas, while also offering high-resolution satellite imagery. Ms. Johnson indicated that the company's archive of consistent historical data makes it a valuable data set for machine learning and AI techniques.

The Government sector currently makes up about 80% of their business, split between 1) defense and intelligence, and 2) civil government use cases. Ms. Johnson highlighted several sustainability-related applications within this vertical, primarily pertaining to regulation enforcement and food security monitoring. For example, the U.K. Royal Payment Agency, which makes financial payments to farmers, traders, and landowners to support their sustainability transition, leverages data from Planet to ensure farmers' compliance with environmental and social criteria. In Brazil, the Federal police has been using Planet's road detection capabilities to spot early signs of deforestation across the Amazon, while using the company's high-resolution satellite fleet to further identify the type of illegal activity.

Commercial clients make up the remaining portion (20%) of Planet's business, with the agricultural sector representing the largest vertical. The company serves several agribusiness customers as well as insurance companies, which leverage its data on land surface temperature and soil moisture levels for agricultural and drought insurance, among others. Ms. Johnson indicated that they see a multi-billion-dollar TAM for using satellite imagery to enhance outcomes for farmers from new seed variables and fertilizers, and track the sustainable impacts of those new technologies. Planet recently acquired the Sentinel Hub platform, a software that leverages satellite data to provide smart farming solutions such as yield prediction.

The Context

PWC recently estimated that over half of global GDP is dependent on nature, which Mr. Bennell believes may be a "lowball estimate". The agricultural sector is particularly exposed, with traditional industrial agricultural practices often resulting in significant environmental impacts. Despite progress on implementing more sustainable agricultural practices, several barriers remain, including policy and subsidy schemes that may prioritize near term food security over longer-term resilient and sustainable soil management. In this context, our experts expect regulation to be a key driver of change, with Europe likely to remain ahead, albeit highlight other market forces such as more robust economics in the sustainable agribusiness space and growing awareness from end-consumers.

Noemie de la Gorce, CFA AC
(44 20) 7134-4229
noemie.delagorce@jpmorgan.com

Teach-in on Regenerative Agriculture: Lessons learnt & ideas for engagement

The below reproduces a Flash Note published on Sept 20th: here.

On September 17th, we hosted Robyn Cooper from the Sustainable Agriculture Initiative (SAI) Platform for a teach-in on the first-ever global framework on regenerative agriculture launched in collaboration with 33 companies. Our take-aways include: 1) The SAI's Regenerating Together Programme is the first industry-led initiative to harmonise the definition of regenerative agriculture globally; 2) The SAI's definition of regenerative agriculture focuses on outcomes rather than practices; 3) Risk management and climate commitments are the most common reasons for companies to engage in regenerative agriculture currently, and 4) Better data on the 'sustainability-yield-resilience' nexus will be key to drive further investments. We also suggest some questions to management at the end of this note, for investors who wish to engage with companies on this topic.

#1. The Regenerating Together programme was founded in 2021 by 33 companies in the Food & Beverage value chain, including ABSugar (Part of Associated British Foods), Ahold Delhaize, Barry Callebaut, Bayer, Cargill, the Coca-Cola Company, Danone, Diageo, Kellogg's, Kraft Heinz Co., McDonald's, Nestle, Pepsico, Starbucks, Syngenta, Unilever, and Yara. The programme aims to create a common global framework to define regenerative agriculture, and build the assessment and monitoring tools for companies to report on their progress. The framework is currently piloted by about 50 companies and a second version will be released by the SAI in the coming weeks.

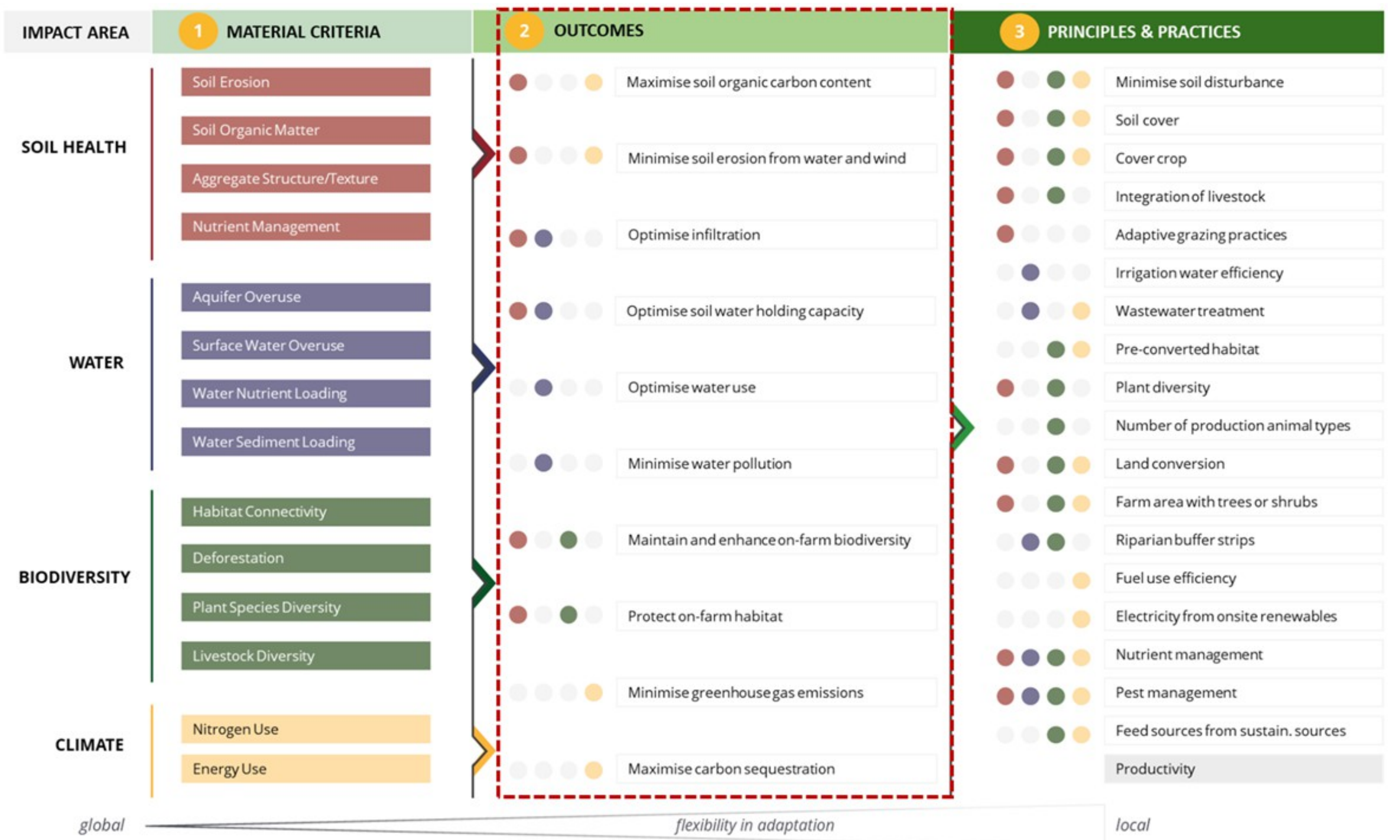
#2. The double business case: According to our guest speaker, the most common reasons for their members to engage in regenerative agriculture programmes include: 1) Improving the resilience of commodity supply in a context of growing price volatility caused (among others) by changing weather patterns, and 2) Delivering on their scope 3 climate targets. Interestingly, opportunities such as gaining market share from "conscious customers" was not mentioned for downstream companies, in line with our own assessment that isolating sustainability from other drivers of purchase decision remains challenging at present (see our ESG Discovery analysis on J.P. Morgan European Food/HPC, Beverage, & Retail coverage for more detail).

