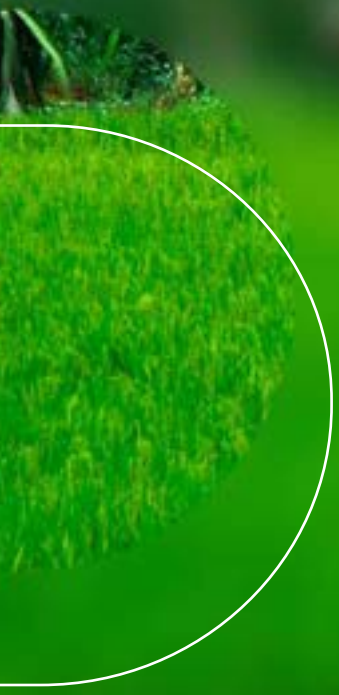
ORBITAS
A Climate Advisers Initiative

State of Climate Transitions

A 2024 Guide for Companies and Investors in the Land Economy





CLIMATE ADVISERS

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About Climate Advisers

This report was produced by Orbitas—a Climate Advisers initiative. Climate Advisers, a B Corporation, strengthens climate action in the United States and around the world through research, analysis, public policy advocacy and communications strategies. Climate Advisers develops and promotes sensible, high-impact initiatives that improve lives, enhance international security and strengthen communities.

> Further information is available at **climateadvisers.org**

About ORBITAS

Orbitas has been a major player in risk analysis across the agriculture, land and forestry sectors since 2020. Since then, it has developed first-of-its-kind methodologies for quantifying climate transition risks and opportunities through economic modeling and financial stress testing. In addition to publishing a ground-breaking global analysis in 2020, Orbitas has localized its analysis with country-level deep dives on Colombia, Peru, Brazil and Indonesia.

> Additional information is available at **orbitas.finance**

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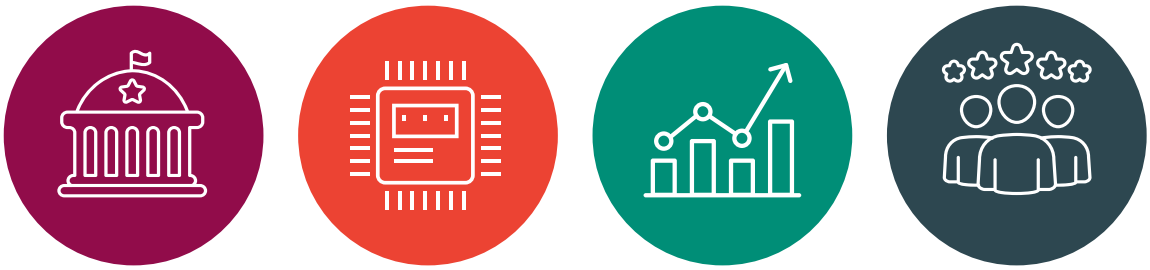
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Forward

Focusing on the most significant climate transitions enables business and financial institutions to prepare

Scientific research has clearly shown that mitigating the worst impacts of climate change requires systemic change across the global economy.[1] These government, private sector, civil society and consumer responses to climate change pose material financial risks to companies and investors, which should be considered by Enterprise Risk Management processes to accurately identify, analyze and mitigate risks.

Regulations are already incentivizing climate-smart solutions, while company supply chain policies and cost of capital segment markets, technology and innovation open significant opportunities for early movers, and climate-related impacts become increasingly linked to brand value and reputation. Companies and financial institutions that proactively assess and respond to these risks can mitigate their negative impacts while benefiting from the many opportunities that these climate transitions present. Inaction, however, may result in being left behind in a quickly transitioning economy.

Forest, land and agriculture (FLAG) sectors are among the most vulnerable to climate change as physical risks to crop yields, livestock health and much more materialize. These sectors emit 23 percent of global greenhouse gas emissions and could offer up to 20 percent of actions needed to mitigate the worst impacts of climate change by 2050.[2] Including pre- and post-production activities, the food sector constitutes about a third of global emissions. Livestock, alone, are responsible for up to 32 percent of global anthropogenic methane emissions.[3] The role of FLAG sectors as major contributors to climate change, combined with the potential of land to store carbon, opens companies and investors up to significant risks and opportunities as the economy transitions to a low carbon future.

A 2022 CDP survey shows that only 6 of over 1,000 food, beverage and agriculture companies disclosed comprehensive, credible climate

The role of FLAG sectors as major contributors to climate change opens companies and investors up to significant risks and opportunities as the economy transitions to a low carbon future.



transition plans aligned with limiting global temperature rise to 1.5° C above pre-industrialized levels.[4] The Science Based Targets initiative (SBTi), an international collaboration providing companies with Paris Agreement-aligned greenhouse gas emissions reduction strategies, recommends that FLAG sector companies reduce their emissions by at least 72 percent to achieve the globally recognized target of achieving net zero emissions by 2050, including meeting zero deforestation targets within their supply chains by 2025.[5] Achieving this goal will necessitate unprecedented climate action across supply chains and regions through private-sector action and new policies.

Meanwhile, the growing global population is driving greater demands for food security and creating additional urgency for reducing the emission intensity of production while maintaining sustainable supply chains that are resilient to physical climate risks. As the physical impacts of climate change intensify, public pressure to protect food security, human health, natural resources and much more will increasingly force global leaders to act. While climate transitions are inevitable, the speed and scale of these transitions have yet to be seen. This report provides insight into the most significant climate transitions materializing for FLAG sectors, thereby enabling businesses and financial institutions to prepare.

—Niamh McCarthy, Senior Director of Climate-Related Risk, Climate Advisers; Director of the Orbitas Initiative

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Definitions



Agriculture, Forestry, and Other Land Use (AFOLU): Categorization of greenhouse gas emissions that originate from Agriculture, Forestry and Other Land Use activities are grouped as the following; crop burning (fires in organic soils, burning crop residues), manure management (manure applied to soils, manure left on pasture), rice cultivation, soil maintenance (synthetic fertilizers, drained organic soils, crop residues), land use change (net forest conversion, savanna fires, forest fires) and enteric fermentation.

Agriculture Technology (AgTech): Innovations and technologies designed to improve the efficiency, productivity and sustainability of agriculture.

Anthropogenic Climate Change: The warming of the Earth's climate due to human activities; burning of fossil fuels, deforestation and industrial processes.

Biodiversity Markets: A market for businesses, organizations and individuals to buy and sell credits related to the conservation and enhancement of biodiversity. These markets aim to provide economic incentives for preserving and resorting ecosystems, assigning value to biodiversity.

Carbon Disclosure Project (CDP): An international non-profit that provides a global system for companies and cities to measure and disclose their environmental impact. A founding member of the Science-Based Targets initiative (SBTi), data collected by CDP aids investors, companies and governments in making informed climate decisions.

Corporate Sustainability Reporting Directive (CSRD): A European Union regulation that expands existing Non-Financial Reporting Directive (NFRD) guidelines, requiring eligible companies to disclose detailed climate and sustainability related information, supporting investors and stakeholders in making more informed decisions.

Climate-smart agriculture (CSA): An approach that aims to increase productivity and resilience in agriculture while reducing associated greenhouse gas emissions and adapting to climate change.

European Sustainability Reporting Standards (ESRS): Detailed standards outlining what information must be disclosed as part of the CSRD, in effort to ensure consistency, comparability and transparency in sustainability reporting.

Financial Stability Board (FSB): An international body that monitors and makes recommendations about the global financial system to promote stability and reduce systemic risk. Founded in 2009 by the G20, the organization has sponsored numerous climate-related financial regulatory initiatives.

Forest, Land, and Agriculture (FLAG): Sectors engaged in activities related to the management and use of forests, land and agriculture.

Global Reporting Initiative (GRI): An international organization that provides a comprehensive framework for sustainability reporting, aiding organizations in the assessment of their environmental, social and governance impacts.

Global warming potential over 100 years (GWP 100): A metric used to compare the impact of different greenhouse gases on the climate over a century relative to the heat absorption of carbon dioxide (CO_2e), which has a GWP of 1.

International Sustainability Standards Board (ISSB): An organization founded by the International Financial Reporting Standards (IFRAS) foundation that maintains sustainability disclosure standards providing investors and other capital market participants with consistent information on sustainability-related risks and opportunities.

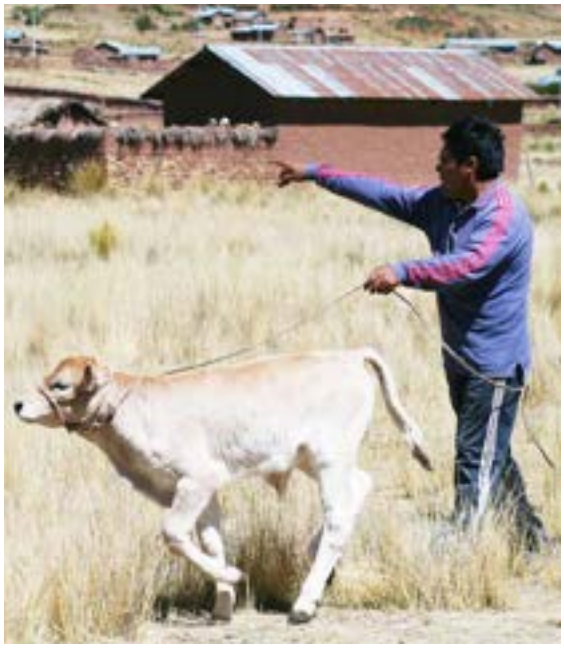
Internet of Things (IoT): Remote monitoring technology that employs the use of physical sensors connected over the internet, enabling data-informed decision-making and automation across various industries.

Nationally Determined Contributions (NDCs): Climate action plans submitted under the Paris Climate Agreement outlining individual country targets for reducing greenhouse gas emissions and adapting to climate impacts.

Net zero commitments: Pledges made by companies, countries or organizations to balance the amount of greenhouse gases they emit with carbon crediting activities such as reforestation, carbon capture and other absorption measures.

Physical Risk: The threat of damage to people and property from physical events such as extreme weather, natural disasters and other long-term environmental changes caused by climate change.

Roundtable on Sustainable Palm Oil (RSPO): A global, multi-stakeholder initiative that aims to promote the production and use of sustainable palm oil through plantation certification.



Row crops: Agricultural crops that are planted in rows wide enough to allow for machinery to pass between them for cultivation, irrigation and harvesting. Common examples include corn, soybeans, cotton and wheat.

Science Based Targets initiative (SBTi): A collaboration between various international organizations aimed at supporting companies in setting science-based emissions reductions targets aligned with the Paris Climate Agreement's goals.

Task Force on Climate-related Financial Disclosures (TCFD): An organization founded by the FSB that aids companies, investors and insurers in developing a comprehensive framework for assessing, disclosing and managing climate-related financial risks.

Transition Risk: The financial or operational disruptions businesses and economies face as society transitions to a low-carbon economy. Risks arise from changes in policies, regulations, technologies and market preferences aimed at addressing climate change.

Voluntary Carbon Market (VCM): A market for businesses, organizations and individuals to buy and sell carbon credits on a voluntary basis, outside of regulatory carbon trading schemes. Buyers seeking to counteract their carbon emissions may buy carbon credit projects that reduce or remove greenhouse gas emissions through reforestation, carbon capture or renewable energy projects, for example.

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Introduction

Over the past two decades, the world has experienced an estimated USD 2.8 trillion in damage attributed to physical climate change impacts.[6] Extreme weather events such as floods, hurricanes and heatwaves have grown in both intensity and frequency. They now rank as the second most critical global risk over a two-year horizon according to the World Economic Forum's survey of global leaders and experts, and they are expected to emerge as the top risk over the next decade.[7]

The forest, land and agriculture (FLAG) sectors—also known as agriculture, forestry and other land use (AFOLU)—are particularly exposed to the unpredictability of physical climate risk. As they are often reliant on historical patterns to generate business strategies, producers, traders and downstream companies are increasingly forced to reevaluate existing business practices as many face challenges with heat-related damage to crops and livestock, shocks to transportation on rainfed canals, and new threats from invasive pests and diseases.

Society's responses to these physical climate events are set to transform the global economy, demanding a fundamental transition to a more sustainable future—a shift not without risks and opportunities of its own. The actions of governments, the private sector, civil society and consumers will dictate the extent of the upheaval companies and investors across FLAG sectors must contend with in the coming years. This presents sizable opportunities for market leaders who proactively act on climate transitions.

As net zero emissions commitments are ad-

opted, encouraged and mandated, companies may be incentivized or forced to adopt less emission-intensive practices. Others may benefit from abundant opportunities and gain market share from productivity improvements and market access linked to high-efficiency agricultural technology (AgTech) and other climate-smart practices. In a world marked by the increasingly rapid flow of information dissemination and growing public concern around climate impacts, a company's response to climate risks has repercussions on its brand value and equity.

As the urgency to address climate change grows, financial institutions are increasingly recognized for taking proactive steps to reduce climate impacts, mitigate climate risks and lean into the many opportunities presented by climate transitions. Through investment strategies, economic forecasting and funding decisions, financial institutions play a key role in steering the global economy. Efforts to integrate climate-related risk into strategic frameworks are setting the course towards more sustainable practices that prioritize climate resiliency instead of rigidity.

As companies and investors face an unprecedented array of climate transition risks and opportunities, the way in which they respond to these materializing climate transition trends will determine the future profitability of their organizations—this necessitates close monitoring and assessment. This report provides a resource covering the most pressing climate transitions materializing on financial statements in FLAG sectors, highlighting the policy and legal, reputational, technology and market trends aligned with the Task Force on Climate-Related Financial Disclosures (TCFD), which forms the basis for most climate-related financial disclosures today.[8, i] Each trend plays a role in shaping the future of FLAG sector companies and financiers, presenting new opportunities while generating unprecedented, disruptive risks.

Transition risks, the financial and operational risks that arise from the transition to a lower-carbon economy, can result from changes in policy, technology, market dynamics and business reputation.

Task Force on Climate-related Financial Disclosures reporting framework.

Established in 2015 by the Financial Stability Board, the TCFD has worked to develop a voluntary reporting framework for companies, investors, lenders, insurers and other stakeholders to better understand and manage the risks and opportunities associated with climate change.[9] The TCFD's recommendations are structured around four elements:

1. Governance: Disclose the organization's governance in responding to climate-related risks and opportunities.

2. Strategy: Disclose the actual and potential impacts of climate-related risks and opportunities on the organization's business, strategy and financial planning in cases wherein such information is material.

3. Risk Management: Disclose how the organization identifies, assesses and manages climate-related risks.

4. Metrics and Targets: Disclose the metrics and targets used by the organization to assess and manage relevant climate-related risks and opportunities where such information is material.

Policy & Legal:
1–3 Year Time Horizon

Potential risks may include universal carbon pricing, ambitious emissions reduction policies and foreign trade restrictions.[10]

Technology:
2–5 Year Time Horizon

Potential risks may include the substitution of existing products and services with lower-emission options and unsuccessful investment in new technologies.

Market:
2–5 Year Time Horizon

Potential risks may include increased cost of commodities and raw materials, changing customer behavior and uncertainty in market signals.

Reputation:
2–5 Year Time Horizon

Potential risks may include shifts in consumer preferences, increased stakeholder concerns/negative feedback and the stigmatization of unsustainable sectors.

[i] The TCFD is now incorporated into the International Sustainability Standards Board guidance through the International Financial Reporting Standards (IFRS) S1 General Requirements for Disclosure of Sustainability-related Financial Information and the IFRS S2 Climate-related Disclosures.

High-emission AFOLU activities accelerate FLAG sector climate transition risk

As global ambition to address climate change grows, the high-emission intensity of FLAG sectors may increase business and investor exposure to emerging transition risks. AFOLU activities responsible for high greenhouse gas emissions, may result in policy and legal, reputational, technology- and market-based repercussions as government organizations, the private sector and civil society increasingly work to mitigate the worst impacts of climate change.

HIGH-EMISSION AFOLU ACTIVITIES

FLAG sectors are cumulatively responsible for nearly 22 percent of annual greenhouse gas emissions, with some agricultural activities driving the lion's share of emissions.[11] Companies and their investors exposed to unsustainable agricultural practices face the most significant climate transitions as high emitters are increasingly scrutinized.[12]

PERCENTAGE OF AFOLU GHG EMISSIONS[ii], 2021

Deforestation and Other Land Use Change: The conversion of forest and grasslands into agricultural, urban or industrial areas is widely relied upon for geographic expansion, which releases substantial greenhouse gas emissions. Moreover, illegal land clearing is often achieved through slash-and-burn techniques that involve lighting fires to burn through vegetation, thus releasing stored carbon and reducing future sequestration ability. FLAG sector companies and investors exposed to producers who rely on geographic expansion in place of yield improvements to grow may face significant reputational backlash if found to be connected to illegal forest clearing.

