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CASES IN SUSTAINABILITY
Applications and Approaches

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July 2025

Preface

In a prior report of our "Cases in Sustainability" series, we mentioned sustainability being a core concern for businesses and organisations worldwide. Seven months into 2025, sustainability reporting regulations have become more prevalent, validating our opinion on the growing importance of sustainability.

To further students' sustainability knowledge, NUS Business School offers the course "Sustainability Strategy". It examines key concepts and applications of sustainability, particularly its integration with strategic analysis and innovation.

Anchored on the Economic, Environmental, Social and Governance (EESG) dimensions, the course develops the business case for sustainability and its relevance for consumers and investors. The course also addresses market regulations, international agreements, reporting standards, carbon management and entrepreneurial sustainability.

The eight cases in this report illustrate how real-life firms approach sustainability, analysed using concepts taught in class. Students worked in teams to research and write the case based on general guidance from the instructor. They were encouraged to choose an Asian firm or a global entity with operations in Asia. By way of synthesis, the businesses analysed are based on their economic type.

Market Application / Operational Approach	Production-Based	Service-Based
Supplier-Oriented	NVIDIA	DBS
	Wilmar	Temasek
User-Oriented	Schneider Electric	Banyan Group
	Unilever	Grab

We can analyse corporate sustainability strategies through two interconnected dimensions: **operational approach** (production-based or service-based) and **market application** (supplier-oriented or user-oriented). **Production-based organisations**, such as manufacturers or resource-intensive industries, prioritise direct environmental impacts

through initiatives such as emission reductions, circular material flows and sustainable sourcing of raw materials.

Meanwhile, **service-based entities**, including financial or technology firms, often address indirect social and governance impacts through their digital platforms with ESG elements, employee engagement programmes or sustainability-linked financial and insurance products. Both approaches require balancing innovation with accountability, as seen in third-party verified environmental declarations and transparent reporting frameworks.

Companies also differ in how they align their operations with sustainability pathways. **Supplier-oriented organisations** often drive systemic change by innovating in areas such as ethical sourcing, clean production technologies or green infrastructure development. Conversely, **user-oriented businesses** frequently bridge sustainability gaps by gearing users towards sustainable choices such as reusable packaging or low-emission transportation modes. However, these categories aren't siloed: user-focused companies may still engage suppliers to phase out polluting materials, while supplier-centric firms might develop products that empower end-users to reduce waste.

This interdependence highlights how comprehensive ESG strategies require both vertical integration (from raw materials to end-use) and horizontal collaboration across value chains.