#3. Better data on the 'sustainability-yield-resilience' nexus will be key to drive further investments. The main challenges highlighted by SAI members to truly scale regenerative agriculture include: 1) costs, and 2) limited data on the linkages between implementing regenerative practices and improving resilience of agricultural systems over time, which may constrain internal buy-in and funding, while posing risks of potential greenwashing allegations. Better data would also help overcome the "yield vs. sustainability" debate (i.e. the idea that more sustainable practices may result in lower yields, thus require more land and negatively impact food security), while empowering farmers who ultimately drive on-the-ground adoption.

Noemie de la Gorce, CFA AC
(44 20) 7134-4229
noemie.delagorce@jpmorgan.com

#4. The SAI defines regenerative agriculture as an outcome-based farming approach that protects and improves soil health, biodiversity, climate, and water resources, while supporting farming business developments. The definition centres on outcomes rather than specific practices that would be classified as "regenerative" (see Figure 1), while also emphasising that regenerative practices should be context-specific, with the first feedback from pilot companies suggesting that engaging with local farmers is critical for success. Our guest speaker indicated that the framework builds on the premise to improve, or at least maintain, farmer livelihoods, with farmer profitability and productivity as foundational bases for regenerative farming systems.

Figure 4: The SAI identifies ten outcomes of regenerative agriculture

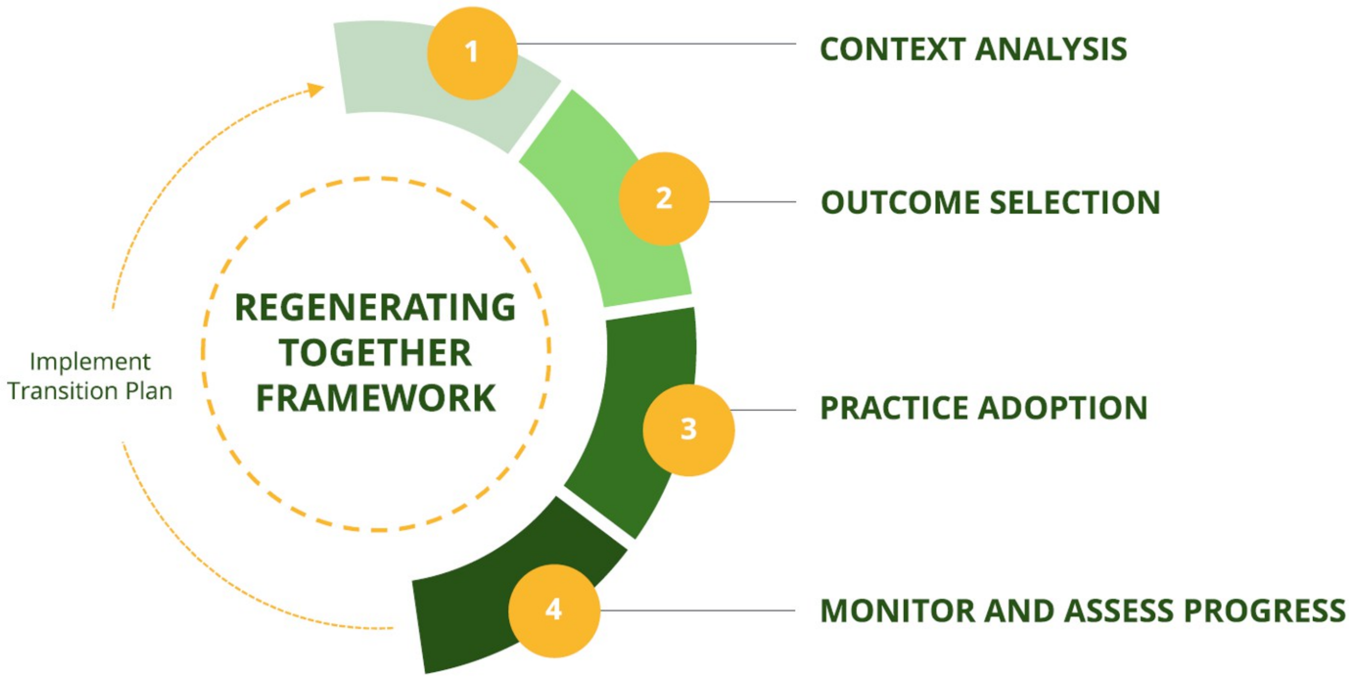


Source: SAI

#5. The SAI has developed a four-step process to help companies implement regenerative agriculture practices, starting with: 1) a materiality assessment, and followed by 2) the selection of at least two outcomes out of the 10 identified by the SAI, 3) practice adoption, and 4) monitoring & reporting. In line with other frameworks addressing multiple environmental objectives (e.g. TNFD and SBTN), our guest speaker stressed the importance of prioritising outcomes based on a robust assessment of material impacts, risks, and opportunities. While we expect that the Regenerating Together programme will drive some convergence between companies' definition of regenerative agriculture, we expect this four-step process will enable companies to retain significant discretion on how to implement regenerative agriculture in practice.

Noemie de la Gorce, CFA AC
(44 20) 7134-4229
noemie.delagorce@jpmorgan.com

Figure 5: We expect the SAI's four-step process will enable companies to retain discretion on how to implement regenerative agriculture in practice.



Source: SAI

#6. Our ideas for engagement: We expect regenerative agriculture will increasingly come into focus as food & beverage companies (and more broadly any companies relying on the agricultural supply chain) strive to deliver on their scope 3 climate targets while demonstrating broader improvements in their environmental footprint. We build on the SAI's framework to suggest five engagement questions for investors who wish to engage with companies' management on this topic:

1. Have you engaged with the SAI's Regenerating Together programme and implemented their framework (why/why not)?
2. What is the business rationale for investing in regenerative agriculture? Have you considered guiding on the dollar investments that will be needed to achieve your regenerative agriculture and FLAG-related scope 3 objectives?
3. How have you prioritised the environmental outcomes, suppliers, and/or commodities in the scope of your regenerative agriculture practices? What are the main data challenges that you face when conducting your materiality assessment?
4. What proportion of your main materials/ingredients do you estimate to come from suppliers that have implemented regenerative agriculture practices, and how do you expect this percentage to evolve in the coming years?
5. What quantitative metrics do you use to track the sustainability benefits associated with your regenerative agriculture initiatives?

#7. About the SAI Platform: SAI gathers 180+ companies across the food & beverage value chain. Our guest speaker described the initiative as a pre-competitive space for those organisations to collaborate towards a sustainable, thriving, and resilient agricultural sector that can protect the earth's resources, human rights, and animal

Noemie de la Gorce, CFA AC
(44 20) 7134-4229
noemie.delagorce@jpmorgan.com

welfare. The SAI provides: 1) Collaborative working groups on crops, dairy, and beef, and 2) B2B solutions, such as the Regenerating Together Programme (discussed above) and the Farm Sustainability Assessment, which is a sustainability benchmarking tool building on some of the largest sustainability standards like Fairtrade and RSPO.

Noemie de la Gorce, CFA AC
(44 20) 7134-4229
noemie.delagorce@jpmorgan.com

Biodiversity credits: Regulation & corporate commitments will be key to boost demand

The below reproduces a Flash Note published on July 11th: here.

On September 2nd, we hosted Holger Schmid, Principal at NatureFinance and Biodiversity Credits Expert, and David Hill, Founder of the UK Environment Bank and UK Net Gain Expert to discuss the "true" potential for biodiversity credits to accelerate biodiversity financing. Our key takeaways include: 1) The biodiversity market is still nascent but its growth potential may be significant; 2) Boosting corporate demand will require a compelling business case, new regulations, and robust market standards; and 3) In the UK, the Net Gain Regulation could help shape a broader biodiversity credit market for the corporate sector.