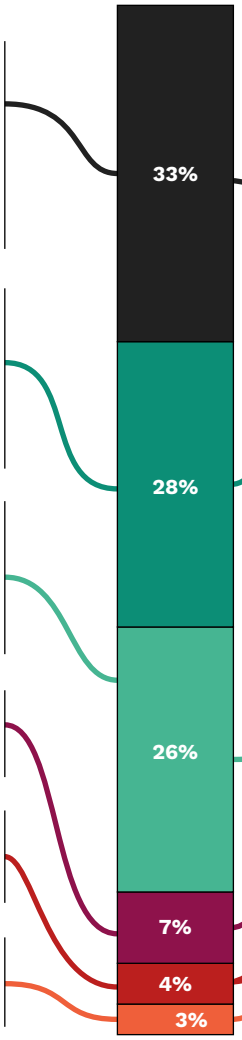
Enteric Fermentation: Ruminant animals, such as cattle, sheep and goats, carry out a specialized digestive process known as enteric fermentation, which emits methane gas as a digestive byproduct, a process worsened by low-quality feed. In response to generally increased climate awareness, some governments have instituted livestock taxes to encourage the adoption of emissions-mitigating feed additives.[13] Downstream FLAG companies may encounter an increase in raw material and commodity pricing, as the financial burden is passed on from individuals and businesses upstream.

Soil Maintenance: While used for preserving soil fertility, maintenance activities such as applying manure to pastures and soils and using synthetic fertilizers can release significant greenhouse gases when preformed unsustainably, as can high emission activities like draining wetlands. Financing or sourcing from unsustainable producers may expose FLAG sector companies and investors to financial repercussions as AFOLU emissions are increasingly scrutinized.

Rice Cultivation: Most rice varieties require near-constant flooding for proper growth. Organic matter trapped within paddies during flooding undergoes anerobic decomposition, which releases methane in the process.

Manure Management: Livestock waste can be used as a powerful soil and pasture fertilizer. However, the poor storage and handling of manure can create anaerobic conditions that release significant methane and nitrous oxide emissions as manure decomposes.

Crop Burning: To prepare fields for future harvests, any remaining crop stubble, leftover straw and crop residues can be burned. While faster and cheaper than manual clearing, burning these materials releases significant carbon dioxide into the atmosphere.



RELEVENT GHGs[iii]

Methane: CH_4 is primarily generated from livestock digestion, livestock manure management and rice cultivation. It has a 100-year global warming potential (GWP_{100}) 28 times greater than CO_2.[14] CH_4 emissions from enteric fermentation by ruminant livestock accounted for the single largest component of farm-gate emissions in 2018.[15]

Carbon Dioxide: CO_2 is primarily generated from land use change, drained organic soils and organic soil fires. Deforestation, which is mainly driven by agriculture, accounts for 74% of global CO_2 agricultural GHG emissions.[16]

Nitrous Oxide: N_2O is mostly generated from fertilizer application and livestock manure management. It has a GWP_{100} that is 265 times greater than CO_2.[17] N_2O emissions from synthetic fertilizers and crop residues increased by more than 35% from 2000 to 2018.[18]

Source: Emissions — Food and Agriculture Organization of the United Nations (FAO); GHGs — U.S. Environmental Protection Agency (EPA), Resources for the Future, Food and Agriculture Organization of the United Nations (FAO).

[ii] Note: Activity emissions presented in CO_2e and include the following AFOLU activities: crop residues, manure left on pasture, manure applied to soils, synthetic fertilizers, drained organic soils, forest fires, savanna fires, net forest conversion, enteric fermentation, rice cultivation, crop burning and manure management.

[iii] Note: 100-year global warming potential (GWP_{100}) measures how much energy the emissions of one ton of a gas will absorb over a 100-year period relative to the emissions of the same amount of CO_2. The larger the GWP_{100}, the heavier the impact of global warming. GWP_{100} values in the table are based on the IPCC Fifth Assessment Report (AR5).



A sustainable cacao grower in Colombia (Cacao farmer members of ACEFUVER; E3 Asesorias)

FLAG sector commodities face growing climate transition risk

Livestock, particularly cattle, contribute to 32 percent of annual methane emissions and 57 percent of total AFOLU greenhouse gas emissions.[19, iv] Due to a combination of poor diet and the clearing of tropical forest for pasture-based grazing, the high emissions potential of livestock has exposed businesses and investors to significant transition risk. Reputational damage from association with deforestation, loss of market access for FLAG traders unable to certify the sustainability of their products, and legal challenges prohibiting initial public offerings (IPOs) on the New York Stock Exchange (NYSE) have all resulted from material climate transition risks.

Reputational damage, loss of market access and legal challenges have all resulted from material climate transition risks.

The high emissions potential of FLAG sectors is not exclusive to livestock, with cultivation of cereals like rice contributing 12 percent of annual methane emissions and 9 percent of total AFOLU greenhouse gas emissions.[20, 21] A staple crop for families around the world, rice's high carbon footprint is due to the use of flood-reliant varieties of the crop, allowing for the anaerobic decay of organic material in near continuously flooded rice paddies.

Businesses and investors involved in the rice supply chains are beginning to face policy and legal restrictions over water usage, loss of agricultural subsidies for failing to implement climate-smart technology and market access restrictions for producers failing to meet sustainable rice platform (SRP) certification requirements, climate transition risks that are expected to worsen in coming years.[22]

The production of commodities with alternatives that can be used as substitute products, such as palm oil, already face some of the most damaging transition risks as businesses and investors are encouraged to leverage inputs with a lower risk of deforestation linkages. Responsible for an estimated 483 million tons of CO_2e—seven percent of annual AFOLU greenhouse gas emissions—the production of palm oil has been heavily linked to deforestation, the draining of peatlands and other land use change practices in Southeast Asia and parts of Africa and South America.[23, v] The reputational damage associated with such events has been severe enough to spur the creation of a not-for-profit organization, the

[iv] Note: Share of total AFOLU emissions was produced by dividing the FAO's global emissions estimate by the FAO's global AFOLU emissions estimate and multiplying by 100.

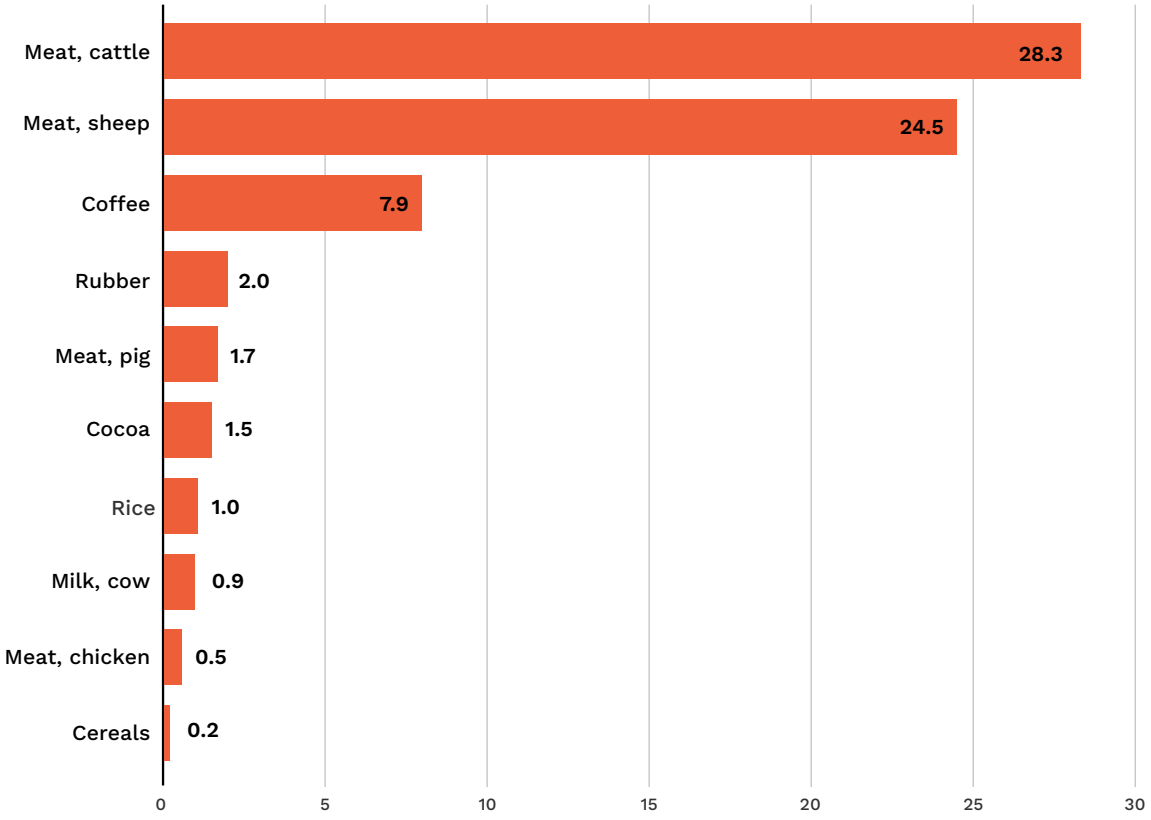
[v] Note: Palm oil share of global AFOLU emissions calculated by taking the FAO's palm oil production quantity multiplying by the International Council on Clean Transportation's average palm oil emissions intensity of 6kg CO_2 e/kg palm oil divided by the FAO's estimate of global AFOLU emissions multiplied by 100.

Roundtable on Sustainable Palm Oil (RSPO), to coordinate sustainable certification efforts.[24] Businesses and investors involved in the palm oil trade have faced policy and legal challenges restricting access to EU markets to RSPO-certified products, reputational damage from association with publicized deforestation events, and a dwindling customer base as major retailers terminate contracts with non-certified traders.

As climate transition risks continue to materialize, the emissions intensity of production of FLAG sectors, may be considered a predictive tool used by businesses and investors to evaluate future risk potential. Those involved in the trade of at-risk products may face more immediate threats; however, these threats can be considered opportunities to explore emerging markets and diversified revenue streams, adopt developing agricultural technologies and secure future financial stability through low-cost financing initiatives. This report highlights the risks and opportunities behind emerging transition trends in the forest, land and agriculture sectors for concerned businesses and exposed investors.

GLOBAL EMISSIONS INTENSITY[vi] OF KEY FLAG

kg CO_2eq/kg, 2021



Source: U.S. Environmental Protection Agency (EPA), Resources for the Future, Food and Agriculture Organization of the United Nations (FAO).

[vi] Note: Commodity emissions converted from N_2O and CH_4 into CO_2e, according to USDA guidelines. 1.47 kg CO_2e/kg of cocoa beans was used to estimate world cocoa emissions, an average representative of the farming practices used by 70% of world cocoa producers. Coffee emissions averaged 3.09 t CO_2 e/hectare for farming practices representative of 41% of global coffee production. This figure was applied to estimate world emissions across the 27 million hectares under cultivation. An average of 6.4 t CO_2e/t of deforestation -exposed natural rubber was applied to countries with estimated rubber deforestation exposure, while emissions for the remainder were calculated using the average emissions found on mature plantations: 0.2 t CO_2e/t of natural rubber.

Regional dynamics driving climate transitions

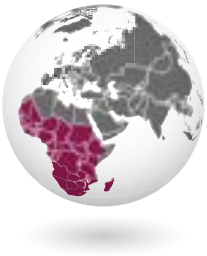
The climate transition risks and opportunities faced by businesses and investors are not uniform. Preexisting regional dynamics will dictate how the global response to climate change is felt, while capital investment will play a major role in companies' ability to lean into climate transition opportunities. While internet availability, electricity and clean water access continue to expand, infrastructure constraints can pose significant challenges to FLAG sector businesses and investors looking to mitigate financial risks from climate change.

Regions with a concentration of companies responsible for upstream production of at-risk commodities may encounter greater policy and legal challenges as foreign regulators and importers restrict market access for emission-intensive or deforestation-linked products. Regions with a higher concentration of downstream processors are less directly exposed to the carbon consequences of production and may instead encounter significant reputational risks when valuable brand assets are associated with unsustainable suppliers and regulators increasingly adopt mandatory disclosures of Scope 3 value chain emissions, which encompass the full range of emissions from supply chain to end-use activities.

Below is a summary of key climate transitions by region, primarily driven by the emission intensity of top commodities and the actions of investors, supply chains, regulators, consumers and civil society.

REGIONAL FLAG SECTOR COMMODITIES MOST AT RISK OF CLIMATE TRANSITIONS

Sub-Saharan Africa



High exposure to deforestation-prone commodities coupled with preexisting infrastructure issues leaves FLAG sectors open to significant climate-related transition risks. A growing consumer preference for sustainable and ethnically sourced products challenges traditional practices in the coffee industry. Meanwhile, deforestation-reduction schemes threaten the expansion of cocoa and rubber plantations, and foreign regulatory restrictions may limit unsustainable producers' access to high-income markets.[25] Infrastructure challenges around internet access, electricity and road quality can also slow the adoption of sustainable practices and emerging AgTech.

Commodities most at risk

- **Coffee**
- **Cocoa**
- **Rubber**
- **Cotton**

Middle East and North Africa



Increased risk from physical climate events may result in more aggressive responses from government organizations aiming to stem further loss of arable land. These efforts may involve reduced water access, mandated adoption of more sustainable agricultural practices and challenges expanding olive oil and date plantations. Access to affordable credit may pose additional obstacles to the use of more sustainable AgTech.

Commodities most at risk

- **Cereals**
- **Citrus fruits**
- **Seed oils**
- **Dates**

Central America and the Caribbean



Reliance on traditional farming methods for coffee, sugarcane and cocoa production threatens market access. As traders and international retailers work to reduce their reliance on suppliers associated with deforestation, farmers practicing traditional slash-and-burn agriculture may risk damaging their reputation with downstream consumers. The government adoption of deforestation reduction schemes and growing interest in carbon and biodiversity credits may offer opportunities to diversify and de-risk revenue streams.

Commodities most at risk

- **Coffee**
- **Sugarcane**
- **Cocoa**
- **Pineapples**

REGIONAL FLAG SECTOR COMMODITIES MOST AT RISK OF CLIMATE TRANSITIONS CONTINUED

South America



South America is highly exposed to deforestation-linked commodities. The region is the world's leading producer of cattle and soybeans, both notoriously involved in the deforestation of large swaths of the Amazon and Cerrado. Traders sourcing from deforestation-linked producers have lost contracts and been subject to public scrutiny and reputational losses once exposed. Financing efforts from local credit unions and Brazilian banks have supported government targets of increasing sustainable agricultural practices and the adoption of supply chain traceability and monitoring.

Commodities most at risk

- **Soybean**
- **Beef**
- **Coffee**
- **Maize**

North America

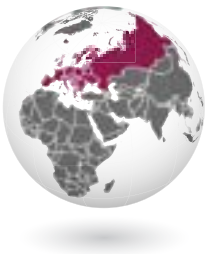


North America faces transition risks throughout FLAG value chains. Upstream producers lead the world in the production of corn, soybean and livestock. However, calls from global asset managers to add sustainability criteria to subsidies threaten a paradigm change for business models reliant on historical government price controls. A thriving AgTech research environment creates major opportunities for competitive advantage through growing efficiency. Finally, downstream retailers are exposed to reputational risk as shifting consumer preferences subject unsustainable actors to intense media scrutiny.

Commodities most at risk

- **Maize**
- **Soybean**
- **Cereals**
- **Livestock**

Europe



Europe's FLAG sector climate transitions materialize primarily in end-stage processing. Specialized chocolate, dairy and seed oil companies are not directly responsible for high emissions activities, instead offshoring production. For these downstream companies, shifting consumer preferences for sustainable and ethically sourced products, in addition to growing regulatory restrictions, represent the most significant transition challenges, as they pressure market leaders to enact policy changes.

Commodities most at risk

- **Chocolate products**
- **Dairy products**
- **Seed oils**

South and Central Asia



South and Central Asia lead the world in rice cultivation—a process responsible for significant methane emissions. The production of sugarcane often involves crop burning to remove biomass and reduce harvest time. Downstream processors of seed oils like palm oil, face additional risks as multinational retailers and distributers move to cut contracts and terminate supplier relationships with those sourcing from producers responsible for deforestation.

Commodities most at risk

- **Rice**
- **Cotton**
- **Tea**
- **Sugarcane**

East/Southeast Asia and Oceania



Leading businesses and investors exposed to deforestation-linked commodities such as palm oil, rubber and coffee have faced intense public scrutiny and reputational damage over publicized deforestation events, while the adoption of deforestation-centric trade regulations have reduced market access to traders and companies unwilling or unable to adopt more sustainable practices.

Commodities most at risk

- **Seed oils**
- **Rubber**
- **Coffee**
- **Tea**

Source: U.S. Environmental Protection Agency (EPA), Resources for the Future, Food and Agriculture Organization of the United Nations (FAO), Farrley Mitchell, World Bank.



Chapter 1

Legal & Policy Trends

Governments around the globe are increasingly recognizing the materiality of climate change impacts. From catastrophic physical risk events to the challenges that come with making the transition to low-carbon economies, regulators and policymakers are beginning to move the needle in an effort to make up for lost time. Three legal and policy trends have emerged to shape the future of FLAG sectors.

1. Increased uptake of climate-related financial disclosure requirements will force FLAG sector companies and investors operating in relevant markets to publicly disclose material financial impacts from climate change. These disclosures are increasingly informing investor decision-making and driving efforts to account for global warming potential.

Above, Brazil's National Congress.

2. The growing adoption of supply chain due diligence requirements will force FLAG sector companies and investors operating in relevant markets to certify the sustainability of their raw materials and commodities. Extensive monitoring and tracing will be required to ensure products have not been exposed to deforestation or other environmental degradation.

3. Increasing government targets have committed FLAG sector companies and investors, in addition to a significant portion of the global economy, to a net zero emissions transition. Reaching both national and global emissions goals will require incentivizing the adoption of more sustainable practices while discouraging emission-intensive production through carbon taxes, market restrictions and fines for environmental degradation.

Increased uptake of climate-related financial disclosure requirements will force FLAG sector companies and investors operating in relevant markets to publicly disclose material financial impacts from climate change.



Legal & Policy Transition Risks



Loss of subsidies

FLAG sector companies, involved with emission-intensive commodities like rice and dairy, risk the loss of government subsidies and price stabilization as climate-conscious regulators work to incentivize climate transitions and reduce support for emission-intensive production.



Sanctions or penalties

The growing adoption of climate-related regulations such as climate-related financial disclosures, supply chain due diligence requirements and carbon boarder adjustment mechanisms subject FLAG sector companies that fail to comply to legal penalties, regulatory sanctions and the potential revocation of market access.



Supply chain monitoring

FLAG sector companies exposed to deforestation-prone commodities, such as beef, soy, palm oil, rubber, coffee, cocoa and timber, will encounter an increase in costs to implement adequate supply chain monitoring and raw material tracing. The failure to implement these practices may increase the risk of divestment, shareholder engagement efforts and consumer backlash, as mandated reporting of land use change practices exposes unsustainable businesses.



Supply chain constraints

Supply chain disruptions are anticipated as downstream companies are forced to exclude unsustainable FLAG sector suppliers in accordance with relevant market regulations, thus constraining the supply of FLAG sector products in the markets of climate leaders.



Regulatory responses

Delay in reaching nationally determined contributions (NDCs) and other climate goals will result in rash and disorderly regulatory responses, threatening FLAG sector companies prone to high greenhouse gas emissions with abrupt and penalizing mitigation efforts as policymakers attempt to make up for lost time.



Limited expansion

Government efforts to halt deforestation and nature loss may limit or reduce the potential for land expansion to grow business practices. Clearing natural vegetation for new land could incur significant financial penalties; combined with land reclamation for nature restoration, this could rapidly increase the cost of land itself.

Legal & Policy Transition Opportunities

Streamlined implementation

Proactive adoption of climate-related financial disclosures offers FLAG sector companies and investors a strategic advantage. By integrating these disclosures early, companies can reduce implementation costs, refine processes and address key risks before mandatory regulations take effect, positioning themselves as sustainability leaders and potentially lowering future compliance costs.

Access to public funding

Government-backed funding and loans for sustainable practices can reduce financial barriers for FLAG sector companies focusing on low-emission production. Public funding initiatives can make capital more accessible and affordable, encouraging investment in sustainable innovations and helping companies meet evolving regulatory standards.

Market differentiation

FLAG sector companies that adopt more sustainable practices and integrate robust supply chain due diligence can earn a competitive advantage against their peers. By implementing comprehensive commodity tracing and monitoring systems prior to regulatory mandates, companies can enhance their market differentiation, attracting environmentally conscious consumers and commanding price premiums for sustainable products



European Union headquarters in Brussels, Belgium.

Climate-related financial disclosure requirements inform investment decisions

Trend 1.1

Transition Risk Factors:

- **Emission-intensive supply chains**
- **High deforestation risk commodities**
- **Lack of greenhouse gas emission monitoring**
- **Omitting climate change from enterprise risk management**

Globally, countries and regions are racing to adopt mandated climate-related financial disclosures, including greenhouse gas emissions and material climate risks. The Task Force on Climate-Related Financial Disclosures (TCFD) is the basis for many climate-related financial disclosures adopted today. First published in 2015, the TCFD incorporated transition and physical risk disclosures to inform more efficient capital allocation, strategic planning and risk assessment in the face of an uncertain future. By the end of 2023, 4,486 companies with a combined market capitalization of USD 29.5 trillion and over USD 222 trillion in assets under management had adopted the framework, signifying the materiality of climate risk.[26, 27] In response to investor support for clear, decision-useful, climate-centric financial information, governing bodies from the European Union, United States, Brazil, Switzerland, Canada, New Zealand, Hong Kong Stock Exchange and the Singapore Stock Exchange are among the 35 regions and nations that have adopted laws mandating climate-related financial disclosures.[28]

Reporting mandates such as the US Securities and Exchange Commission financial disclosures rule, the EU Corporate Sustainability Reporting Directive (CSRD) and the Singapore Stock Exchange Sustainability mandate require that companies disclose material climate-related risks, based on criteria such as number of employees, balance sheet size and annual turnover. Each mandate incorporates a specific disclosure framework that identifies information that must be reported and clarifies materiality thresholds.

Companies and financial institutions mandated to report their climate-related financial risks vary by policy, but this group is growing rapidly. Nearly 40 percent of the world's GDP is estimated to be required to disclose the materiality of climate change by 2030.[29] The EU is expected to provide guidance specific to FLAG sector companies by early 2025, incorporating many elements from the Greenhouse Gas Protocol's Land Sector and Removals Guidance.[30] Extensive monitoring, reporting and verification of AFOLU activities is expected to be included, ensuring a more comprehensive accounting of all relevant greenhouse gas emissions. This will subject deforestation-prone commodities, such as rubber, palm oil, cattle, soy, coffee, cocoa and timber, to increased scrutiny.[31]

23,000

companies worth USD 67 trillion reported climate-related financial disclosures through CDP in 2023.[33]

1,600+

European businesses representing 89 percent of the continent's market capitalization disclosed their progress towards climate targets through CDP in 2023.[34]

50,000

companies will be required to report under the EU CSRD annually from 2024 onwards.[35, 36]

GLOBAL REGULATORS RACE TO ADOPT CLIMATE-RELATED FINANCIAL DISCLOSURES[vii]

North America

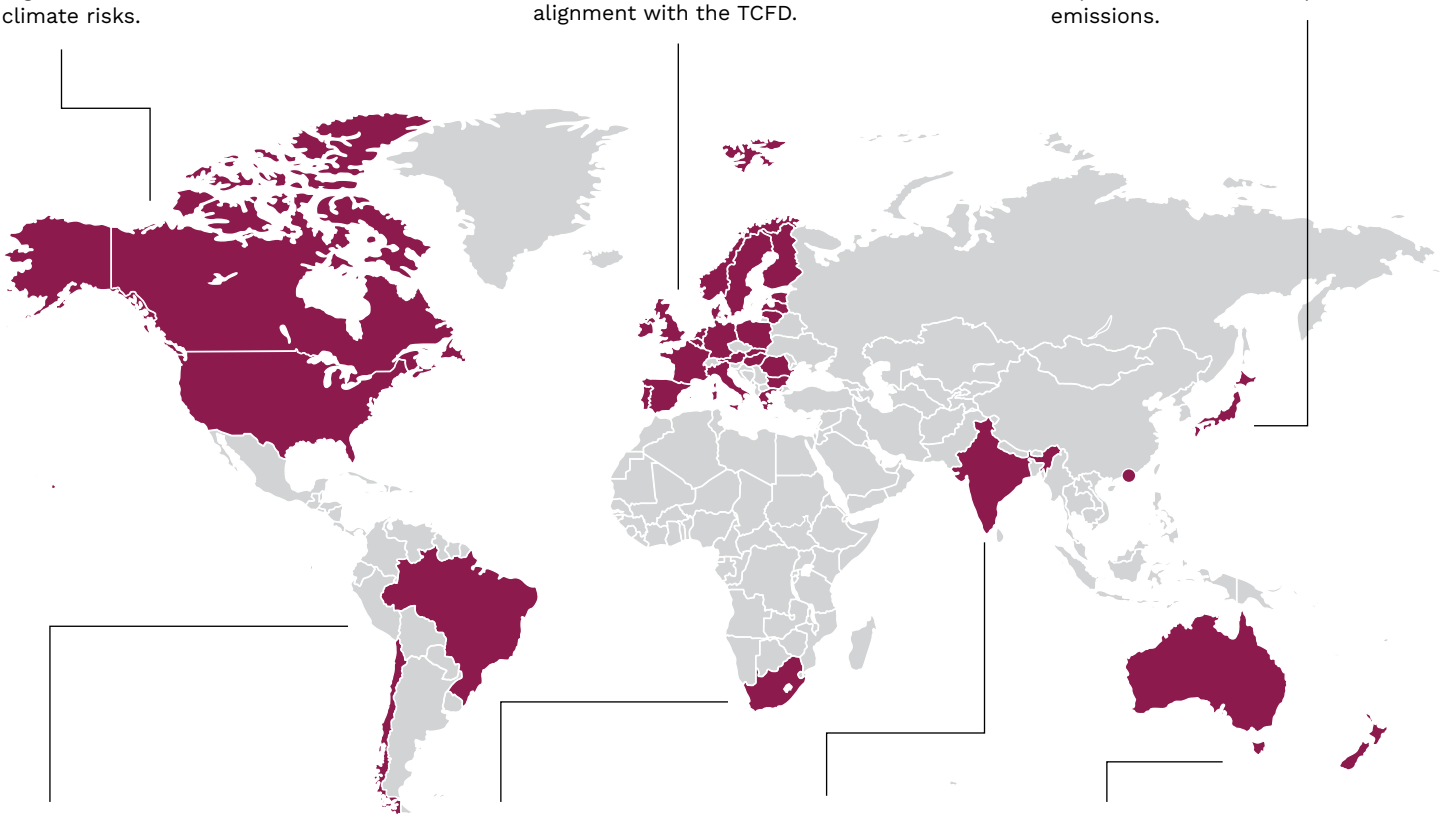
The US has adopted a national climate-related financial disclosure rule, which is supplemented by additional proposed or implemented reporting requirements in multiple states, including New York, Washington, Illinois and California. Canada requires that federally regulated financial institutions disclose climate risks.

Europe

The EU requires large and listed companies and those doing substantial business in the EU to report and audit information related to sustainability risks and impacts. The UK requires large companies, those with more than 500 employees or an annual turnover greater than GBP 500 million, to disclose information in alignment with the TCFD.

East Asia

Companies that submit annual securities reports in Japan must meet disclosure requirements in alignment with the TCFD. In Hong Kong, all issuers on the Stock Exchange will be required to disclose Scope 1 and 2 emissions while large cap issuers will be required to disclose Scope 3 emissions.



South America

The central bank requires banks in Brazil to disclose climate-related data aligned with the TCFD. In Chile, large companies and eventually all companies overseen by the Financial Market Commission will need to report Environmental Social Governance (ESG) practices in financial reports.

Africa

Regulators in South Africa are considering requirements that mandate the inclusion of material climate risk disclosures in financial reporting.

South Asia

The top 1,000 publicly listed companies in India, based on market capitalization, must disclose data on emissions and supply chains.

Oceania

Australia's Senate passed legislation that requires large companies and asset owners to begin reporting climate risks starting in 2025 with a phased-in approach for Scope 3 reporting. New Zealand's disclosure rule requires large, publicly traded companies, insurers and banks with more than NZD 1 billion in assets to report on climate change risks.

Source: Orbitas

[vii] See the Orbitas Climate-Related Financial Regulation Explorer for more information and to stay up to date: https://orbitas.finance/climate-related-regulations-map/

CLIMATE-RELATED FINANCIAL DISCLOSURE REPORTING FRAMEWORKS[vii]

Task Force on Financial Disclosures (TCFD)

Coverage: Voluntary adoption

Scope: Climate-related risks, opportunities, financial impacts and scenario analyses

Materiality: Single materiality—public companies' legal obligation to disclose any information that could be financially material

---

Carbon Disclosure Project (CDP)

Coverage: Voluntary adoption; reporter level

Scope: Climate change, water security, forest health

Building Blocks: TCFD, ISSB, GHG protocol

Materiality: Impact materiality—aspects that reflect the reporter's environmental impact, particularly carbon emissions, water usage and deforestation

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Global Reporting Initiative (GRI)

Coverage: Voluntary adoption; company level

Scope: Economic, environmental, and social

Materiality: Impact materiality—aspects that reflect the company's economic, environmental and social impacts or influence stakeholder decisions

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International Sustainability Standards Board (ISSB)

Coverage: Standards subject to national jurisdiction adoption

Scope: General sustainability and climate

Building Blocks: TCFD, SASB, CDSB

Materiality: Single materiality—impacts on the company that could be reasonably expected to influence financial decisions

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European Sustainability Reporting Standards (ESRS)[viv]

Coverage: Mandatory standards for large EU companies and listed SMEs

Scope: Environmental, social, and governance (ESG)

Building Blocks: TCFD, GRI, CDP

Materiality: Double materiality—company impact on people and the environment; the financial effects of climate change on the company over short-, medium- and long-term time horizons

Source: IFRS, EU Finance Commission, CDP, TCFD, GRI.

[viii] Note: European Sustainability Reporting Standards (ESRS), International Sustainability Standards Board (ISSB), Global Reporting Initiative (GRI), Carbon Disclosure Project (CDP), Task Force on Climate-Related Financial Disclosures (TCFD).

[viv] Note: Companies report through the ESRS framework to fulfill CSRD requirements.

Supply chain due diligence requirements limit market access

Trend 1.2

Transition Risk Factors:

- **Emission-intensive supply chains**
- **High deforestation risk commodities**
- **Human rights violations**

Policymakers are increasingly accounting for climate-related risks along international supply chains. The European Union and the United Kingdom have passed a series of laws restricting the import of certain commodities exposed to deforestation—actions responsible for about 11 percent of global greenhouse gas emissions.[37] Exporters of several FLAG commodities (beef, palm oil, coffee, cocoa, soy, wood and rubber) will be required to carry out rigorous analyses of their supply chains to certify that their products destined for the EU and UK markets are not exposed to illegal deforestation and degradation.[38, 39, 40] Failure to verify export integrity and blatant violation of requirements will risk fines, confiscation of revenue and product, and potential exclusion from UK and EU markets.

Carbon border adjustment mechanisms (CBAMS) have also been passed in the EU and Canada, assigning an additional tariff on imports of carbon-intensive industrial goods like fertilizer, cement, aluminum and others.[41] These regulations aim to prevent carbon leakage by leveling the playing field between domestic producers subject to more restrictive carbon policies and foreign producers exempt from related expenses. As more markets consider and adopt these due diligence policies, market access will increasingly be restricted to producers of deforestation-free commodities and lower-emission goods.

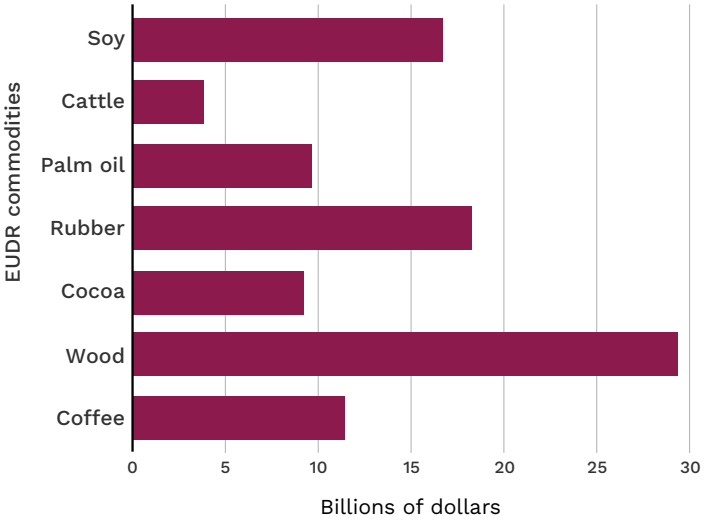


COMMODITY TRADE FLOWS TARGETED UNDER THE EUROPEAN UNION DEFORESTATION REGULATION.