#1. The biodiversity credit market is still nascent. A handful of OTC deals have been announced so far, with significant variations between the price of biodiversity units, ranging from $2 to $100 according to our guest speakers, with a separate analysis by the Biodiversity Credit Alliance pointing to prices reaching up to $700 per unit. According to Mr. Schmid, this primarily reflects the lack of standardized methodology for valuing positive biodiversity outcomes. He highlighted three main differences in the way project developers currently estimate biodiversity benefits, including 1) a focus on *direct* biodiversity impacts (E.g. diversity of species) vs. *indirect* drivers of biodiversity loss (E.g. deforestation and pollution), 2) the use of composite indicators vs. single-metrics to measure biodiversity impacts, and 3) the reliance on a static vs. dynamic baseline to assess additionality.

#2. The growth potential of the biodiversity credit market could be significant. The World Economic Forum (WEF) and McKinsey recently estimated global demand for biodiversity credits could reach between $1-7bn by 2030, and $6-180bn by 2050. The adoption of the Global Biodiversity Framework (GBF) by over 190 countries in December 2022 was an important milestone according to our guest speakers, recognizing for the first time the role of biodiversity credits in financing nature restoration & conservation. As we highlighted in our report on biodiversity, this has already resulted in the first global definition of a biodiversity credit ("*a certificate that represents a measured and evidence-based unit of positive biodiversity outcome that is durable and additional to what would have otherwise occurred*"), and will likely lead to further initiatives to set market standards and trading mechanisms, as well new policies at the national-level.

#3. Unlocking corporate demand for biodiversity credits requires establishing a compelling business case. While Mr. Schmid and Mr. Hill expect regulation to be the main driver of demand for biodiversity credits, they also emphasized other reasons why companies may be purchasing biodiversity credits, including gaining market shares from "conscious consumers" and securing sustainable supply chains. This is consistent with the analysis from the WEF, which identified four use cases for biodiversity credits by corporates, including 1) Securing ecosystem services on which their activities rely on (E.g. hotels purchasing biodiversity credits to maintain surrounding protected areas); 2) Contributing to nature recovery beyond their own impacts; 3) Offering products that allow consumers to buy nature improvements; and 4) Taking responsibility for unmitigated biodiversity impacts wherever regulations do not exist. Our guest speakers expect the food & beverage, agribusiness, construction, infrastructure, and utilities sectors may become large buyers of biodiversity credits over time.

#4. TNFD could accelerate demand by incentivizing companies to set biodiversity-related commitments. TNFD provides a framework for companies to assess their dependencies and impacts on nature, and set nature-related commitments, which may include the purchase of biodiversity credits. It also provides a framework for financial institutions to conduct nature due diligence on their investees. Our guest speakers highlighted that a mandatory adoption of TNFD by national jurisdictions could be a significant catalyst to accelerate corporate action, echoing our view that the integration of TNFD into ISSB will be the ultimate driver of global adoption.

#5. In the UK, the Net Gain regulation could help shape a broader biodiversity credit market for the corporate sector. The regulation requires project developers to implement mandatory biodiversity net gain (BNG) plans targeting at least a 10% improvement. BNG is measured using the DEFRA metric, which considers 1) the size of the land, 2) the type and strategic significance of the habitat, and 3) the condition of the habitat. Developers can achieve BNG by 1) creating biodiversity onsite, 2) creating biodiversity onsite and off-site, or as a last resort 3) purchase statutory biodiversity credits from the government. Interestingly, Mr. Hill mentioned that large offsite mitigation schemes can be more efficient than onsite schemes to drive positive biodiversity outcomes. While he sees limited demand for BNG, he expects that the regulation will help shape a broader biodiversity credit market for the corporate sector, which currently suffers from a lack of demand.

Circular Economy: EU sustains regulatory leadership

The below reproduces a Flash Note published on Sept 26th: here.

On September 23rd, we hosted Clarissa Morawski, CEO of Reloop, to untangle the EU's new regulation on Packaging & Packaging Waste and discuss its potential business implications. Our takeaways include: 1) The new regulation is the most ambitious packaging policy worldwide, 2) "Winners" could include recyclers, producers of sorting equipment & reverse vending machines, as well as companies able to facilitate waste collection and reusability, and 3) The Regulation paves the way to broader & more stringent Extended Producer Responsibility Schemes (EPRs).

#1. The EU's Packaging and Packaging Waste Regulation is the most ambitious regulation on packaging globally. Unlike other legislations adopted under the region's Circular Economy Action Plan (see #5 below), it is a regulation rather than a directive, which implies that it will apply immediately and consistently to all EU countries following its publication in the Official Journal. The regulation introduces the following key measures and targets:

- 90% of beverage packaging (including plastic bottles and aluminum cans) to be collected separately by 2029,
- Mandatory deposit return schemes (already in place in 15 EU countries),
- A standardized calculation of recycling rates across the EU, which better accounts for losses that could arise during waste collection and sorting. The region's recycling targets have been maintained to 50% by 2026 and 55% by 2030.
- All plastic packaging to be recyclable by 2030 (the definition of "recyclable" will be confirmed in a separate delegated act),
- 10% of packaging for both alcohol and non-alcohol beverage (excluding wine, spirits, and milk) to be made available in reusable packaging by 2030, increasing to 40% by 2040,
- 30% of recycled content in non-food and some food-grade plastic packaging by 2030 and 65% by 2040. The target is significantly lower for food packaging other than PET (E.g. flexible film packaging or high density polyethylene), at 10%.
- Ban some types of plastic packaging and single-use plastic products, such as plastic wrappings of grocery store fruits and vegetables.

#2. Recyclers, producers of sorting equipment and reverse vending machines, as well as companies able to facilitate waste collection and reusability will likely be the main "winners" of this regulation. Ms. Morawski highlighted that significant investments in recycling capabilities have already been made by companies such as Ball Corporation (covered by Jeffrey J. Zekauskas), Novelis Inc (covered by Arjun Chandar; no equity coverage), Indorama Ventures (covered by Sumedh Samant, CFA), and Borealis (not covered). The regulation could also accelerate further the transition from plastic to paper packaging, although issues persist for recycling paper packaging that includes plastic coating and PFAs. On the other hand, Ms. Morawski pointed to companies involved in waste incineration, as well as producers of non-recyclable

Noemie de la Gorce, CFA [AC]
(44 20) 7134-4229
noemie.delagorce@jpmorgan.com

packaging and packaging made of virgin materials as most at-risk.

#3. The regulation paves the way to broader and more stringent Extended Producer Responsibility Schemes (EPRs). EPRs require companies to fund the costs of the end-of-life management of the packaging that they put to the market. Some EPRs already cover 100% of the costs (E.g. in Austria and Germany), whilst other countries have adopted a more progressive approach (E.g. France, Italy). Ms. Morawski pointed to challenges associated with EPRs in their current form, including 1) the risk of under-reporting , and 2) fees not being sufficiently high to truly drive changes in packaging design. To address those issues, some countries have piloted new initiatives, such as requiring the audit of companies' plastic data and applying a bonus/malus based on design choices by brands.

#4. Three developments to watch out for: 1) The EU's definition of "designed for material recycling", which it will stipulate in a separate delegated act (it is unclear at this juncture if it will be closer to the definition of "technically recyclable" or "recyclable in practice and at scale" of the Ellen Mc Arthur Foundation); 2) Negotiations on a revised Waste Framework Directive, which proposes to expand EPRs to fashion brands and textile producers and set mandatory reduction targets on food waste; and 3) Negotiations on the global plastic treaty scheduled the last week of November 2024, which may accelerate regulations beyond Europe (see our Flash Note here).

#5. About the EU Circular Economy Action Plan: Initially adopted in 2015, the Circular Economy Action Plan was subsequently amended in 2020 to align with the objectives of the EU Green Deal. The Action Plan has three overarching goals, which are 1) Preventing resource scarcity and reducing Europe's reliance on imported raw materials; 2) Reducing the region's environmental impacts and meeting its Climate Neutrality target; and 3) Creating new economic opportunities and improving the region's competitiveness. The main legislations already adopted under the Action Plan include the Waste Framework Directive, which introduced the first EPRs and recycling targets, and the Single Use Plastics Directive, which banned the ten most commonly found single-use plastic items on European beaches.

Noemie de la Gorce, CFA [AC]
(44 20) 7134-4229
noemie.delagorce@jpmorgan.com

A Paris Moment for Plastic? Takeaways from our Expert Event with the Scientists' Coalition for an Effective Plastics Treaty

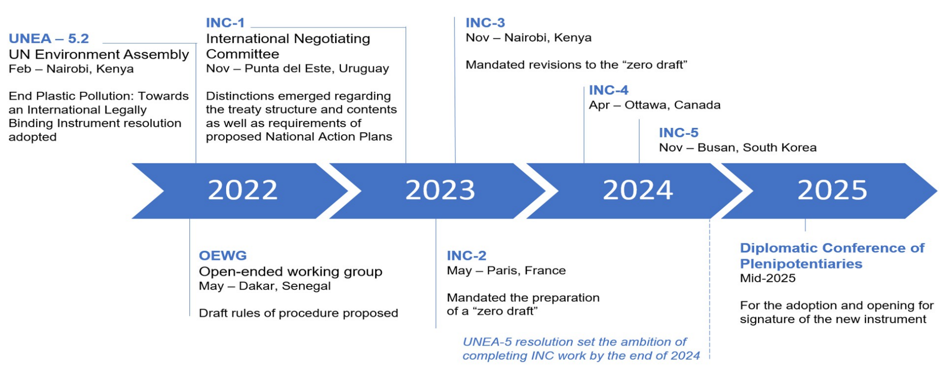
The below reproduces a Flash Note published on Apr.11th in collaboration with J.P. Morgan APAC ESG Research: here.

On April 10th, we hosted Bethanie Carney Almroth, professor of ecotoxicology at the University of Gothenburg (Sweden), and Fredric Bauer, Associate Senior Lecturer in Technology and Society at the University of Lund (Sweden). The two experts provided an update on the international negotiations on a treaty to ban plastic pollution and their outlook on national regulations, technologies, and business implications. Overall, we came away from this call with increased conviction on the rising materiality of 'circularity' as a multi-year theme. Our key takeaways include: 1) the inclusion in the treaty of an objective to cut global plastic production worldwide has proven to be one of the most controversial debates among negotiators; 2) scaling up plastic recycling will require a simplification in the composition of plastics and enhanced traceability across the value chain; and 3) plastic alternatives and substitutes still need to be scaled up while demonstrating their "true greenness".

International negotiations have progressed at record speed, but sticking points remain

In March 2022, 175 countries committed to develop a binding international agreement to end plastic pollution. While the United Nations had already attempted to address specific plastic-related issues, such as marine pollution and microplastics, in the past, **this is the first time that countries have committed to tackle pollution throughout the full plastic lifecycle**. The final rounds of negotiations, scheduled in April and November 2024, aim to finalize the draft treaty ahead of a potential formal diplomatic signing in 2025, paving the way for new regional and national regulations being adopted from 2025 onwards. **Our guest speakers emphasized that this treaty is being negotiated at record speed compared to previous international agreements.**

Figure 6: Towards a global treaty on plastics, a timeline



Source: J.P. Morgan, UNEP.

What's on the table?

With the draft treaty still at an early stage, there is significant uncertainty on what the final version will look like. **Our guest speakers highlighted the various elements currently being discussed by negotiators, from standardizing the list of polymers and chemicals of concern, through to establishing a regulated trade system for polymers and plastic chemicals** (see Figure 1 for more detail). Several coalitions have formed to advocate for specific measures, including the High Ambition Coalition to End Plastic Pollution, led by Norway and Rwanda and joined by 63 other countries such as Australia, Canada, Japan, Mexico, South Korea, the EU, UK, and UAE, which advocates for a commitment to "restrain plastic consumption and production to sustainable levels". On the other hand, the "like-minded" group, which comprises some of the largest fossil-fuel petrochemical producers, such as Saudi Arabia and Russia, has rejected the proposal of restricting plastic production (link). Our guest speakers also highlighted that countries have committed to an internationally-binding treaty, which in theory implies stronger enforcement mechanisms than "resolutions with voluntary actions" like the Paris Agreement, albeit in practice, we understand that peer pressure and global accountability may remain the most effective implementation drivers.

Figure 7: Measures and objectives that could be included in the Plastic Treaty

	Lifecycle stage	Potential measures/targets
1	**Resources (oil extraction & bio-based feedstock)**	Production reduction
2	**Polymer Production**	Criteria to identify polymers, chemicals, and products "of concern"
3	**Product Manufacture**	Safety & sustainability standards
4	**Transport & trade**	Shift to reuse and refill
5	**Commercial, industrial & consumer use**	Trade provisions
6	**Waste management & recycling**	Improved waste management & recycling
7	**Removal & remediation**	Environmental remediation for areas that are already highly polluted

Source: J.P. Morgan based on the Scientists' Coalition for an Effective Plastics Treaty (link)

More holistic and harmonized regulations might be in sight

While several countries have already adopted policies and regulations on plastic, they have historically focused on specific impacts or products, such as banning single-use plastic straws or bags, or implementing extended producer responsibility schemes. **Our guest speakers emphasized that the treaty could trigger a more holistic response to plastic pollution that considers all stages of the value chain**, from production to disposal. Solutions could range from: 1) extending the lifetime of some plastic-based products, 2) implementing proper waste sorting and management systems, 3) requiring alternatives and substitutes for plastic usage that is not "essential", 4) banning some hazardous plastic chemicals, and 5) improving plastic recyclability and recycling

Noemie de la Gorce, CFA AC
(44 20) 7134-4229
noemie.delagorce@jpmorgan.com

systems. Further, **the treaty provides an opportunity to harmonize plastic-related regulations worldwide**, a key ask from the Business Coalition for a Global Plastics Treaty, which comprises about 200 companies including some of the largest plastic users and producers.

Plastic recycling not yet ready for prime time

Plastics 101

Plastics are based on polymers, which are themselves made of a combination of: 1) monomers (hydrogen and carbon atoms); and 2) additives, such as bisphenols and PFAs. About 99% of polymers are synthetic, i.e. comprised fossil-based materials, while the remaining 1% are natural polymers, i.e. based on biomass-based monomers and natural additives (e.g. sugar, salt, and ethanol). Those natural polymers are also referred to as "bio-based plastics". Depending on their physical properties, plastics can be categorized into three types, which are: 1) Thermosets (e.g. polyurethane), which are extremely rigid and thus cannot be recycled; 2) Thermoplastics, which can be mechanically recycled; and 3) Elastomers, which are typically more difficult to recycle. For more detail, see the Plastics 101 fact-sheet from the Scientists' Coalition for an Effective Plastic Treaty.

Current recycling technics face several challenges

Mechanical recycling is by far the most common recycling technique today, owing to its simplicity and energy-efficiency, among other things. However, our speakers highlighted several issues associated with this technique, including: 1) plastic reaching recycling stage can be contaminated by hazardous products, posing safety risks; 2) plastic quality can be materially affected during the material degradation process, resulting in recycled plastic having to be mixed with new virgin plastic in order to be reused; and 3) recycling facilities release micro- and nanoplastics, resulting in chemical contamination and health impacts.

Scaling up plastic recycling requires chemicals simplification and better traceability

Recycling is hampered by: 1) the complexity of plastic chemistry, and 2) the lack of transparency on plastics' underlying chemistry. In March 2024, the PlastChem report identified 16,000 different chemicals used in plastic production, 26% of which were assessed as highly hazardous to human health and the environment, including 400 that are present in all major plastic types such as food packaging. Further, scientists were unable to assess the toxicity of over 60% of those plastic chemicals, owing to a lack of information on what plastics were made of, which is itself due to the complexity of the plastic value chain and the lack of reporting requirements for entities across that value chain. In this perspective, **1) simplification of plastic chemicals and polymers, and 2) enhanced traceability/transparency across the plastic value chain will be key to scale up recycling**, according to our guest speakers.