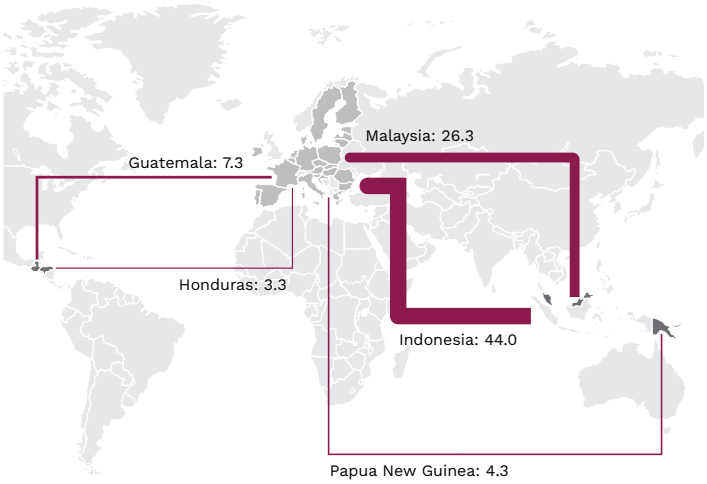
The countries below represent the leading country of origin for various commodity imports

Commodity trade flow | Exporting country in top 10 deforestation list | Exporting country | European Union

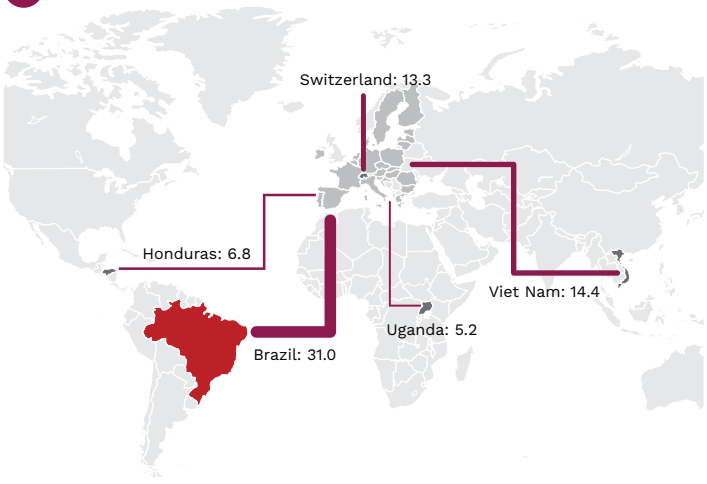
Import value of EUDR commodities ($, billions)



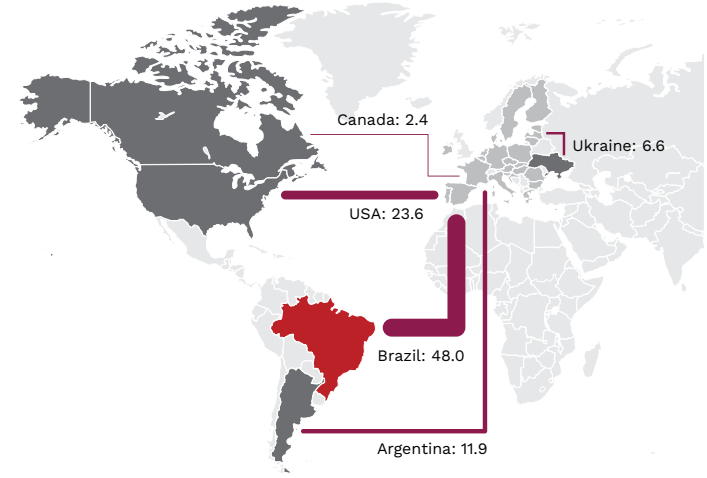
Palm oil leaders (%)



Coffee leaders (%)



Soy leaders (%)

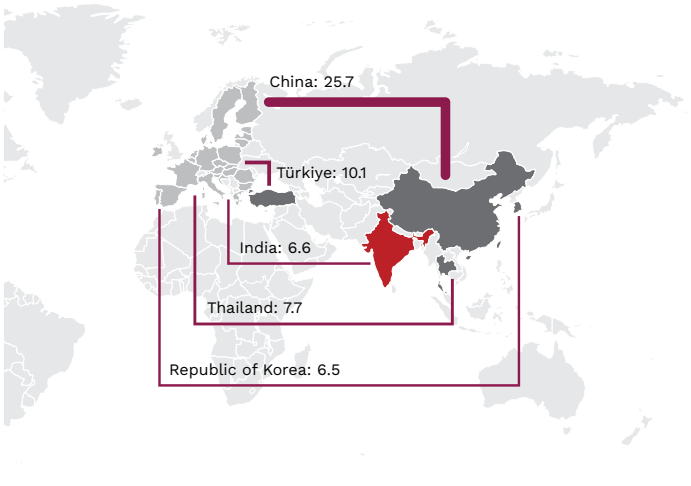


Countries with the highest deforestation-risk based on average deforestation per year (2015-2020)
ha/year

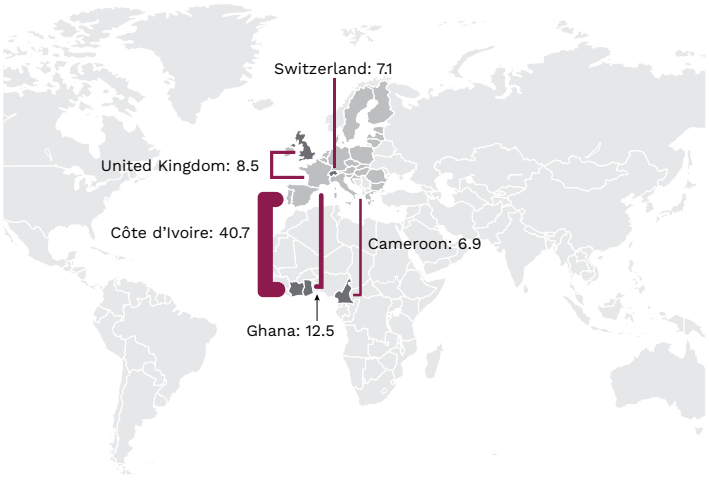
		Leading export to EU
Brazil	1.7M	Soy
India	668,400	Rubber
Indonesia	650,000	Palm Oil
U.R. of Tanzania	474,000	Coffee
Myanmar	293,920	Wood
Paraguay	279,340	Soy
Mozambique	267,030	Wood
Sudan	264,000	Rubber
Bolivia	242,540	Wood
Colombia	199,230	Coffee

Source: Global Forest Watch (GFW),[42] United Nations Comtrade Database (UN COMTRADE),[43] Food and Agriculture Organization (FAO)[44]

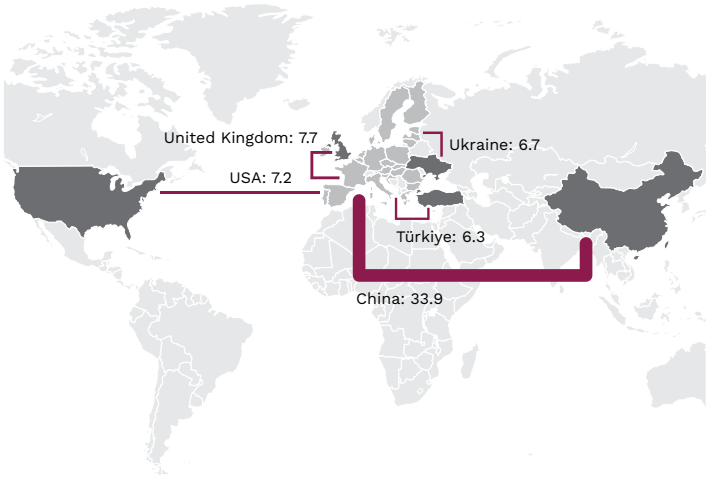
Rubber leaders (%)



Cocoa leaders (%)



Wood leaders (%)



Cattle leaders (%)



Government commitments accelerate climate incentives and regulations

Trend 1.3

Transition Risk Factors:

- **Emission-intensive supply chains**
- **Lack of greenhouse gas emission monitoring**
- **High deforestation risk commodities**
- **Omitting climate change from enterprise risk management**

Public pressure to mitigate the impacts of climate change has spurred increasingly aggressive government commitments to reduce GHG emissions. Since the signing of the 2015 Paris Climate agreement, which bound signatory countries to voluntary emission reductions, national governments have collectively pledged 92 percent of the global economy to a net zero emissions target.[45, 46, 47] Initial landmark legislation from the EU and UK established national targets aiming to achieve net zero emissions by 2050, a timeline that has since been adopted by the US, Canada, Japan, South Korea and Brazil.[48] China's dual carbon goals propose a more conservative taper with a 2030 peak emissions year and carbon neutrality in 2060.[49] Despite similar timelines, legislative strategies differ on specific sectoral targets.

FLAG sector commitments range from specific reductions in UK farm-related emissions of 64 percent by 2050 relative to 2017 to a planned increase of 6 billion cubic meters of China's forest stock by 2030 relative to 2007 to financial support for soil carbon management practices in the EU that aim to sequester 42 megatons of CO_2e per year by 2030.[50, 51, 52, 53] Denmark has recently successfully passed an annual per cow emissions tax starting at USD 43 per 1.1 ton of CO_2e in 2030 and rising to USD 107 by 2035, the proceeds of which will be used to support the agriculture sector's green transition.[54] Broad targets and commitments extend beyond national borders with cities and states around the world (e.g. New York City and California in the United States), incorporating emission reduction efforts into local legislative efforts.[55, 56]



Global Methane Pledge

158 countries, representing 50% of global anthropogenic methane emissions, have pledged to voluntarily reduce global methane emissions by at least 30% from 2020 levels by 2030.[57]



World Zero Deforestation Commitment

Over 140 countries representing more than 85% of the world's forests have committed to ending and reversing deforestation by 2030, committing USD 19 billion between public, private and charitable funds.[58]



World Net Zero Emissions Commitment

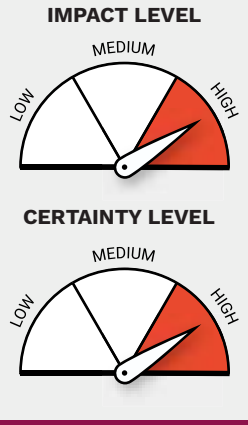
150 countries representing 88% of global CO_2e emissions, 92% of global GDP and 89% of global population have made net zero commitments.[59]

CASE STUDY: EU DEFORESTATION REGULATION (EUDR)

SECTOR
Beef, cocoa, coffee, palm oil, rubber, soy, timber

LOCATION
European Union

Under this regulation, operators and traders importing to or exporting from the EU market will have to prove that their products are free of both legal and illegal deforestation. If upstream suppliers refuse to adhere to policies implemented by their buyers, they risk suspension of trade, exposing firms to market access risks and more.



INCOME STATEMENT IMPACTS

Sales Revenue

Soft commodity producers with deforestation in their supply chains will lose access to the EU market.

RISK → Those who lose market access will see **decreased sales and revenue**.

OPPORTUNITY → Firms without deforestation in their supply chains can **increase sales revenue** due to increased market access and demand.

SG&A

Soft commodity producers may face regulatory penalties, fines and/or legal action.

RISK → These result in **increased SG&A expenses**.

BALANCE SHEET IMPACTS

Goodwil

Attention on compliance is increasing.

RISK → Laggards can suffer reputational damage and **loss of customer loyalty**.

OPPORTUNITY → First-movers can build a reputation as an environmental good actor and **improve customer opinion and retention**.

Write-downs and Impairment

Business practices and trade policy are changing in response to a warming climate.

RISK → At-risk assets can **lose their value** as a result of changes in business practices and government policy.

Weighted Cost of Capital (WACC)

Lenders and investors increasingly require compliance with environmental and social standards and laws.

RISK → Laggards may face **higher financing costs** and increased liabilities.

OPPORTUNITY → Leaders may find **fewer barriers to capital** as a result of responsible actions.

Source: European Commission — EU Green Deal



Chapter 2

Technology Transition Trends

Driven by innovative improvements in sustainability and efficiency, FLAG sectors are undergoing rapid transformation globally. Investments in climate-smart solutions and growing access to advanced agricultural technologies are helping producers meet the challenges of climate change while unlocking new opportunities for growth. Three technology trends have emerged to shape the future of FLAG sectors.

1. Public and private investment in research and development (R&D) is accelerating the creation of new agricultural practices and technologies designed to enhance resilience in the face of climate change. From improving drought-resistant varieties for staple crops such as rice and wheat to developing soil health restoration techniques, innovations are enabling climate mitigation while also improving productivity.

Above, a sustainable, regenerative rice farm in Guangzhou (China Agricultural University; WRI China).



2. The rapid development of agricultural technology (AgTech) is transforming FLAG sectors, driving efficiency improvements and aggressive adopters. Solutions such as precision agriculture, farm automation and improved farm analytics allow farmers to optimize their operations, reduce waste and lower their carbon footprint.

3. Emerging solutions aimed at reducing livestock methane emissions are providing FLAG sector companies and their investors with new opportunities to avoid carbon tax policies and other emissions-related compliance costs. Innovations such as methane reducing feed additives for cattle, improved management practices and selective breeding for lower-emissions animals are offering early adopters the opportunity to improve their brand image through improved sustainability measures.

Technology Transition Risks



High costs of adopting new technologies

Transitioning to more sustainable agricultural technologies often necessitates substantial upfront capital investment. FLAG sector companies that already operate on thin margins may face difficulties in adopting new technologies and further delay the transition to more sustainable practices, causing them to lose market share.



Loss of access to international markets

FLAG sector companies that decline to adopt more sustainable agricultural technologies may risk losing competitive advantage to their peers. As markets begin to restrict more deforestation-linked geographic expansion through tracing and monitoring, unsustainable suppliers will risk losing access to international markets and associated revenue.



Technical challenges implementing new technologies

Increasing technical complexity from newly developed agricultural technologies or more sustainable practices may raise the bar for implementation, requiring access to expertise that is not universally available to FLAG sector suppliers. Regions with poor infrastructure and supply chains dependent on decentralized smallholders, such as cocoa and rubber, may face challenges reducing on-farm emissions, thus losing customers and increasing emissions costs.



Decreased demand from consumers

Introduced through research and development, substitute FLAG products with lower emission intensity, such as dairy and meat alternatives, may disrupt traditional commodity markets, siphoning off demand from consumers interested in low-carbon products.

Technology Transition Opportunities

Increased productivity

Early adoption of climate-smart agriculture (CSA) practices allows FLAG sector companies to establish themselves as sustainability leaders, potentially gaining a competitive advantage. By integrating CSA practices early, these companies can benefit from long-term productivity enhancements, reduced emissions and lower operating costs, positioning themselves favorably against peers.

Efficiency gains

Publicly funded AgTech advancements offer significant scale and cost reductions for private sector companies and investors. By leveraging these innovations, FLAG sector companies can achieve efficiency gains and reduce expenses, providing a financial incentive for the early adoption of new AgTech solutions.

Access to financing

Investors have the opportunity to provide upfront financing for developing AgTech solutions, supporting FLAG sectors. This financial backing can help companies overcome initial cost barriers, enabling them to implement cutting-edge technologies that enhance sustainability and maintain business relationships with environmentally conscious stakeholders.



Investment in research and development drives advancements in climate-smart agriculture

Trend 2.1

Transition Risk Factors:

- **Emission-intensive supply chains**
- **Substitute products**
- **Slow adoption of climate solutions**

In recent years, funding for CSA-related R&D has surged, reflecting the critical role of FLAG sectors in combating climate change. Government investment has led the way with programs from the United States Department of Agriculture (USDA) investing USD 23.1 billion from 2022 through 2027 to provide technical and financial assistance to pilot innovative CSA practices across 20–25 million acres of working lands. The USDA dedicated an additional USD 80 million in annual research grants to innovation hubs responsible for advancements in CRISPR-based genomic editing for drought-resistant crop varieties, biologic-based pest management practices and greenhouse gas monitoring technology across leading institutions, including the University of California, Cornell University and the University of Wisconsin Madison.[60, 61, 62, 63] Similar efforts from the EU's Horizon Europe Program and the Indian Agricultural Research Institute have developed innovative livestock feed additives and non-flooding rice varieties. Brazil's ABC+ program, an agricultural policy building on the success of the original ABC program (2010–2020), will support pilot mitigation projects across 40 million hectares by 2030, aiming to reduce 162 million tons of FLAG-related CO_2e.[64, 65, 66]

Private foundations and international organizations have also directed significant funds toward the establishment of dedicated research centers. In 2024, Imperial College and North Carolina State University opened alternative protein innovation centers following a USD 30+ million investment from the Bezos Earth Fund. Additionally, the Bill & Melinda Gates Foundation has committed USD 1.4 billion to help meet the climate adaptation needs of smallholder farmers by funding research centers at Wageningen University, the University of Sydney and the University of Sao Paulo.[67, 68, 69]

Examples of leading agricultural research centers.

MIT: MIT Media Lab's Open Agriculture Initiative has refined vertical farming technologies, such as "food computers" responsible for climate-controlled environments that can be adjusted to optimize plant growth.

Harvard: The Broad Institute has been at the forefront of CRISPR research. Developing applications for CRISPR in various crops, improving resilience to climate change and increasing productivity.

John Innes Centre: The John Innes Centre has made significant strides in developing nitrogen-efficient crops, utilizing genetic engineering to improve the use efficiency of cereals such as wheat and barley.

The International Rice Research Institute: The International Rice Research Institute in the Philippines has developed climate-resilient rice varieties more resistant to flooding and drought.

The Indian Agricultural Research Institute: The Indian Agricultural Research Institute has developed a range of smart fertilizer technologies that improve crop nitrogen uptake efficiency through the slow and controlled release of biological-based fertilizers.

The International Livestock Research Institute: The International Livestock Research Institute of Kenya has pioneered research in breeding climate-resilient livestock. The institute is focused particularly on producing cattle, goats and sheep that are better suited to the changing climate of Sub-Saharan Africa.

The Brazilian Agricultural Research Corporation: The Brazilian Agricultural Research Corporation (Embrapa) has led the development of agroforestry practices and promoted smallholder use of integrated crop–livestock–forestry Systems (iCLF), silvopastoral systems and other agroforestry strategies.

Source: Massachusetts Institute of Technology (MIT), Harvard, John Innes Centre, International Rice Research Institute (IRRI), Indian Agricultural Research Institute (IARI), International Livestock Research Institute (ILRI), Brazilian Agricultural Research Corporation (Embrapa).

EXAMPLES OF GOVERNMENT AND NGO FUNDING FOR CSA R&D.

The World Bank

Following the adoption of the Paris Agreement, the World Bank has significantly expanded its financing for CSA, boosting annual funding nearly eightfold to almost USD 3 billion by 2024.[70]

The United States

The Inflation Reduction Act provides USD 19.5 billion for the implementation of climate-smart practices between 2023 and 2027.[71]

The European Union and Switzerland

The European Union and Switzerland invested EUR 207 (~USD 220) million in CSA in 2023.