Plastic alternatives & substitutes still need to be scaled up while demonstrating their 'true greenness'

Bio-based plastics: a necessary but imperfect solution

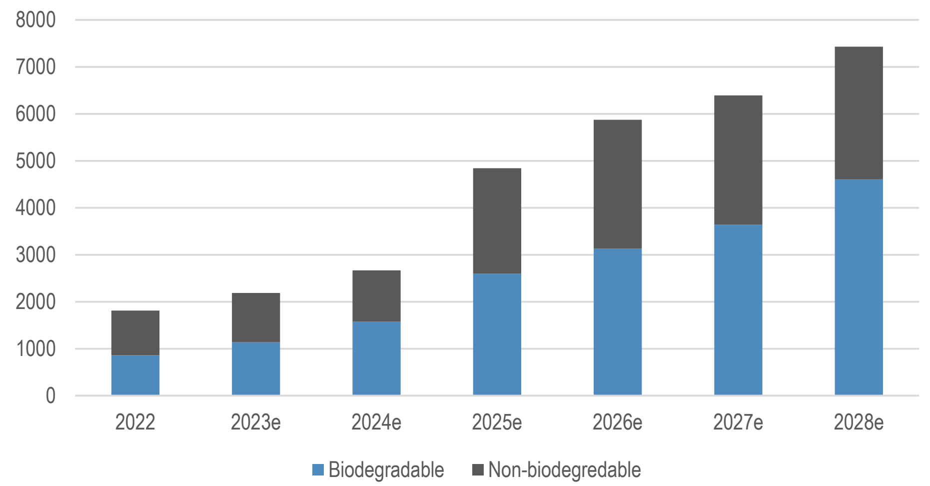
Plastic *alternatives* typically refer to "bio-based plastics" made from materials and chemicals that are not fossil-fuel based. Our guest speakers indicated that some bio-based plastics face similar challenges to fossil-based plastics owing to 1) their similar polymer structures, and 2) the potential use of hazardous chemicals. We also separately found some academic Research pointing to biodegradable plastics resulting in

Noemie de la Gorce, CFA [AC]
(44 20) 7134-4229
noemie.delagorce@jpmorgan.com

microplastics entering the food value chain. Having said that, some academic studies also indicate that bio-based plastics can achieve a better environmental footprint than fossil-based polymers if derived from renewable/second generation feedstock and if their end-of-life is well managed. In this perspective, **enhanced transparency and traceability on the composition of bio-based plastics may here again be key to build trust in this new technology, in our view.**

Figure 8: Global production capacities of bioplastics are expected to multiply by 4x by 2028

1,000 tonnes



Source: J.P. Morgan based on European Bioplastic, nova-Institute (link)

A brighter future for plastic substitutes?

In this perspective, plastic substitutes may be more promising from a pure sustainability standpoint. Plastic substitutes refer to non-plastic materials that may be used to replace synthetic and natural polymers, such as glass, wood, and aluminum (see Table 1). Our guest speakers highlighted the wide range of substitutes available, although most have yet to be truly scaled up, according to the UN.

Table 1: Illustrative list of plastic substitutes for selected applications

Traditional substitutes	Textiles	Mulch	Packaging/SUP	Textiles/pack/SUP
Aluminum	Areca leaves	Hay	Banana leaves and paper	Balsa wood
Ceramics	Banana leaves, stem, or fibres	Leather	Calabash hard shell	Bamboo
Clay	Bamboo fibres	Ray	Casein	Cellulose nanofibres
Cotton	Fruit peels	Straw	Cotton linters	Coconut husks
Glass	Beeswax-coated cloth	Seaweed film and fibres	Mushroom	Coir
Paper	Down	White clover	Rayon	Cork
Wood	Grape waste	Wood bark	Rice paper	Corn
Natural Fibers	Pineapple leaves	Woodship	Seaweed and fruit peels films and paper	Cotton
	Tofu waste	Wool	Wood bark	Flax
	Silk			Fish skin or residues
	Various animal wools			Hemp
				Jute
				Leather
				Nettles
				Seaweed
				Silk
				Sisal
				Sugarcane
				Plant waste
				Wheat husks
				Wood pulp
				Woodchip

Source: J.P. Morgan based on the UN.

Noemie de la Gorce, CFA AC
(44 20) 7134-4229
noemie.delagorce@jpmorgan.com

About the speakers

Bethanie Carney Almroth and Fredric Bauer are part of the Scientists' Coalition for an Effective Plastics Treaty, an international network of diverse, independent scientific and technical experts seeking to contribute with summaries and interpretations of scientific knowledge to decision makers and the public involved in the negotiations towards a global agreement to end plastic pollution (link). Bethanie Carney Almroth is a professor of ecotoxicology at the University of Gothenburg in Sweden. She studies the environmental impacts of plastics, microplastics, and chemicals in plastics products. Fredric Bauer is an Associate Senior Lecturer in Technology and Society at Lund University in Sweden. He has conducted extensive research on the plastics and chemicals industries, as well as low-carbon innovation and development in energy and emissions intensive industries.

Analyst Certification: The Research Analyst(s) denoted by an “AC” on the cover of this report certifies (or, where multiple Research Analysts are primarily responsible for this report, the Research Analyst denoted by an “AC” on the cover or within the document individually certifies, with respect to each security or issuer that the Research Analyst covers in this research) that: (1) all of the views expressed in this report accurately reflect the Research Analyst’s personal views about any and all of the subject securities or issuers; and (2) no part of any of the Research Analyst's compensation was, is, or will be directly or indirectly related to the specific recommendations or views expressed by the Research Analyst(s) in this report. For all Korea-based Research Analysts listed on the front cover, if applicable, they also certify, as per KOFIA requirements, that the Research Analyst’s analysis was made in good faith and that the views reflect the Research Analyst’s own opinion, without undue influence or intervention.

All authors named within this report are Research Analysts who produce independent research unless otherwise specified. In Europe, Sector Specialists (Sales and Trading) may be shown on this report as contacts but are not authors of the report or part of the Research Department.

Important Disclosures

Company-Specific Disclosures: Important disclosures, including price charts and credit opinion history tables, are available for compendium reports and all J.P. Morgan–covered companies, and certain non-covered companies, by visiting https://www.jpmm.com/research/disclosures, calling 1-800-477-0406, or e-mailing research.disclosure.inquiries@jpmorgan.com with your request.

Explanation of Equity Research Ratings, Designations and Analyst(s) Coverage Universe:
J.P. Morgan uses the following rating system: Overweight (over the duration of the price target indicated in this report, we expect this stock will outperform the average total return of the stocks in the Research Analyst’s, or the Research Analyst’s team’s, coverage universe); Neutral (over the duration of the price target indicated in this report, we expect this stock will perform in line with the average total return of the stocks in the Research Analyst’s, or the Research Analyst’s team’s, coverage universe); and Underweight (over the duration of the price target indicated in this report, we expect this stock will underperform the average total return of the stocks in the Research Analyst’s, or the Research Analyst’s team’s, coverage universe. NR is Not Rated. In this case, J.P. Morgan has removed the rating and, if applicable, the price target, for this stock because of either a lack of a sufficient fundamental basis or for legal, regulatory or policy reasons. The previous rating and, if applicable, the price target, no longer should be relied upon. An NR designation is not a recommendation or a rating. In our Asia (ex-Australia and ex-India) and U.K. small- and mid-cap Equity Research, each stock’s expected total return is compared to the expected total return of a benchmark country market index, not to those Research Analysts’ coverage universe. If it does not appear in the Important Disclosures section of this report, the certifying Research Analyst’s coverage universe can be found on J.P. Morgan’s Research website, https://www.jpmorganmarkets.com.

J.P. Morgan Equity Research Ratings Distribution, as of July 06, 2024

	Overweight (buy)	Neutral (hold)	Underweight (sell)
J.P. Morgan Global Equity Research Coverage*	49%	38%	13%
IB clients**	49%	46%	34%
JPMS Equity Research Coverage*	48%	41%	11%
IB clients**	69%	66%	50%

***Please note that the percentages may not add to 100% because of rounding.**
****Percentage of subject companies within each of the "buy," "hold" and "sell" categories for which J.P. Morgan has provided investment banking services within the previous 12 months.**
For purposes of FINRA ratings distribution rules only, our Overweight rating falls into a buy rating category; our Neutral rating falls into a hold rating category; and our Underweight rating falls into a sell rating category. Please note that stocks with an NR designation are not included in the table above. This information is current as of the end of the most recent calendar quarter.

Equity Valuation and Risks: For valuation methodology and risks associated with covered companies or price targets for covered companies, please see the most recent company-specific research report at http://www.jpmorganmarkets.com, contact the primary analyst or your J.P. Morgan representative, or email research.disclosure.inquiries@jpmorgan.com. For material information about the proprietary models used, please see the Summary of Financials in company-specific research reports and the Company Tearsheets, which are available to download on the company pages of our client website, http://www.jpmorganmarkets.com. This report also sets out within it the material underlying assumptions used.

A history of J.P. Morgan investment recommendations disseminated during the preceding 12 months can be accessed on the Research & Commentary page of http://www.jpmorganmarkets.com where you can also search by analyst name, sector or financial instrument.

Analysts' Compensation: The research analysts responsible for the preparation of this report receive compensation based upon various factors, including the quality and accuracy of research, client feedback, competitive factors, and overall firm revenues.

Registration of non-US Analysts: Unless otherwise noted, the non-US analysts listed on the front of this report are employees of non-US affiliates of J.P. Morgan Securities LLC, may not be registered as research analysts under FINRA rules, may not be associated persons of J.P. Morgan Securities LLC, and may not be subject to FINRA Rule 2241 or 2242 restrictions on communications with covered companies, public appearances, and trading securities held by a research analyst account.

Other Disclosures

J.P. Morgan is a marketing name for investment banking businesses of JPMorgan Chase & Co. and its subsidiaries and affiliates worldwide.

UK MIFID FICC research unbundling exemption: UK clients should refer to UK MIFID Research Unbundling exemption for details of J.P. Morgan's implementation of the FICC research exemption and guidance on relevant FICC research categorisation.

All research material made available to clients are simultaneously available on our client website, J.P. Morgan Markets, unless specifically permitted by relevant laws. Not all research content is redistributed, e-mailed or made available to third-party aggregators. For all research material available on a particular stock, please contact your sales representative.

Any long form nomenclature for references to China; Hong Kong; Taiwan; and Macau within this research material are Mainland China; Hong Kong SAR (China); Taiwan (China); and Macau SAR (China).

J.P. Morgan Research may, from time to time, write on issuers or securities targeted by economic or financial sanctions imposed or administered by the governmental authorities of the U.S., EU, UK or other relevant jurisdictions (Sanctioned Securities). Nothing in this report is intended to be read or construed as encouraging, facilitating, promoting or otherwise approving investment or dealing in such Sanctioned Securities. Clients should be aware of their own legal and compliance obligations when making investment decisions.

Any digital or crypto assets discussed in this research report are subject to a rapidly changing regulatory landscape. For relevant regulatory advisories on crypto assets, including bitcoin and ether, please see https://www.jpmorgan.com/disclosures/cryptoasset-disclosure.

The author(s) of this research report may not be licensed to carry on regulated activities in your jurisdiction and, if not licensed, do not hold themselves out as being able to do so.

Exchange-Traded Funds (ETFs): J.P. Morgan Securities LLC ("JPMS") acts as authorized participant for substantially all U.S.-listed ETFs. To the extent that any ETFs are mentioned in this report, JPMS may earn commissions and transaction-based compensation in connection with the distribution of those ETF shares and may earn fees for performing other trade-related services, such as securities lending to short sellers of the ETF shares. JPMS may also perform services for the ETFs themselves, including acting as a broker or dealer to the ETFs. In addition, affiliates of JPMS may perform services for the ETFs, including trust, custodial, administration, lending, index calculation and/or maintenance and other services.

Options and Futures related research: If the information contained herein regards options- or futures-related research, such information is available only to persons who have received the proper options or futures risk disclosure documents. Please contact your J.P. Morgan Representative or visit https://www.theocc.com/components/docs/riskstoc.pdf for a copy of the Option Clearing Corporation's Characteristics and Risks of Standardized Options or http://www.finra.org/sites/default/files/Security_Futures_Risk_Disclosure_Statement_2018.pdf for a copy of the Security Futures Risk Disclosure Statement.

Changes to Interbank Offered Rates (IBORs) and other benchmark rates: Certain interest rate benchmarks are, or may in the future become, subject to ongoing international, national and other regulatory guidance, reform and proposals for reform. For more information, please consult: https://www.jpmorgan.com/global/disclosures/interbank_offered_rates

Private Bank Clients: Where you are receiving research as a client of the private banking businesses offered by JPMorgan Chase & Co. and its subsidiaries ("J.P. Morgan Private Bank"), research is provided to you by J.P. Morgan Private Bank and not by any other division of J.P. Morgan, including, but not limited to, the J.P. Morgan Corporate and Investment Bank and its Global Research division.

Legal entity responsible for the production and distribution of research: The legal entity identified below the name of the Reg AC Research Analyst who authored this material is the legal entity responsible for the production of this research. Where multiple Reg AC Research Analysts authored this material with different legal entities identified below their names, these legal entities are jointly responsible for the production of this research. Research Analysts from various J.P. Morgan affiliates may have contributed to the production of this material but may not be licensed to carry out regulated activities in your jurisdiction (and do not hold themselves out as being able to do so). Unless otherwise stated below, this material has been distributed by the legal entity responsible for production. If you have any queries, please contact the relevant Research Analyst in your jurisdiction or the entity in your jurisdiction that has distributed this research material.

Legal Entities Disclosures and Country-/Region-Specific Disclosures:
Argentina: JPMorgan Chase Bank N.A Sucursal Buenos Aires is regulated by Banco Central de la República Argentina ("BCRA"- Central Bank of Argentina) and Comisión Nacional de Valores ("CNV"- Argentinian Securities Commission - ALYC y AN Integral N°51). **Australia:** J.P. Morgan Securities Australia Limited ("JPMSAL") (ABN 61 003 245 234/AFS Licence No: 238066) is regulated by the Australian Securities and Investments Commission and is a Market Participant of ASX Limited, a Clearing and Settlement Participant of ASX Clear Pty Limited and a Clearing Participant of ASX Clear (Futures) Pty Limited. This material is issued and distributed in Australia by or on behalf of JPMSAL only to "wholesale clients" (as defined in section 761G of the Corporations Act 2001). A list of all financial products covered can be found by visiting https://www.jpmm.com/research/disclosures. J.P. Morgan seeks to cover companies of relevance to the domestic and international investor base across all Global Industry Classification Standard (GICS) sectors, as well as across a range of market capitalisation sizes. If applicable, in the course of conducting public side due diligence on the subject company(ies), the Research Analyst team may at times perform such diligence through corporate engagements such as site visits, discussions with company representatives, management presentations,