Agriculture Innovation Mission for Climate (AIM4C)

Launched by the United States and the United Arab Emirates in November 2021, AIM4C aims to boost investment and support for CSA and food systems innovation and increased investments to over USD 8 billion globally by 2023.[72]

Australia

The Australian Government established the AUD 302 (~USD 200) million CSA program over five years.[73]

African Development Bank Group

In 2023, the African Development Fund approved USD 20 million for Mozambique to promote private sector development and attract investment in CSA.[74]

Source: World Bank Group, United States Department of Agriculture (USDA), The Environment, U.S. Department of State, The Asian Foundation, African Development Bank Group and the Australian Government Department of Agriculture, Fisheries and Forestry.

Rapidly developing AgTech solutions to create market leaders through sustainable efficiency

Trend 2.2

Transition Risk Factors:

- **Emission-intensive supply chains**
- **Slow adoption of climate solutions**
- **Lack of access to sustainability-linked financing**
- **Focus on expansion rather than efficiency**
- **High deforestation risk commodities**

Improvements in crop management through changes to on-farm software, greater resource use efficiency through targeted application, and emerging emissions monitoring tools are attracting strong interest in available markets, improving the sustainability of high-emission AFOLU activities and reducing environmental degradation.[75, 76] While adoption differs across farm size, location and technology, 81 percent of large farms and 76 percent of medium farms surveyed in 2022 use or plan to utilize at least one type of these technologies in the next two years.[77]



Agriculture technology adoption survey.[x]

	Precision AgTech adoption	Yield Monitoring and mapping	Variable rate fertilizer application	Spray control	In-field soil Sensors
Global	18%	69%	67%	67%	45%
North America	28%	76%	76%	70%	37%
South America	27%	79%	79%	77%	56%
Europe	21%	40%	40%	53%	47%
Asia	4%	42%	42%	44%	47%

Source: McKinsey and Company

[x] Note: Asia includes China and India; Europe includes Germany, France, Netherlands and Spain; North America includes Canada and the United States; South America includes Argentina and Brazil.

Reducing the amount of greenhouse gas emissions associated with enteric fermentation, soil maintenance and land use change is not necessarily the sole priority of each product. However, solutions are designed to improve overall sector efficiency, reduce resource use and improve yields—steps that inadvertently reduce the need for geographic expansion, the largest AFOLU emission-contributing activity. A combination of innovations in precision agriculture, farm automation and robotics, and crop and microbial genetics is estimated to reduce 71 percent of the greenhouse gas emissions associated with row crops, responsible for 5 percent of CO_2e emissions between the United States and Europe.[78]

DEVELOPING AGTECH SOLUTIONS FOR FLAG SECTORS



Farm Management Software: Efficient farm management software streamlines routine crop maintenance tasks, improving nutrient application and resource allocation through extensive data collection and management. Adopters benefit from informed decision-making and improved productivity.



Smart Fertilizers: Advancements in smart fertilizers have significantly reduced the environmental degradation associated with typical nitrogen-based fertilizers, minimizing the nitrogen emissions caused by nutrient runoff by leveraging slow/controlled release coatings and bio-enhancers.[79, 80]



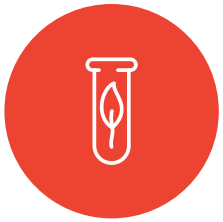
Precision agriculture hardware: Precision farming techniques leverage real-time data and sensor technology to monitor crop health and soil fertility. This enables FLAG sector producers to make informed decisions and optimize agricultural inputs, ultimately enhancing their overall yield, crop health and growth rates through increased efficiency. Additionally, the integration of satellite-based geospatial technologies enables more efficient land management and reduces land degradation.



Remote sensing technologies: Internet of Things (IoT) sensors and software allow for the real-time monitoring of soil conditions, providing farmers with precise soil moisture and nutrient data, optimizing irrigation and conserving fertilizer.[81]



Farm Automation and Robotics: The integration of farm automation and robotics offers significant efficiency improvements, reducing labor costs and enhancing productivity for FLAG sector producers. Thus far, early use of automation and robotics has manifested in aerial drones for input spraying, field monitoring and management. Terrestrial drones are being evaluated for their ability to automate weeding, planting and harvesting operations.



Seed Selection: Genetic manipulation and breeding have enabled researchers to select specific traits across a range of commodities. Varieties with higher draught resilience, heat tolerance, yield improvements and other genetic mutations have allowed FLAG sector companies to source raw materials and commodities from new regions, reducing risks commonly associated with a more centralized supply chain.

Sources: National Academies, Purdue University, WEF, IBM & Science, Orbitas

Emerging solutions for reducing livestock methane emissions introduce financial opportunities

Trend 2.3

Transition Risk Factors:

- **Emission-intensive supply chains**
- **Slow adoption of climate solutions**
- **Lack of access to sustainability-linked financing**
- **Focus on expansion rather than efficiency**
- **High deforestation risk commodities**

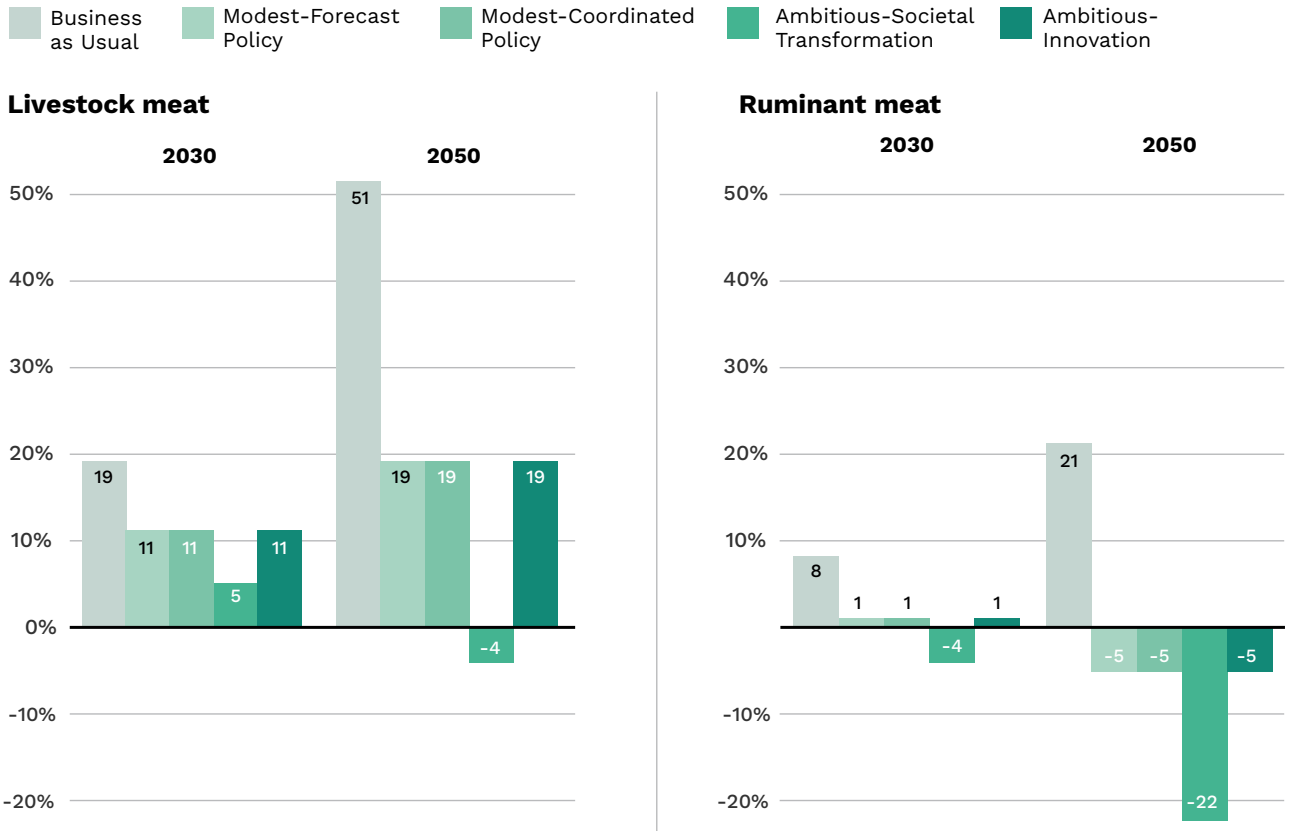
Already responsible for 49 percent of agriculture-related greenhouse gas emissions, beef consumption is expected to increase by 64 percent between 2013 and 2050 if consumer demand and technology changes associated with climate transitions do not materialize.[82] However, even in a world that limits global temperature rise to below 2° C above pre-industrialized levels, the sector's high emissions from land use change and enteric fermentation could risk production decreases of 25 percent by 2050 in Brazil.[83] While climate transitions are projected to impact consumer demand across livestock sectors, the ruminant meat sector is likely to experience the most significant impacts. As a result, research is increasingly directed towards exploring strategies to reduce associated methane emissions, which are responsible for 38 percent of AFOLU emissions.[84]

Feed additives such as nitrate salts, enzyme inhibiters and fat supplements have been found to cut cattle methane emissions by between 10 and 40 percent. Natural solutions such as seaweed have shown potential reductions of up to 80 percent. While cattle emit the highest fermentation-related emissions, these emerging solutions can also be used by FLAG sector companies involved with other ruminant animals, such as sheep and goats.

Substitute product developments in the form of cell-cultivated and plant-based meat alternatives have also offered consumers more sustainable options, potentially reducing overall livestock demand as adoption becomes more widespread. Other solutions have focused on diet augmentation: pasture-based rotational grazing has been encouraged in place of industrial agricultural practices that typically rely on corn-based feeds responsible for increasing the rate of enteric fermentation and the release of methane. Additional advancements in veterinary healthcare have allowed for larger, healthier cattle, increasing the meat output per animal while decreasing the total head of cattle required for levels of production.



PROJECTED PERCENTAGE CHANGE IN GLOBAL DEMAND RELATIVE TO 2020[xi]



In absolute values (MMT DM/yr)

	Business as Usual	Modest-Forecast Policy	Modest-Coordinated Policy	Ambitious-Societal Transformation	Ambitious-Innovation
2030	374	349	349	331	349
2050	475	374	374	302	374

In absolute values (MMT DM/yr)

	Business as Usual	Modest-Forecast Policy	Modest-Coordinated Policy	Ambitious-Societal Transformation	Ambitious-Innovation
2030	63	58	58	55	58
2050	70	55	55	45	45

Source: Orbitas[86, 87]

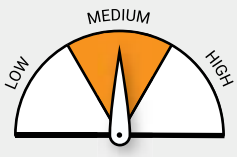
[xi] For more information on how the cattle sector can navigate climate transition risks and opportunities, see the Orbitas report "Brazil's Cattle Sector Amidst Climate Transitions" https://orbitas.finance/brazil-cattle-climate-change-financial-impacts/

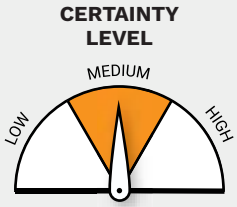
CASE STUDY: CUSTOMERS REPLACE BEEF WITH ALTERNATIVE PROTEINS

SECTOR
Beef

LOCATION
Brazil

New technologies in the production of meat and protein alternatives, including plant-based, microbial and fermented proteins, are increasing substitution risk for meat products, especially as they become cheaper to make and more affordable and desirable to customers. Emission intensive cattle producers with low-intensity, low-yield practices will be the most exposed to these substitution effect risks and will be less likely to survive demand shocks due to lack of preparedness for climate transitions.





INCOME STATEMENT IMPACTS

Sales Revenue

Beef could become less desirable to consumers.

RISK → Producers could see **lower demand and fewer units sold**, resulting in decreased revenue.

OPPORTUNITY → Those who diversify production could see **increased revenue**.

Cost of Goods Sold (COGS)

Inefficient, land intensive and high emission practices could increase production costs

RISK → Emissions pricing and rising land prices under climate transitions could result in **higher operating costs** for producers that do not adopt climate smart technologies and practices.

BALANCE SHEET IMPACTS

Write-downs and Impairment

Available technologies and consumer preferences are changing with increased awareness of climate change.

RISK → As customers substitute away from beef, **some assets could lose their value**.

OPPORTUNITY → Producers who change production patterns could avoid this and **diversify their income streams**.

Source: NCBI — Meat Substitutes: Resource Demands and environmental footprints

ORBITAS
A Climate Advisers Initiative



Chapter 3

Market Transition Trends

Globally, markets are rapidly evolving in the face of climate change. Innovative FLAG sector companies and investors are seeking opportunities to diversify their revenue and achieve sustainable differentiation through environmental commitments and practice changes. Five market trends have emerged to shape the future of the FLAG sector.

1. Emerging alternative markets for FLAG commodities are providing innovative companies and investors increased resiliency in the face of climate transitions. Offering opportunities to diversify revenues through dairy alternatives, plant-based proteins and industrial goods, flexible supply chains may better compete against traditional commodities in a market that increasingly values product sustainability.



2. Growing consumer preference for sustainable goods has proven resilient in the face of economic turbulence, with sustainable products experiencing stronger market share growth against non-sustainable products, despite price inflation in recent years. Failure to integrate comprehensive emission reductions and monitoring along FLAG supply chains may result in companies and their investors losing competitive advantages, leaving money on the table as climate leaders capture growing price premiums.

3. Downstream companies are increasingly mandating sustainability commitments from their FLAG sector supplier networks. Requirements vary from geospatial monitoring efforts to deforestation-free certification strategies to on-farm emissions accounting, all designed to mitigate the reputational risk associated with linkages to deforestation events.

4. Adoption of investor sustainability policies and conditional loans are increasingly linking capital to demonstrated improvements in sustainability and climate resilience. Both public and private funding has aided the adoption of sustainable practices in the FLAG sector, encouraging the use of CSA practices and AgTech devices, while portfolio-level ESG criteria have guided investments away from climate laggards.

5. Growing interest in voluntary carbon markets and nascent biodiversity markets will subject FLAG sector resources to increased competition as alternative land uses become more financially rewarding. The difficulties posed by physical climate change and navigating the challenges of the transitioning market and regulatory environment mean that diversifying revenue through nature-based solutions may present a more reliable future for low margin producers.

Emerging alternative markets for FLAG commodities are providing innovative companies and investors increased resiliency in the face of climate transitions.

Market Transition Risks



Heightened competition from substitute products

Companies and investors involved with traditional FLAG sector commodities such as beef and dairy will face heightened competition as consumer demand for low-emission and sustainably produced products, including dairy and meat alternatives, continues to grow.



Competition from sustainable producers

FLAG sector companies responsible for downstream value add through palm oil, soy and sugarcane processing may encounter rising commodity costs as sustainable industrial use-cases such as biofuel and bioplastics provide upstream producers with emerging opportunities to capture higher market share.



Losing access to markets

Companies and investors that fail to certify the sustainability of their suppliers and continue to make investments exposed to deforestation-prone FLAG sector commodities, including beef, leather, palm oil, soy, rubber, cocoa, timber and coffee, risk losing access to relevant markets as downstream retailers increasingly mandate compliance with strict sustainability standards.



Rising commodity costs

Growing international interest in carbon and biodiversity credits may subject FLAG sector companies to rising commodity costs, as producers of low margin commodities may receive a higher return for engaging in reforestation efforts instead of ramping up production.



Difficulty securing financing

FLAG sector companies that fail to adhere to investor sustainability preferences and criteria may find it difficult to secure affordable financing opportunities due to increased climate risk concerns. Poor sustainability scoring and a lack of certifications may restrict future business expansion and jeopardize the future health of the company.

Market Transition Opportunities

New revenue streams

Diversifying into alternative markets provides certain FLAG sector companies, such as those involved in the production of almonds, oats and sugarcane, with the opportunity to explore new revenue streams. Early entry into emerging sectors such as plant-based proteins, dairy substitutes and bio-based industrials can reduce a company's reliance on traditional, emission-intensive products and create new growth opportunities.

Growth potential

Investing in more sustainable industrial applications offers significant growth potential for FLAG sector companies involved in commodities like sugarcane. As demand for biofuels and bioplastics rises, businesses can capitalize on new market opportunities and enhance their competitive edge by aligning with sustainable practices.

New market access

Certifying the sustainability of suppliers can open new market access for FLAG sector companies dealing with deforestation risk and emission-intensive commodities. Meeting rigorous sustainability standards can attract business from environmentally conscious retailers, strengthen market position and capture price premiums.

Emerging revenue streams

Participating in carbon and biodiversity credit markets presents FLAG sector companies with additional revenue opportunities. By engaging in reforestation and conservation projects, companies can capitalize on the demand for environmental credits and enhance their sustainability credentials.