etc. Research issued by JPMSAL has been prepared in accordance with J.P. Morgan Australia's Research Independence Policy which can be found at the following link: J.P. Morgan Australia - Research Independence Policy. **Brazil**: Banco J.P. Morgan S.A. is regulated by the Comissao de Valores Mobiliarios (CVM) and by the Central Bank of Brazil. Ombudsman J.P. Morgan: 0800-7700847 / 0800-7700810 (For Hearing Impaired) / ouvidoria.jp.morgan@jpmorgan.com. **Canada**: J.P. Morgan Securities Canada Inc. is a registered investment dealer, regulated by the Canadian Investment Regulatory Organization and the Ontario Securities Commission and is the participating member on Canadian exchanges. This material is distributed in Canada by or on behalf of J.P.Morgan Securities Canada Inc. **Chile:** Inversiones J.P. Morgan Limitada is an unregulated entity incorporated in Chile. **China:** J.P. Morgan Securities (China) Company Limited has been approved by CSRC to conduct the securities investment consultancy business. **Dubai International Financial Centre (DIFC)**: JPMorgan Chase Bank, N.A., Dubai Branch is regulated by the Dubai Financial Services Authority (DFSA) and its registered address is Dubai International Financial Centre - The Gate, West Wing, Level 3 and 9 PO Box 506551, Dubai, UAE. This material has been distributed by JP Morgan Chase Bank, N.A., Dubai Branch to persons regarded as professional clients or market counterparties as defined under the DFSA rules. **European Economic Area (EEA):** Unless specified to the contrary, research is distributed in the EEA by J.P. Morgan SE ("JPM SE"), which is authorised as a credit institution by the Federal Financial Supervisory Authority (Bundesanstalt für Finanzdienstleistungsaufsicht, BaFin) and jointly supervised by the BaFin, the German Central Bank (Deutsche Bundesbank) and the European Central Bank (ECB). JPM SE is a company headquartered in Frankfurt with registered address at TaunusTurm, Taunustor 1, Frankfurt am Main, 60310, Germany. The material has been distributed in the EEA to persons regarded as professional investors (or equivalent) pursuant to Art. 4 para. 1 no. 10 and Annex II of MiFID II and its respective implementation in their home jurisdictions ("EEA professional investors"). This material must not be acted on or relied on by persons who are not EEA professional investors. Any investment or investment activity to which this material relates is only available to EEA relevant persons and will be engaged in only with EEA relevant persons. **Hong Kong**: J.P. Morgan Securities (Asia Pacific) Limited (CE number AAJ321) is regulated by the Hong Kong Monetary Authority and the Securities and Futures Commission in Hong Kong, and J.P. Morgan Broking (Hong Kong) Limited (CE number AAB027) is regulated by the Securities and Futures Commission in Hong Kong. JP Morgan Chase Bank, N.A., Hong Kong Branch (CE Number AAL996) is regulated by the Hong Kong Monetary Authority and the Securities and Futures Commission, is organized under the laws of the United States with limited liability. Where the distribution of this material is a regulated activity in Hong Kong, the material is distributed in Hong Kong by or through J.P. Morgan Securities (Asia Pacific) Limited and/or J.P. Morgan Broking (Hong Kong) Limited. **India**: J.P. Morgan India Private Limited (Corporate Identity Number - U67120MH1992FTC068724), having its registered office at J.P. Morgan Tower, Off. C.S.T. Road, Kalina, Santacruz - East, Mumbai – 400098, is registered with the Securities and Exchange Board of India (SEBI) as a 'Research Analyst' having registration number INH000001873. J.P. Morgan India Private Limited is also registered with SEBI as a member of the National Stock Exchange of India Limited and the Bombay Stock Exchange Limited (SEBI Registration Number – INZ000239730) and as a Merchant Banker (SEBI Registration Number - MB/INM000002970). Telephone: 91-22-6157 3000, Facsimile: 91-22-6157 3990 and Website: http://www.jpmipl.com. JPMorgan Chase Bank, N.A. - Mumbai Branch is licensed by the Reserve Bank of India (RBI) (Licence No. 53/ Licence No. BY.4/94; SEBI - IN/CUS/014/ CDSL : IN-DP-CDSL-444-2008/ IN-DP-NSDL-285-2008/ INBI00000984/ INE231311239) as a Scheduled Commercial Bank in India, which is its primary license allowing it to carry on Banking business in India and other activities, which a Bank branch in India are permitted to undertake. For non-local research material, this material is not distributed in India by J.P. Morgan India Private Limited. Compliance Officer: Spurthi Gadamsetty; spurthi.gadamsetty@jpmchase.com; +912261573225. Grievance Officer: Ramprasadh K, jpmipl.research.feedback@jpmorgan.com; +912261573000.

Investment in securities market are subject to market risks. Read all the related documents carefully before investing. Registration granted by SEBI and certification from NISM in no way guarantee performance of the intermediary or provide any assurance of returns to investors.

Indonesia: PT J.P. Morgan Sekuritas Indonesia is a member of the Indonesia Stock Exchange and is registered and supervised by the Otoritas Jasa Keuangan (OJK). **Korea**: J.P. Morgan Securities (Far East) Limited, Seoul Branch, is a member of the Korea Exchange (KRX). JPMorgan Chase Bank, N.A., Seoul Branch, is licensed as a branch office of foreign bank (JPMorgan Chase Bank, N.A.) in Korea. Both entities are regulated by the Financial Services Commission (FSC) and the Financial Supervisory Service (FSS). For non-macro research material, the material is distributed in Korea by or through J.P. Morgan Securities (Far East) Limited, Seoul Branch. **Japan**: JPMorgan Securities Japan Co., Ltd. and JPMorgan Chase Bank, N.A., Tokyo Branch are regulated by the Financial Services Agency in Japan. **Malaysia**: This material is issued and distributed in Malaysia by JPMorgan Securities (Malaysia) Sdn Bhd (18146-X), which is a Participating Organization of Bursa Malaysia Berhad and holds a Capital Markets Services License issued by the Securities Commission in Malaysia. **Mexico**: J.P. Morgan Casa de Bolsa, S.A. de C.V. and J.P. Morgan Grupo Financiero are members of the Mexican Stock Exchange and are authorized to act as a broker dealer by the National Banking and Securities Exchange Commission. **New Zealand**: This material is issued and distributed by JPMSAL in New Zealand only to "wholesale clients" (as defined in the Financial Markets Conduct Act 2013). JPMSAL is registered as a Financial Service Provider under the Financial Service providers (Registration and Dispute Resolution) Act of 2008. **Philippines**: J.P. Morgan Securities Philippines Inc. is a Trading Participant of the Philippine Stock Exchange and a member of the Securities Clearing Corporation of the Philippines and the Securities Investor Protection Fund. It is regulated by the Securities and Exchange Commission. **Singapore**: This material is issued and distributed in Singapore by or through J.P. Morgan Securities Singapore Private Limited (JPMSS) [MDDI (P) 068/08/2024 and Co. Reg. No.: 199405335R], which is a member of the Singapore Exchange Securities Trading Limited, and/or JPMorgan Chase Bank, N.A., Singapore branch (JPMCB Singapore), both of which are regulated by the Monetary Authority of Singapore. This material is issued and distributed in Singapore only to accredited investors, expert investors and institutional investors, as defined in Section 4A of the Securities and Futures Act, Cap. 289 (SFA). This material is not intended to be issued or distributed to any retail investors or any other investors that do not fall into the classes of "accredited investors," "expert investors" or "institutional investors," as defined under Section 4A of the SFA. Recipients of this material in Singapore are to contact JPMSS or JPMCB Singapore in respect of any matters arising from, or in connection with, the material. **South Africa**: J.P. Morgan Equities South Africa Proprietary Limited and JPMorgan Chase Bank, N.A., Johannesburg Branch are members of the Johannesburg Securities Exchange and are regulated by the Financial Services Conduct Authority (FSCA). **Taiwan**: J.P. Morgan Securities

(Taiwan) Limited is a participant of the Taiwan Stock Exchange (company-type) and regulated by the Taiwan Securities and Futures Bureau. Material relating to equity securities is issued and distributed in Taiwan by J.P. Morgan Securities (Taiwan) Limited, subject to the license scope and the applicable laws and the regulations in Taiwan. According to Paragraph 2, Article 7-1 of Operational Regulations Governing Securities Firms Recommending Trades in Securities to Customers (as amended or supplemented) and/or other applicable laws or regulations, please note that the recipient of this material is not permitted to engage in any activities in connection with the material that may give rise to conflicts of interests, unless otherwise disclosed in the "Important Disclosures" in this material. **Thailand**: This material is issued and distributed in Thailand by JPMorgan Securities (Thailand) Ltd., which is a member of the Stock Exchange of Thailand and is regulated by the Ministry of Finance and the Securities and Exchange Commission, and its registered address is 3rd Floor, 20 North Sathorn Road, Silom, Bangrak, Bangkok 10500. **UK:** Unless specified to the contrary, research is distributed in the UK by J.P. Morgan Securities plc ("JPMS plc") which is a member of the London Stock Exchange and is authorised by the Prudential Regulation Authority and regulated by the Financial Conduct Authority and the Prudential Regulation Authority. JPMS plc is registered in England & Wales No. 2711006, Registered Office 25 Bank Street, London, E14 5JP. This material is directed in the UK only to: (a) persons having professional experience in matters relating to investments falling within article 19(5) of the Financial Services and Markets Act 2000 (Financial Promotion) (Order) 2005 ("the FPO"); (b) persons outlined in article 49 of the FPO (high net worth companies, unincorporated associations or partnerships, the trustees of high value trusts, etc.); or (c) any persons to whom this communication may otherwise lawfully be made; all such persons being referred to as "UK relevant persons". This material must not be acted on or relied on by persons who are not UK relevant persons. Any investment or investment activity to which this material relates is only available to UK relevant persons and will be engaged in only with UK relevant persons. Research issued by JPMS plc has been prepared in accordance with JPMS plc's policy for prevention and avoidance of conflicts of interest related to the production of Research which can be found at the following link: J.P. Morgan EMEA - Research Independence Policy. **U.S.**: J.P. Morgan Securities LLC ("JPMS") is a member of the NYSE, FINRA, SIPC, and the NFA. JPMorgan Chase Bank, N.A. is a member of the FDIC. Material published by non-U.S. affiliates is distributed in the U.S. by JPMS who accepts responsibility for its content.

General: Additional information is available upon request. The information in this material has been obtained from sources believed to be reliable. While all reasonable care has been taken to ensure that the facts stated in this material are accurate and that the forecasts, opinions and expectations contained herein are fair and reasonable, JPMorgan Chase & Co. or its affiliates and/or subsidiaries (collectively J.P. Morgan) make no representations or warranties whatsoever to the completeness or accuracy of the material provided, except with respect to any disclosures relative to J.P. Morgan and the Research Analyst's involvement with the issuer that is the subject of the material. Accordingly, no reliance should be placed on the accuracy, fairness or completeness of the information contained in this material. There may be certain discrepancies with data and/or limited content in this material as a result of calculations, adjustments, translations to different languages, and/or local regulatory restrictions, as applicable. These discrepancies should not impact the overall investment analysis, views and/or recommendations of the subject company(ies) that may be discussed in the material. J.P. Morgan accepts no liability whatsoever for any loss arising from any use of this material or its contents, and neither J.P. Morgan nor any of its respective directors, officers or employees, shall be in any way responsible for the contents hereof, apart from the liabilities and responsibilities that may be imposed on them by the relevant regulatory authority in the jurisdiction in question, or the regulatory regime thereunder. Opinions, forecasts or projections contained in this material represent J.P. Morgan's current opinions or judgment as of the date of the material only and are therefore subject to change without notice. Periodic updates may be provided on companies/industries based on company-specific developments or announcements, market conditions or any other publicly available information. There can be no assurance that future results or events will be consistent with any such opinions, forecasts or projections, which represent only one possible outcome. Furthermore, such opinions, forecasts or projections are subject to certain risks, uncertainties and assumptions that have not been verified, and future actual results or events could differ materially. The value of, or income from, any investments referred to in this material may fluctuate and/or be affected by changes in exchange rates. All pricing is indicative as of the close of market for the securities discussed, unless otherwise stated. Past performance is not indicative of future results. Accordingly, investors may receive back less than originally invested. This material is not intended as an offer or solicitation for the purchase or sale of any financial instrument. The opinions and recommendations herein do not take into account individual client circumstances, objectives, or needs and are not intended as recommendations of particular securities, financial instruments or strategies to particular clients. This material may include views on structured securities, options, futures and other derivatives. These are complex instruments, may involve a high degree of risk and may be appropriate investments only for sophisticated investors who are capable of understanding and assuming the risks involved. The recipients of this material must make their own independent decisions regarding any securities or financial instruments mentioned herein and should seek advice from such independent financial, legal, tax or other adviser as they deem necessary. J.P. Morgan may trade as a principal on the basis of the Research Analysts' views and research, and it may also engage in transactions for its own account or for its clients' accounts in a manner inconsistent with the views taken in this material, and J.P. Morgan is under no obligation to ensure that such other communication is brought to the attention of any recipient of this material. Others within J.P. Morgan, including Strategists, Sales staff and other Research Analysts, may take views that are inconsistent with those taken in this material. Employees of J.P. Morgan not involved in the preparation of this material may have investments in the securities (or derivatives of such securities) mentioned in this material and may trade them in ways different from those discussed in this material. This material is not an advertisement for or marketing of any issuer, its products or services, or its securities in any jurisdiction.

Confidentiality and Security Notice: This transmission may contain information that is privileged, confidential, legally privileged, and/or exempt from disclosure under applicable law. If you are not the intended recipient, you are hereby notified that any disclosure, copying, distribution, or use of the information contained herein (including any reliance thereon) is STRICTLY PROHIBITED. Although this transmission and any attachments are believed to be free of any virus or other defect that might affect any computer system into which it is received and opened, it is the responsibility of the recipient to ensure that it is virus free and no responsibility is accepted by JPMorgan Chase & Co., its subsidiaries and affiliates, as applicable, for any loss or damage arising in any way from its use. If you received this transmission in error, please immediately contact the sender and destroy the material in its entirety, whether in electronic or hard copy format. This message is

Noemie de la Gorce, CFA AC
(44 20) 7134-4229
noemie.delagorce@jpmorgan.com

subject to electronic monitoring: https://www.jpmorgan.com/disclosures/email

MSCI: Certain information herein ("Information") is reproduced by permission of MSCI Inc., its affiliates and information providers ("MSCI") ©2024. No reproduction or dissemination of the Information is permitted without an appropriate license. MSCI MAKES NO EXPRESS OR IMPLIED WARRANTIES (INCLUDING MERCHANTABILITY OR FITNESS) AS TO THE INFORMATION AND DISCLAIMS ALL LIABILITY TO THE EXTENT PERMITTED BY LAW. No Information constitutes investment advice, except for any applicable Information from MSCI ESG Research. Subject also to msci.com/disclaimer

Sustainalytics: Certain information, data, analyses and opinions contained herein are reproduced by permission of Sustainalytics and: (1) includes the proprietary information of Sustainalytics; (2) may not be copied or redistributed except as specifically authorized; (3) do not constitute investment advice nor an endorsement of any product or project; (4) are provided solely for informational purposes; and (5) are not warranted to be complete, accurate or timely. Sustainalytics is not responsible for any trading decisions, damages or other losses related to it or its use. The use of the data is subject to conditions available at https://www.sustainalytics.com/legal-disclaimers. ©2024 Sustainalytics. All Rights Reserved.

"Other Disclosures" last revised August 24, 2024.

Completed 29 Sep 2024 09:02 PM BST   Disseminated 30 Sep 2024 12:15 AM BST