Emerging alternative markets increase substitution risk for FLAG sector products

Trend 3.1

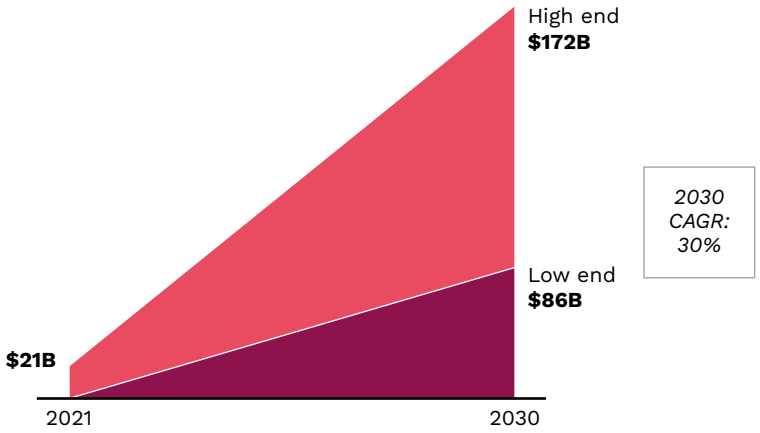
Transition Risk Factors:

- **Substitute products**
- **Emission-intensive supply chains**
- **Slow adoption of climate solutions**
- **Failure to adapt to changing consumer preferences**

Emerging substitute markets provide FLAG sector investors and companies with opportunities to diversify previously concentrated revenues. By venturing into dairy alternatives (e.g., almond milk, oat milk and soy milk), meat alternatives (e.g., plant-based proteins, cellular proteins and fermented proteins) and industrial goods (e.g., biofuels, bioplastics and textiles), downstream traders are tapping into new, lucrative markets that reduce consumer reliance on traditional commodity markets.[87, 88, 89]

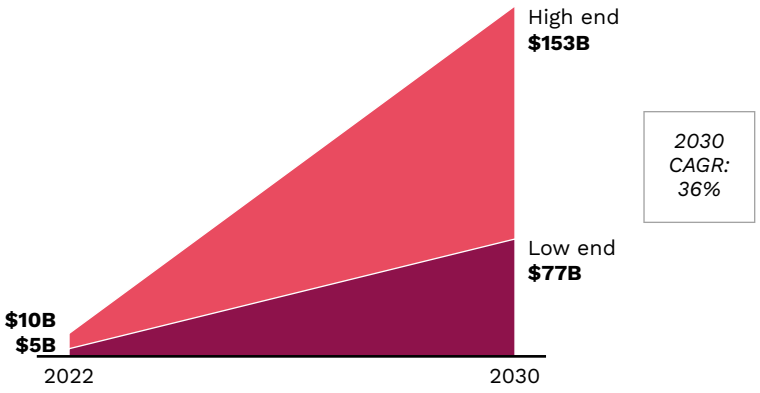
FLAG sector companies involved in high-carbon products, such as beef and other livestock, have faced increased competition from low-carbon commodities taking advantage of developments in manufacturing. Seizing growing sustainability concerns, plant-based dairy has been particularly effective at substituting itself in place of cattle-based dairy in the diets of younger consumers. 40 percent of U.S. shoppers in 2022 reported buying plant-based meat or dairy alternatives, consumer sentiment that is driving confidence in emerging dairy and meat alternative markets, estimated to grow at a CAGR of 30 percent and 36 percent, respectively, over the next decade.[90, 91, 92] Additional competition has been felt by industrial goods players, as both consumers and governments around the world have continued to research alternatives to traditional plastics, textiles and fuels.

ALTERNATIVE DAIRY AND EGGS MARKET FORECAST THROUGH 2030



Sources: Byran, Garnier & Co, Company Reports[93]

ALTERNATIVE PROTEIN MARKET FORECAST THROUGH 2030



Sources: Earnest & Young Parthenon (EYP)[94]

Growing consumer preferences for sustainable goods reward emission reduction practices

Trend 3.2

Transition Risk Factors:

- **Failure to adapt to changing consumer preferences**
- **Emission-intensive supply chains**
- **Slow adoption of climate solutions**
- **Lack of greenhouse gas emission transparency**
- **High deforestation risk commodities**

Due to their heightened environmental awareness, consumers are increasingly favoring sustainable goods over other products. This shift in consumer behavior reflects a broader societal trend towards eco-consciousness: according to a PwC survey, 85 percent of consumers now believe they experience firsthand the disruptive effects of climate change in their daily lives.[95] Seeking avenues to affect change, 46 percent have resorted to buying more sustainable products as a way to reduce their environmental impact.[96] Surveyed consumers were also willing to pay an average premium of 9.1 percent above average price for goods produced with minimal emissions.

Shifting preferences have driven growth in sustainably marketed products, now responsible for one-third of all growth in Consumer Packaged Goods (CPG) from 2013 to 2023, despite having less than one-fifth market share. This represents a five-year CAGR of 9.9 percent compared to 6.4 percent for their conventional counterparts.[97] Despite these products typically being associated with higher prices, consumer preferences for sustainable differentiation have remained strong even through the economic turbulence that followed the global COVID-19 pandemic, with sustainably marketed goods maintaining positive market share growth of 2.5 percent between 2020 and 2023.[98]

81%

Share of surveyed consumers would be willing to pay an average of 9 percent above average prices for more sustainable products.[99]

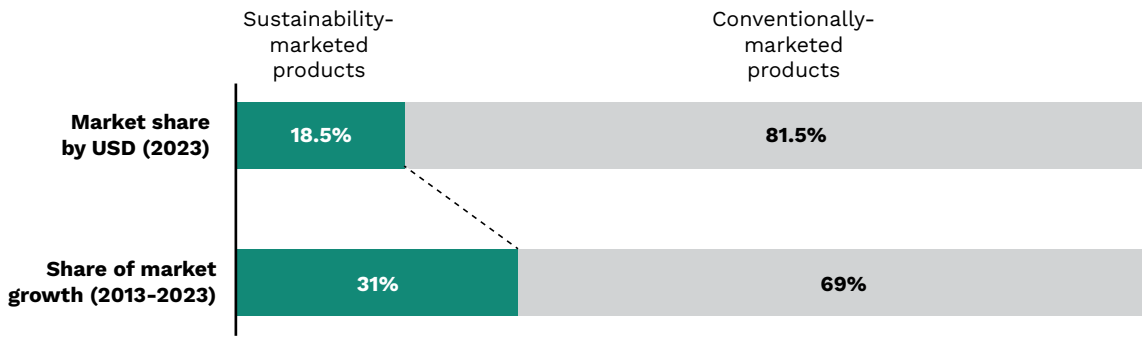
9.9

Five-year CAGR percentage achieved for products marketed as sustainable as compared to 6.4 percent for their conventional counterparts.

1/3

Proportion of all growth in CPG driven by products marketed as sustainable, despite these products having less than one-fifth market share.[100]

SUSTAINABLY MARKETED PRODUCTS OUTCOMPETE GROWTH OF CONVENTIONAL COUNTERPARTS



Source: New York University Stern School of Business.[101]

Downstream companies' environmental sourcing policies segment markets

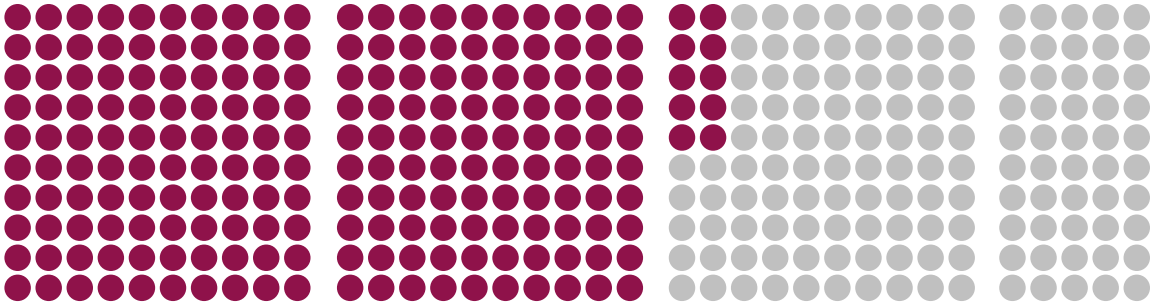
Trend 3.3

Transition Risk Factors:

- **Emission-intensive supply chains**
- **Slow adoption of climate solutions**
- **Lack of access to sustainability-linked financing**
- **Focus on expansion rather than efficiency**
- **Lack of greenhouse gas emission monitoring**
- **High deforestation risk commodities**

FLAG sector producers and their investors are facing threats to market access as downstream companies and financiers increasingly require FLAG sector producers to commit to certain environmental standards. Fearing the reputational damage associated with environmental degradation, traders, companies and other entities have looked to adopt extensive transparency and traceability measures to mitigate potential exposure. Requirements may include compliance with geospatial monitoring efforts, deforestation-free certifications and GHG accounting. Those failing to comply may have their contracts terminated and may potentially be blacklisted by industry peers.

An increasing number of companies, including downstream and midstream entities, are disclosing their involvement with landscape and/or jurisdictional approaches, which prioritize multi-level collaboration between stakeholders to build resilient and sustainable supply chains.[102] Actions taken at companies such as Unilever, Proctor & Gamble, Nike and many other firms are leaving non-compliant producers with limited avenues to bring their product to market, sometimes driving those unable to adopt sustainability measures to cease business operations altogether.[103, 104, 105]



60 percent of the 350 FLAG sector companies with the greatest exposure to palm oil, soy, beef, leather, timber and pulp and paper, alongside 150 banks and asset managers that lend to or invest in them, **have adopted no-deforestation policies.**[106]

Conditional loans and sustainable investment policies incentivize climate-smart practices

Trend 3.4

Transition Risk Factors:

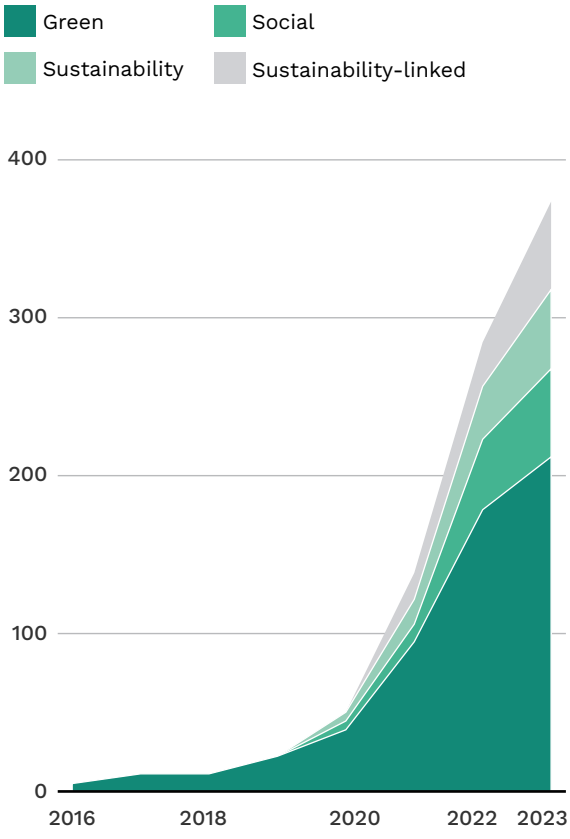
- **Emission-intensive supply chains**
- **Slow adoption of climate solutions**
- **Lack of access to sustainability-linked financing**
- **Focus on expansion rather than efficiency**
- **High deforestation risk commodities**
- **Omitting climate change from enterprise risk management**

Financial institutions are increasingly adopting environmental policies to promote sustainable land use practices, often linking loan approval to the condition that applicants meet environmental benchmarks. These practices may range from the mandated adoption of sustainable farming practices (e.g., agroforestry, iCLF and rotational grazing) to the implementation of CSA techniques (e.g., drought-resistant seed selection) and reductions in emission intensity along supply chains. Meanwhile, banks have broadly committed to improving their portfolios in terms of positive environmental impacts and reduced climate risks. Public lenders such as the European Investment bank (EIB), the World Bank and the International Fund for Agricultural Development (IFAD) have each integrated strict environmental standards for agricultural borrowers and encouraged the adoption of climate change mitigation practices. They have also committed more than USD 200 billion in financing to drive climate-resiliency projects.

Similar policies have also been adopted by commercial lenders, with banks such as Rabobank developing green financing products that reward FLAG sector portfolio companies for reducing their environmental impact through reduced pesticide use, enhanced biodiversity and more. Borrowers unable to achieve specific environmental benchmarks risk losing access to affordable capital markets given that lenders are increasingly adopting carbon mitigation measures across their own portfolios to address climate risks. The market for loans carrying labels such as "green," "social" and "sustainability" has increased twentyfold from EUR 12.8 billion in 2018 to EUR 270 billion in 2023.[107, 108]

Investors are already signaling that they consider deforestation a financially material climate risk. Established in 2020, the Investors Policy Dialogue on Deforestation (IPDD) has grown to 81 financial institutions across 21 countries with US 10.5 trillion in Assets Under Management: its primary concern is the "financial impacts that deforestation and the violation of the rights of indigenous peoples and local communities may have on their clients and investee companies by potentially increasing reputational, operational and regulatory risks."[109] Meanwhile, more than 5,000 global signatories with over 128 trillion in assets under management have signed on to the six Principles of Responsible Investment with the goal of integrating Environmental, Social and Governance (ESG) considerations into investment and ownership decisions. As these and similar initiatives grow, access to capital is likely to become increasingly linked to sustainably criteria.

GROWTH IN LOANS WITH SUSTAINABILITY CRITERIA[xii]



Source: Bloomberg private placements monitor, Goldman Sachs Asset Management

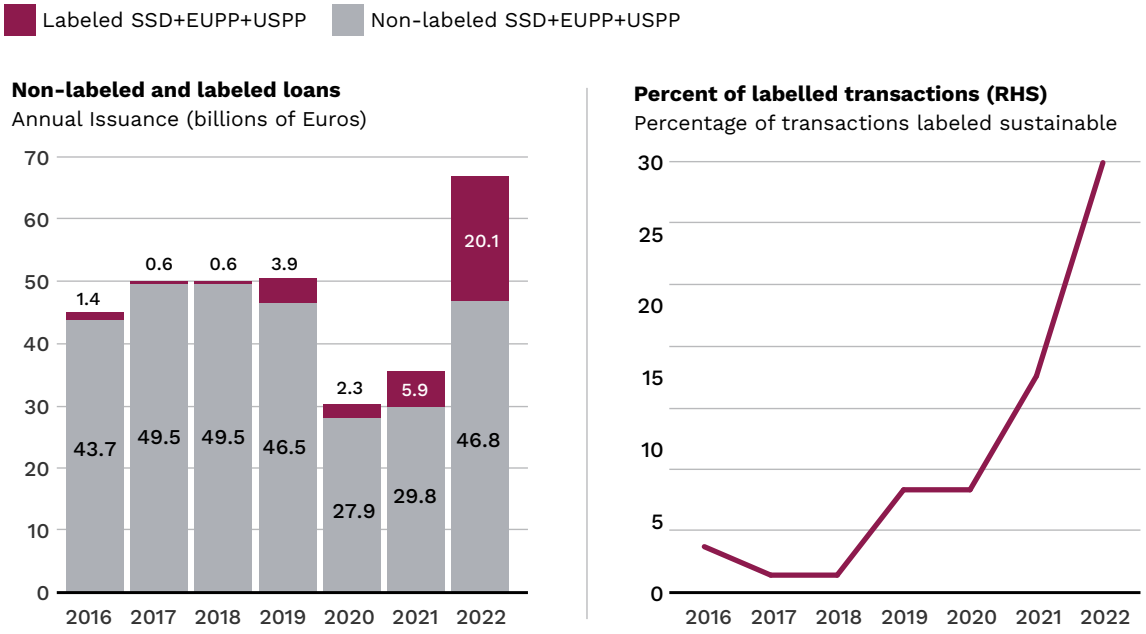
[xii] 2023 Total only accurate up through the end of Q2

Corporates are becoming more ambitious about moving toward sustainable business strategies.

2,253

Number of companies representing a market capitalization of USD 23 trillion followed SBTi emission reduction strategies by the end of 2021, and 80 percent of emissions reductions targets were aligned with limiting global temperature rise to below 1.5° C above pre-industrialized levels.

PERCENTAGE OF EU TRANSACTIONS LABELED SUSTAINABLE[xiii]



Source: Private placement monitor, Goldman Sachs Asset Management, Rabobank, CACIB, Heleba, Bloomberg,

[xiii] Note: Schuldschein (SSD), Euro Private Placements (EUPP), US Private Placements (USPP)

Carbon markets and nascent biodiversity markets offer revenue diversification opportunities

Trend 3.5

Transition Risk Factors:

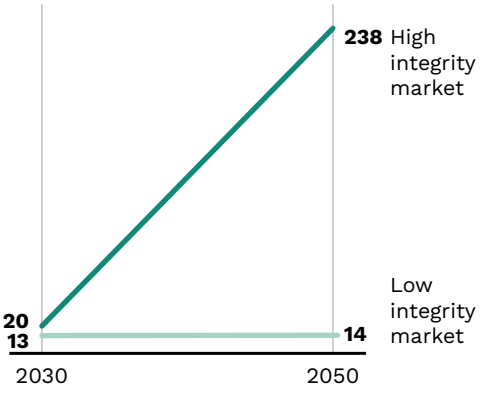
- **Emission-intensive supply chains**
- **Slow adoption of climate solutions**
- **Focus on expansion rather than efficiency**
- **Unwillingness to diversify revenue streams**

Competition from nature-based solutions for land resources may provide opportunities for traditional agricultural producers struggling with the impact of climate change. Although the gold standard is for companies to eliminate greenhouse gas emissions entirely, high-integrity carbon credits will remain a critical tool for achieving net zero commitments, especially as the voluntary carbon market is expected to grow from USD 2 billion in 2020 to around USD 250 billion by 2050.[112] While more nascent, interest in biodiversity markets is also expected to rise, and its total market value by 2050 is estimated to be USD 69 billion.[113] Growth in these markets may accelerate competition for inefficient agricultural land, with many producers facing increased pressure to reassess land use priorities if they can potentially earn more from promoting reforestation and conservation efforts than continuing low efficiency agricultural production.

FLAG sector producers already experiencing the negative effects of climate change may seize the opportunity to diversify their revenue streams. Despite a recent slump in voluntary carbon market growth driven by concerns around quality and durability, initiatives such as the Voluntary Carbon Markets Integrity Initiative and the Integrity Council for Voluntary Carbon Markets seek to provide market clarity and reduce investment risk, while regulators such as the U.S. Commodities Future Trading Commission work to improve counterparty trust through due diligence practices. Furthermore, regions covered by compliance markets continue to increase, with strict eligibility criteria often providing structure and credibility to developing carbon and biodiversity markets.

PROJECTED GROWTH IN THE VALUE OF CARBON MARKETS[xiv]

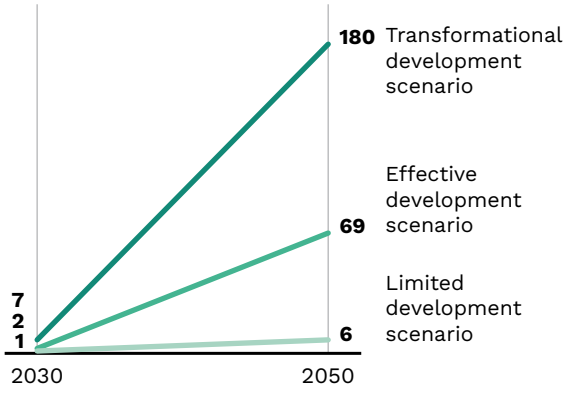
Global market size (tons in USD)



Source: BloombergNEF[114, 115]

PROJECTED GROWTH IN THE VALUE OF BIODIVERSITY MARKETS

Global market size (millions USD)



Source: World Economic Forum (WEF)[116]

[xiv] Note: Limited development scenario assumes unambitious market development, grounded in historical precedent only. Companies that had nature targets in 2023 are assumed to participate in biodiversity credit markets by 2030. Effective development scenario assumes more ambitious market development grounded in historical parallels in voluntary carbon markets, with widespread adoption of nature targets. Transformational development scenario envisions a substantial part from how businesses and consumers value nature. Assuming rapid adoption of nature targets and successful implementation of global climate and nature goals.

ACTIVITIES THAT MAY BE ELIGIBLE FOR CARBON AND BIODIVERSITY CREDITS.

Example carbon credit project types



Avoided deforestation



Clean energy initiatives



Reforestation for carbon removal

Example biodiversity credit project types



Restoration or development of new habitats



Nature and ecosystem restoration



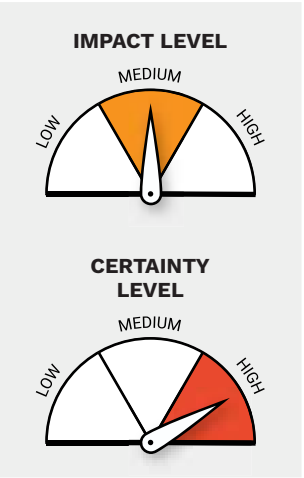
Conservation projects

CASE STUDY: LAND-USE PACT SIGNED BY TOP COMPANIES AT COP 26

SECTOR
Beef, Palm Oil, Soy, Cocoa

LOCATION
Global

During COP 26, 10 commodity companies (including JBS, Cargill, Bunge and Wilmar International) pledged to end deforestation in their supply chains by 2030. They join over 140 countries who have agreed to reinforce existing commitments to halt forest loss from agricultural commodity production and trade. If upstream soft commodity producers refuse to adhere to policies implemented by their buyers, they risk facing sanctions such as suspension of trade, exposing firms to market access risks.



INCOME STATEMENT IMPACTS

Climate-related risks that affect income, expenses and revenue

Sales Revenue		
Soft commodity producers could lose market access due to increased scrutiny and stricter regulations.	RISK →	Those who do will lose will see **decreased sales and revenue**.
SG&A		
Soft commodity producers may face regulatory penalties, fines and/or legal action.	RISK →	These result in **increased SG&A expenses.**

BALANCE SHEET IMPACTS

Climate-related risks that affect assets, liabilities and shareholder equity

Goodwill		
Attention on compliance is increasing.	RISK →	Laggards can suffer reputational damage and **loss of customer loyalty**.
	OPPORTUNITY →	First-movers can build a reputation as an environmental good actor and **improve customer opinion and retention**.
Write-downs and Impairment		
Business practices and trade policy are changing in response to a warming climate.	RISK →	At-risk assets can **lose their value** as a result of changes in business practices and government policy.
Weighted Cost of Capital (WACC)		
Lenders and investors increasingly require compliance with environmental and social standards.	RISK →	Laggards may face **higher financing costs and increased liabilities**.
	OPPORTUNITY →	Leaders may find **fewer barriers to capital** as a result of responsible actions.

Source: Global Food Industry News



Chapter 4

Reputational Transition Trends

The global perception of climate change has shifted. Heightened awareness and scrutiny from stakeholders are driving FLAG sector companies and investors to become more transparent and proactive in their climate actions as they seek to avoid the reputational damage that comes with being linked to incidents of environmental degradation or deforestation. Four reputational trends have emerged to shape the future of the FLAG sector.

1. Growing shareholder activism is compelling FLAG sector companies and investors to improve the sustainability of their business practices. Shareholder resolutions, external public campaigns and dialogue with company executives will continue to drive the adoption of scrutinized climate commitments.



2. Growing stakeholder scrutiny of climate commitments is increasing pressure on FLAG sector companies and investors to make good on their environmental promises. Public concern and growing access to monitoring technologies will enable NGOs, the public and watchdog groups to better scrutinize company operations and practices. Companies that misrepresent their commitments or fail to meet environmental targets risk incurring severe reputational damage, consumer backlash and regulatory scrutiny.

3. The increasing speed of information dissemination in the digital age is amplifying the reputational risks faced by the FLAG sector. As internet access continues to expand, consumers will have a greater ability than ever before to amplify reputationally damaging information and expose unsustainable business practices, thus altering public brand perception. Companies that fail to act transparently may face heightened scrutiny and reputational damage as their controversies are exposed and disseminated.

4. Supply chain transparency separates climate leaders from climate laggards. Companies that disclose environmental impacts, adopt rigorous reporting and make use of advanced monitoring technologies will strengthen their brand resilience. Those that fail to implement supply chain transparency strategies risk both reputational and financial damage.

Reputation Transition Risks



Rapid access to information

The rapid rate of information dissemination and widespread media access pose significant reputational threats to FLAG sector companies involved with deforestation-prone commodities, such as beef, leather, coffee, cocoa, timber, palm oil, soy and rubber. Evidence of illegal deforestation or environmental degradation can spread globally within minutes, exposing those responsible to immediate public backlash, regulatory scrutiny and reputational damage.



Shareholder concerns

FLAG sector companies that fail to respond appropriately to shareholder sustainability concerns are likely to face disruptive, reputationally damaging backlash. Unaddressed shareholder concerns may also draw increased scrutiny on company practices from the broader public and regulatory agencies.



Intense scrutiny from monitoring

Growing satellite monitoring efforts from third-party stakeholders can subject FLAG sector companies with public sustainability and supply chain commitments to intense scrutiny, which can damage their reputation if companies are found to be misrepresenting their business practices or connected to illegal deforestation and environmental degradation.



Loss of competitive edge

FLAG sector companies that fail to introduce comprehensive supply chain monitoring and product tracing risk losing a competitive edge to those seen as climate leaders, thereby foregoing potential earnings associated with a sustainable reputation. Climate-friendly and deforestation-free product certifications can allow for premium pricing opportunities depending on whether the company's brand image is trustworthy.

Reputation Transition Opportunities

Increased competitive edge

Adopting early sustainability measures provides FLAG sector companies the chance to stand out in the market. By increasing supply chain transparency and reducing greenhouse gas emissions, companies can gain a competitive edge and differentiate themselves from peers lagging in sustainability efforts.

Enhanced resilience to evolving regulation

Embracing shareholder calls for greater sustainability can offer FLAG sector companies enhanced resilience to evolving regulatory landscapes. By proactively addressing climate risks and aligning with sustainability demands, these companies can reduce organizational risk and stay ahead of regulatory changes.

Access to investment

Investing in concrete sustainability practices can allow FLAG sector companies to attract investment from ESG-focused funds and investors. Companies possessing robust sustainability credentials can improve their financial stability, secure better funding opportunities and strengthen their growth potential in competitive markets.

Reputation management

Leveraging digital platforms for transparency and communication offers FLAG sector companies the opportunity to manage their reputations effectively. By proactively sharing accurate information and updates on sustainability initiatives, companies can foster consumer trust, mitigate reputational risks and achieve market differentiation.



Shareholder activism incentivizes climate-related financial risk mitigation

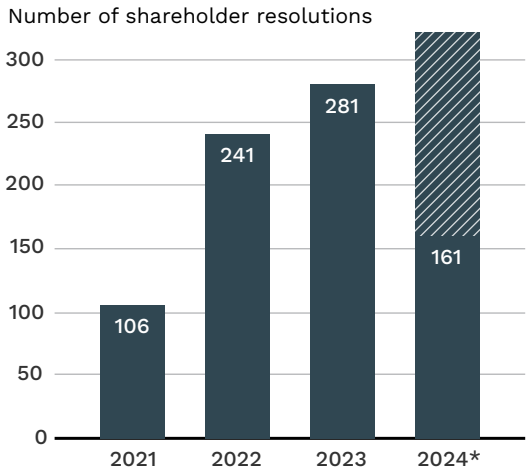
Trend 4.1

Transition Risk Factors:

- **Emission-intensive supply chains**
- **Lack of greenhouse gas emission monitoring**
- **Omitting climate change from enterprise risk management**
- **Slow adoption of climate solutions**
- **High deforestation risk commodities**
- **Customer-facing business models**

Reported incidents of shareholder activism are growing. This has driven significant advancements in supply chain sustainability and corporate climate action.[117] Through a combination of formal mechanisms such as shareholder resolutions, direct dialogue with executives and external pressure through public campaigns and NGO collaborations, shareholders are increasingly working to compel company management to address critical climate-related issues.[118, 119] Companies and investors involved in the trade of high deforestation risk commodities, such as those involving palm oil, beef and soy, have faced increased pressure, leading traders such as Wilmar International, Bunge and Archer Daniel Mills to commit to zero-deforestation policies, while downstream giants Tyson foods and Unilever have announced substantial greenhouse gas reduction goals across their supply chains.[120, 121, 122, 123, 124] Similar efforts targeting meatpacker giant JBS culminated in the meatpacker's 2020 commitment to improve traceability and eliminate deforestation through its cattle supply chain by 2030.[125] Shareholder efforts to publicize corporate sustainability failings has imbued financial influence with reputational power, thus incentivizing the adoption of sustainability initiatives that mitigate risk and protect the image of public retail brands.

ENVIRONMENT-LINKED SHAREHOLDER RESOLUTIONS FILED BETWEEN 2021 AND 2024[xv]



* In Q1 and Q2 of 2024, 161 shareholder resolutions took place. An additional 161 shareholder resolutions are shown to estimate the trend for the entire year.
Source: United Nations Principles for Responsible Investment (UN PRI) shareholder resolution database.[126]



[xv] 2024 shareholder resolution count accurate through June 14, 2024, while the second half of 2024 is an estimate based on trending. Resolutions without associated dates are not included.

Growing stakeholder scrutiny of climate commitments drives greenwashing concerns

Trend 4.2

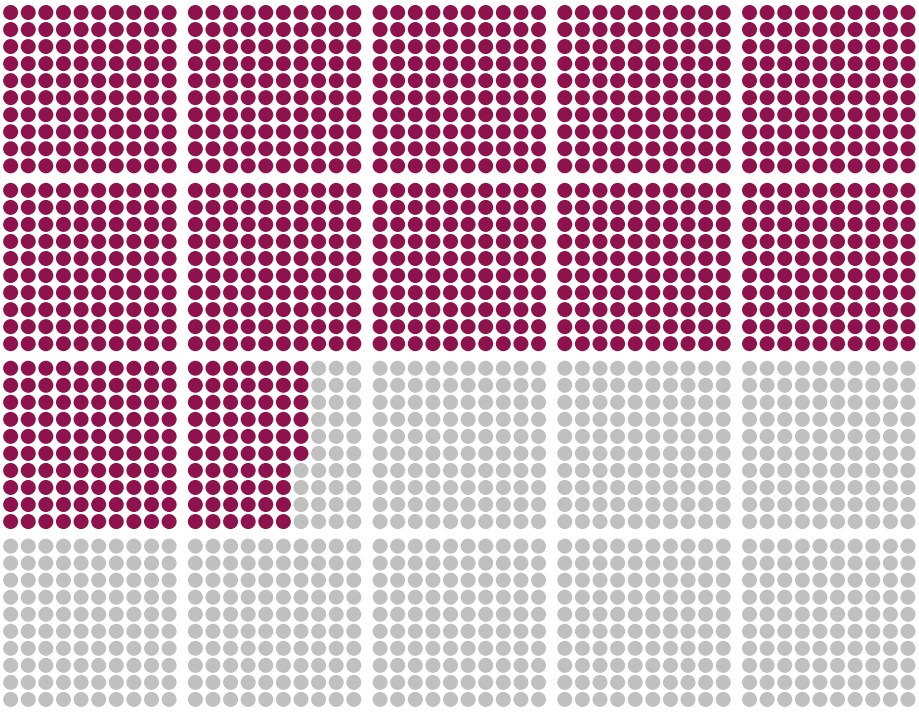
Transition Risk Factors:

- **Emission-intensive supply chains**
- **Customer-facing business models**
- **Inconsistency between commitments and action**
- **Lack of greenhouse gas emission monitoring**
- **Omitting climate change from enterprise risk management**

Increased stakeholder scrutiny has resulted in FLAG sector investors and supply chain companies facing risk of reputational damage and being found guilty of misrepresenting or failing to meet their climate commitments. Environmental NGOs and advocacy groups, shareholders and institutional investors, along with the broader public, increasingly demand transparency and accountability from companies regarding their environmental practices, scrutinizing sustainability reports, product labeling and sourcing practices.[127] Companies and investors found to be misrepresenting their commitments can face severe backlash, condemnation from environmental groups, consumer boycotts and regulatory scrutiny. The consequences can be just as severe for those that fail to meet climate targets, as experienced by Nestle in 2020. Falling short of its goal to reduce greenhouse gas emissions by 20 percent, Nestle faced negative media coverage, investor pressure and a decline in its sustainability rating, damaging its reputation as a leader in climate action.[128, 129]

SCIENCE BASED TARGETS

SBTi guidance requires companies setting FLAG science-based targets to **account for previously excluded land-based emissions**.



1,166 of the largest 2,000 publicly traded companies in the world by revenue have committed to achieving **net zero emissions by at least 2070**.[130]

PROMINENT SUSTAINABILITY SCORING SYSTEMS

CDP

Number of companies reviewed: 18,700+

Rating System: A to D-

System Framework: Specializes in environmental impact, including climate change, water security and deforestation.

Sustainalytics

Number of companies reviewed: 14,000+

Rating System: Low to Severe Risk

System Framework: Scores companies on their exposure to material ESG risks; evaluates unmanaged risk rather than overall ESG performance.[131]

MSCI ESG

Number of companies reviewed: 8,500+

Rating System: AAA to CCC

System Framework: Focuses on ESG performance; assesses companies' ability to manage ESG risks relative to peers.[132]

ISS ESG

Number of companies reviewed: 6,000+

Rating System: 1 to 10

System Framework: Focuses on ESG performance with an emphasis on corporate governance; often used in proxy voting and corporate governance assessment.[133]

Leading FLAG sector companies' sustainability ratings

Company	CDP	Sustainalytics	MSCI ESG	ISS ESG
Unilever	A	17.1 (Low Risk)	AA	1 (Very Good)
Nestle	A-	25.6 (Medium Risk)	AA	2 (Good)
Cargill	B	N/A	BBB	5 (Medium)
Archer Daniels Midland	B	29.1 (Medium Risk)	BBB	4 (Low)
Tyson Foods	B	32.4 (Medium Risk)	BB	7 (Low)
Bungee	C	35.3 (High Risk)	BBB	6 (Medium)
Louis Dreyfus Company	C	N/A	BB	6 (Medium)
JBS	D	45.3 (Severe Risk)	CCC	8 (Very Low)
Danone	A	19.1 (Low Risk)	AA	2 (Good)
Wilmar	B	30.2 (High Risk)	BBB	7 (Low)

Source: Carbon Disclosure Project (CDP), Sustainalytics, MSCI ESG, ISS ESG

Increasing speed of information dissemination amplifies brand value impacts

Trend 4.3

Transition Risk Factors:

- **Customer-facing business models**
- **Exposure to unsustainable practices**
- **Emission-intensive supply chains**
- **Slow adoption of climate solutions**
- **Lack of greenhouse gas emission monitoring**
- **Omitting climate change from enterprise risk management**

The digital age has enabled the rapid spread of information, amplifying both positive and negative events at an unprecedented rate. As internet access continues to grow worldwide (it is expected to reach 7.9 billion people by 2029), consumers have greater access than ever to information that can influence purchasing decisions, especially in the case of exposure to ethically controversial practices. Investigative journalism exploring agricultural practices, climate impacts and food safety concerns has the potential to dominate domestic media cycles, while evidence of environmental degradation may go viral within hours of publishing. Any misstep or controversy risks substantial reputational damage that will erode consumer trust and lead to the controversial company being viewed as a climate pariah. Unfortunately, misinformation and unfounded rumors have the potential to spread just as quickly as a powerful exposé. This reinforces the need to develop strong transparency guidelines and procedures crucial to securing the public image and reputation of FLAG sector companies and financiers exposed to controversial commodities. Companies that fail to publicly monitor their own risks may face increased attention and scrutiny from environmental NGOs, civil society groups and journalists eager to drive transparency.

Exposing negative information can result in financial losses across FLAG sectors

Nestle: Following a viral Greenpeace campaign that linked Nestle's KitKat chocolate bars to Indonesian deforestation, mass boycotts forced commitments to zero deforestation, which required a restructuring of the supply chain at significant cost.[134]

Sinar Mas, Asia Pulp & Paper (APP): NGO and media campaigns exposed paper manufacturer APP's deforestation practices, leading numerous retailers, including Walmart and Staples, to cut contracts in the face of scrutiny.[135, 136]

IOI Corporation: Following media coverage and eventual suspension from the Roundtable on Sustainable Palm Oil (RSPO) for breaking No Deforestation, No Peat and No Exploitation (NDPE) commitments, the palm oil trader lost lucrative contracts with CPG buyers Unilever and Nestle, amounting to losses of up to 10 percent annual revenue.[137, 138]

Sawit Sumbermas Sarana: Following intense media scrutiny and failure to comply with NDPE commitments, palm oil trader Sawit Sumbermas Sarana lost 81 percent of its customer base as prominent buyers reconsidered their partnerships due to deforestation concerns.[139]

Negative reputational events have financial impacts

1.69%

Negative stock return rate measured following environmental violations.

30%

Share of a company's market value can be impacted by reputational events.

20%

Increase in market value impact of reputational events over the past 20 years due to social media.

Supply chain transparency separates climate leaders from climate laggards

Trend 4.4

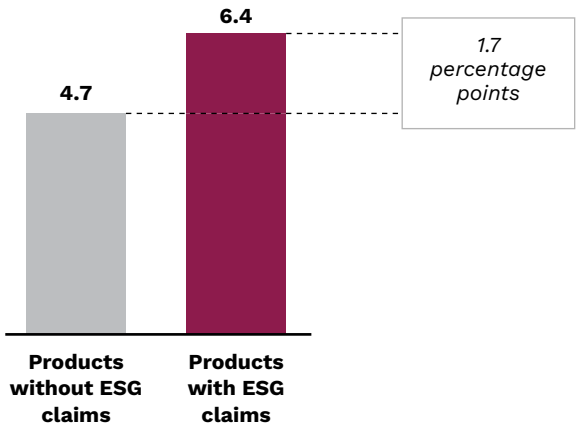
Transition Risk Factors:

- **Emission-intensive supply chains**
- **Omitting climate change from Enterprise Risk Management**
- **Lack of greenhouse gas emission monitoring**
- **Exposure to unsustainable practices**
- **Customer-facing business models**

Operational transparency is differentiating between climate leaders and laggards: proactive players move to highlight their supply chain sustainability. By disclosing their environmental impact, adopting rigorous reporting standards and embracing sustainable practices, FLAG sector investors, retailers, traders and producers are positioning themselves as climate leaders, ensuring brand resiliency in a sector prone to reputational risks. Companies such as Unilever and Danone have set themselves apart through proactive sustainability reporting, publishing updates regarding net zero emission commitments and mandating regenerative agriculture practices from their supplier networks. Tech-enabled advancements in satellite monitoring capabilities have also improved internal tracing procedures, while growing access to satellite imagery has improved third-party and watchdog transparency efforts, enabling better identification of the parties responsible for greenwashing and environmental degradation. Those that fail to implement comprehensive transparency measures often face reputational damage as consumers, investors and regulators increasingly value business sustainability. However, reputational damage often carries financial consequences, as experienced by the largest meatpacker in the world, JBS. Following reports that linked JBS to Amazon deforestation, 22 asset managers with USD 272 billion under management divested from the company and highlighted specific concerns over associations with widespread deforestation.[140]

PRODUCTS THAT MADE ESG CLAIMS HAD HIGHER AVERAGE SALES GROWTH

Percent CAGR 2018-2022



Source: McKinsey and Co.,[141] NielsenIQ

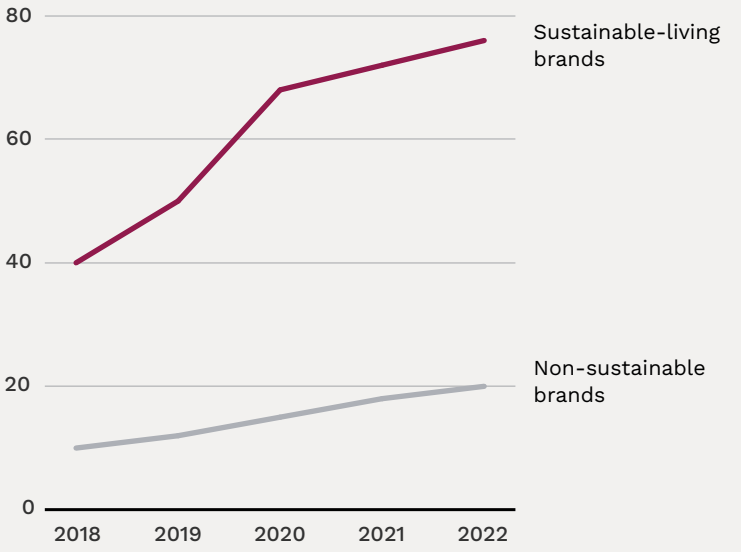
Unilever case study: Sustainability driving growth

Unilever, a global leader in consumer goods, has made strides in integrating sustainability into its business model, most notably through its commitment to sustainable sourcing. Partnering with organizations such as the Rainforest Alliance, Roundtable on Sustainable Palm Oil and Roundtable on Responsible Soy, Unilever has committed to ensuring 95 percent of its crop volumes are produced sustainably by 2030.[142, 143]

Unilever's focus on sustainability is not just about ethical responsibility—it's also a business strategy that has delivered strong results. The company's Sustainable Living brands, which are built around strong sustainability credentials, grew 69 percent faster than the rest of the business. These brands, such as Lipton and Ben & Jerry's, accounted for 75 percent of Unilever's overall growth in 2020.[144] This growth is directly linked to consumer demand for more sustainable and ethically produced products, showing that sustainability initiatives can fuel business expansion.[145]

GROWTH OF UNILEVER SUSTAINABLE PRODUCTS

Growth rate (%)



Impact of Certifications

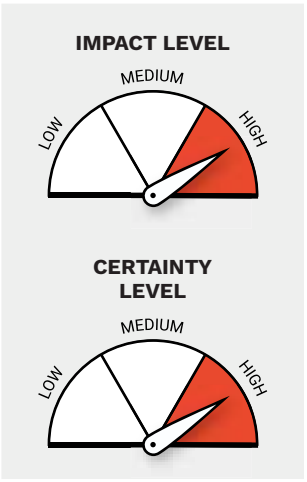
By sourcing tea from Rainforest Alliance–certified farms, exclusively distributing RSPO-certified palm oil and offering Fair Trade products, Unilever works to ensures its supply chains promote biodiversity, fair wages and better working conditions. These certifications help build consumer trust and loyalty, particularly among increasingly conscious shoppers who prioritize sustainability when making purchasing decisions. The success of Unilever's Sustainable Living brands demonstrates that companies can achieve both positive social impact and financial success by aligning with global environmental and ethical standards.

CASE STUDY: SEC CLIMATE DISCLOSURES RULE

SECTOR
Palm Oil, Soy, Beef

LOCATION
U.S.

The SEC has enacted a rule that will require businesses to disclose to investors how their operations affect climate change, including Scope 1 and 2 emissions. They will be required to highlight climate-related risks that are 'reasonably' likely to impact financial statements, standardizing ESG reporting and data collection. As a consequence, the ruling will expose high-emitting companies as high-risk investments. Although the ruling is being challenged in court, the global rise of climate-related financial disclosures means that even if one jurisdiction experiences delays, global companies are increasingly still required to inform investors of climate risks in other regions.



INCOME STATEMENT IMPACTS

Sales Revenue

With more information, customers can make choices based on sustainablility.

RISK → Producers with high emissions could see **lower demand, falling prices and fewer units sold** resulting in decreased revenue.

OPPORTUNITY → Producers taking steps to mitigate their emissions could see **increased demand and higher revenue**.

BALANCE SHEET IMPACTS

Goodwil

Mandatory compliance makes information on emissions public.

RISK → Those not adequately mitigating their emissions could suffer reputational damage and **loss of customer loyalty**.

OPPORTUNITY → First-mover companies can highlight their sustainable practices and **build reputational bonuses**.

Write-downs and Impairment

Business practices and trade policy are changing in response to a warming climate.

RISK → At-risk assets can **lose their value** as a result of changes in business practices and government policy.

Weighted Cost of Capital (WACC)

Lenders and investors have more information on climate-related risks and total emissions at a company level.

RISK → Risky companies may face **higher financing costs** and increased liabilities.

OPPORTUNITY → Lower-risk companies may find **fewer barriers to capital** as a result of responsible actions.

Source: SEC



Takeaways

Recommendations for key stakeholders: What can companies and investors do to mitigate financial risk?

Understanding and preparing for the risks and opportunities driven by climate transitions is essential to the long-term success of FLAG sectors. The trends outlined in this report present disruptive, sector-wide risks to profitability that companies and investors should consider and incorporate into enterprise risk management practices.

As climate risk is increasingly proving to be financially material, the market has provided risk professionals with unprecedented pathways to incorporate climate considerations into management practices. Proactive companies can lean into significant opportunities to move beyond compliance and reporting needs and to inform strategic and operational decision-making.

A future that is both sustainable and profitable will require a radical level of collaboration among major stakeholders. Understanding the impact of the trends outlined in this report can provide a starting point for companies and investors in the land sector to mitigate risks and lean into opportunities presented by climate transitions.



For investors

Investors can follow eight steps to help futureproof their investments and lending in the face of government, consumer and private sector responses to climate change: **assess, adopt, diversify, collaborate, capitalize, monitor, include and empower.**

1. Assess

ACTION → **BENEFITS**

Assess climate transition risk and vulnerability across investments, ***incorporate*** forward-looking information into investment decision-making, ***engage*** portfolio companies with high climate risk exposure to improve practices, ***develop*** new targets for sustainable agriculture deal origination and ***update*** criteria for acceptable risk in financial vehicles.

Increase investment resilience and ***reduce*** risk of investments' exposure to the future impacts of climate change.

2. Adopt

ACTION → **BENEFITS**

Adopt voluntary climate-related financial disclosures, ***measure*** disclosure metrics according to the TCFD (now incorporated into the ISSB Standards through the IFRS S1 General Requirements for Disclosure of Sustainability-related Financial Information and IFRS S2 Climate-related Disclosures) as well as the Greenhouse Gas Protocol, ***disclose*** climate metrics publicly, ***incorporate*** climate risk management into enterprise risk management strategy and ***develop*** climate risk scoring at the transaction level.

Stay ahead of the competition by understanding opportunities for reducing emissions and mitigating risk before disclosures become mandatory and ***show progress*** against climate goals.

3. Diversify

ACTION → **BENEFITS**

Link investment and lending to sustainable practices, ***prioritize*** investments with growth strategies that leverage emerging alternative markets, sustainable low-emission practices and newer, high-efficiency technology solutions and ***incentivize*** supplier compliance with sustainable practices through targeted and results-based financing.

Strengthen your portfolio through the early adoption of revenue streams in low-emission markets and ***prepare*** your investments for changing regulatory environments due to land use restrictions, increased GHG prices and other factors—this is particularly relevant for commodities traditionally exposed to high rates of deforestation.

4. Collaborate

ACTION

Collaborate with FLAG supply chains and leading portfolio companies to identify promising new technological and management techniques, ***provide*** guidance on reducing greenhouse gas emissions and ***encourage*** adoption of rapidly developing AgTech solutions.

BENEFITS

Strengthen your investments by supporting resource efficiency, reductions in livestock methane emissions and synthetic fertilizer runoff and improvements to production practices through pilot projects.

5. Capitalize

ACTION

Invest in the production of low-emission, deforestation-free and sustainable products to benefit from premium pricing opportunities and ***lean*** into emerging market segments that underpin the transition to a sustainable future.

BENEFITS

Capitalize on shifting consumer preferences and increased willingness to pay more for low-emission, deforestation-free and sustainable products.

6. Monitor

ACTION

Monitor new asset classes as the economic value of carbon, biodiversity and soil health are increasingly internalized on financial statements and ***assess*** potential investments in soil health improvements, agroforestry systems and high-quality carbon and biodiversity markets.

BENEFITS

Be ready to invest in and capitalize on new asset classes as their values grow.

7. Include

ACTION

Include shareholder activist groups in sustainability-related decisions and ***work with*** these groups to set sustainability-related targets, ***plan*** future investments and handle reputational risk events.

BENEFITS

Improve risk management processes and ***understand*** potential issues early.

8. Empower

ACTION

Increase investments in innovations that create competitive advantages through the production of sustainable products; ***assess*** existing barriers to adoption for portfolio companies; ***develop*** new financial vehicles that provide the patient capital to support climate transitions; ***participate*** with peers in knowledge-sharing activities on industry standards for measuring impact, risk monitoring reporting and establishing science-based and nature-positive goals and ***advocate*** for expanded catalytic capital that is patient, risk tolerant, concessionary and flexible.

BENEFITS

Improve the future resilience of investments and ***accelerate*** the market growth of sustainable products with the potential to lead the competition in future export-oriented markets.



For companies

Companies can follow eight steps to help futureproof their businesses and supply chains in the face of government, consumer and private sector responses to climate change: **report, mandate, support, analyze, adopt, leverage, explore and market.**

1. Report

ACTION → **BENEFITS**

Adopt comprehensive supply chain due diligence reporting and monitoring to increase market transparency.

Reduce risks to the business and brand value by discontinuing relationships with suppliers engaging in illegal activities and those who undercut pricing through unsustainable production methods.

2. Mandate

ACTION → **BENEFITS**

Demand the mandatory use of source of origin traceability practices by suppliers and ***conduct*** effective monitoring.

Enhance the company's reputation and market access to products in domestic and international markets by ensuring that all inputs involved in the supply chain are sustainable and—particularly in FLAG sectors—are reducing emissions and not connected to deforestation.

3. Support

ACTION → **BENEFITS**

Promote and implement programs to achieve zero-deforestation throughout the entire supply chain, ***provide*** finance for technological assistance that sustainably increases yields and productivity while achieving deforestation-free agriculture and mitigates climate risks among suppliers, ***collaborate*** to test financial products that increase supply chain transparency and ***clearly label*** products that are deforestation and conversion-free to allow sustainable producers access to international markets and potentially enable the company to benefit from differentiated pricing and resources.

Empower your supply chain to operate sustainably and ***protect*** your company's reputation and future ability to operate in current and evolving markets.

4. Analyze

ACTION → **BENEFITS**

Conduct comprehensive climate transition risk assessments and ***utilize*** scenario analysis to better forecast climate impacts and market trends while mitigating risks.

Increase your understanding of and ***prepare*** your business and supply chain for climate transitions.

5. Adopt

ACTION → **BENEFITS**

Adopt voluntary climate-related financial disclosures, ***measure*** disclosure metrics according to the TCFD (now incorporated into the ISSB Standards through the IFRS S1 General Requirements for Disclosure of Sustainability-related Financial Information and IFRS S2 Climate-related Disclosures) as well as the Greenhouse Gas Protocol, ***disclose*** climate metrics publicly and ***incorporate*** climate risk management into enterprise risk management strategy.

Stay ahead of competitors by understanding opportunities for reducing emissions and mitigating risk before disclosures become mandatory and ***show progress*** against climate goals.

6. Leverage

ACTION → **BENEFITS**

Tap into specialized lending and pilot programs by increasing government sustainability initiatives to incentivize supply chain decarbonization and sustainable business practices in response to ambitious government climate goals.

Increase income and the ability to support sustainable business actions.

7. Explore

ACTION → **BENEFITS**

Explore voluntary carbon markets and nascent biodiversity markets and ***diversify*** revenue through emerging FLAG sector markets, including emerging end-stage processing opportunities.

Improve brand reputation and ***meet*** expectations for sustainability commitments through the addition of high integrity carbon and biodiversity credits, ***reduce*** risks from your supply chain and ***support*** more expensive sourcing from high-grade sustainably certified products.

8. Market

ACTION → **BENEFITS**

Market efforts to improve the sustainability of your business operations and supply chain by leveraging the increasing speed of information dissemination.

Improve business and brand reputation by highlighting company progress toward climate goals.

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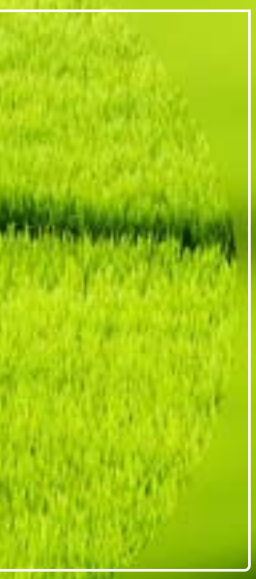
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