The casebook is targeted at the general reader who has some basic knowledge of strategic management and is embarking on the learning journey for sustainability applied to businesses and organisations. Each case is unique and can be used on a standalone basis. Discussion questions at the end of each case invite readers to ponder more about the issues present.
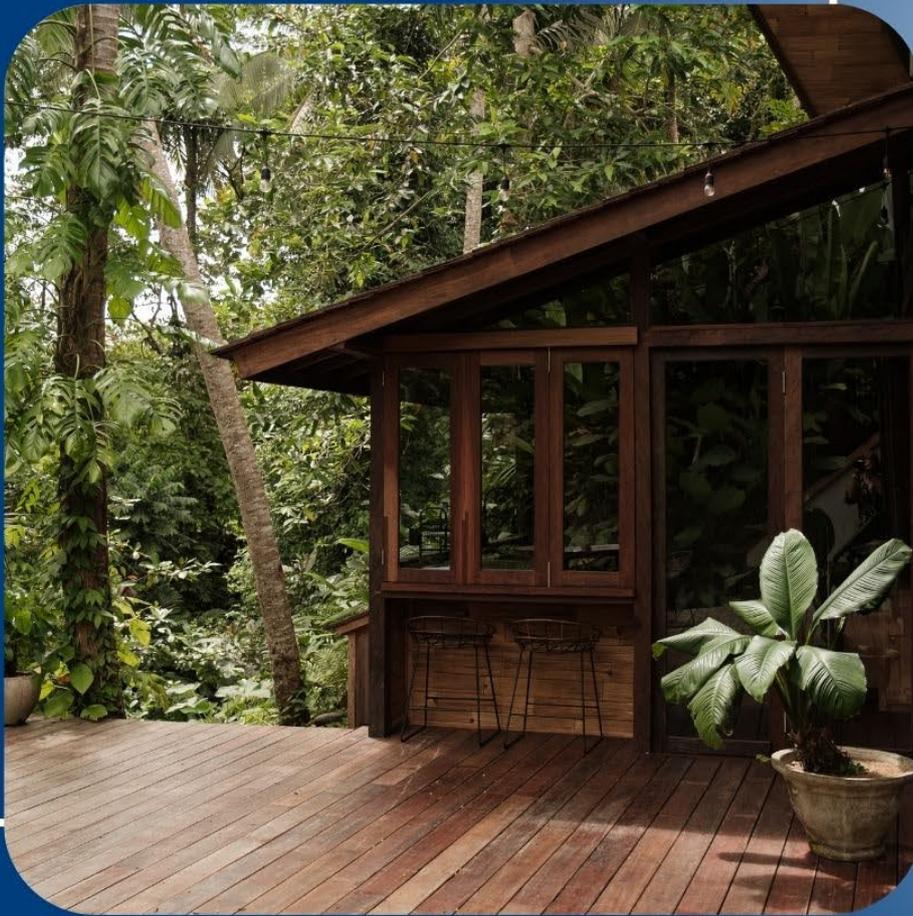
In 2025, geopolitical developments have rocked the boat for sustainability and businesses alike. May this casebook inspire more to stay steadfast in sustainability despite the waves ahead.

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Introduction and Company Overview

Banyan Group (rebranded from Banyan Tree Group in 2024) is a leading international hospitality group based in Singapore. The company is well known for its early and consistent commitment to sustainable luxury travel. It was founded in 1994 by Ho Kwon Ping and Claire Chiang. The first resort, Banyan Tree Phuket, was built on a former tin mine that had been restored into a lush and welcoming environment. This project marked the beginning of the company's efforts to integrate environmental and social responsibility into its business model. From the beginning, Banyan Tree has followed the philosophy of "Embracing the Environment, Empowering People". This phrase reflects the company's belief that business success should be linked to positive social and environmental impact. Sustainability is not treated as an additional feature. It is a core value that shapes the design of its resorts, the guest experience and the company's approach to growth.

Brand Positioning

Banyan Group positions itself as a provider of experiences that are both luxurious and meaningful. The group manages 12 brands, including Banyan Tree, Angsana, Cassia, and Dhawa (Banyan Group, 2024). Each brand targets a different type of customer, but all reflect the company's commitment to well-being, cultural respect and environmental care. This shared value system is central to the brand identity.

Integrated Business Model

Banyan Group operates mainly in the luxury segment of the hospitality industry. Its offerings include hotel accommodation, spa treatments, wellness experiences and residential properties. The company uses an integrated business model, managing the full value chain from property development and ownership to hotel operations and retail. This approach helps Banyan Group maintain consistent quality across its offerings. It also ensures that sustainability is built into every part of the business, rather than treated as a separate function.

Geographic Presence and Expansion Strategy

Banyan Group began in Asia but has expanded to become a global entity. Today, it operates in more than 20 countries, including China, Maldives, Mexico, Morocco, Thailand and Vietnam. The company follows a careful international expansion strategy: using management contracts and partnerships instead of owning properties directly. This reduces financial risk while helping the brand grow sustainably. A major step in this strategy was the partnership with Accor in 2016, which gave Banyan Tree access to a wider network and more resources while keeping its brand identity intact (The Straits Times, 2016). The company is also developing integrated resort

communities that combine hotels, wellness centres and residential areas. These projects support its long-term goals and help strengthen its position in the global luxury hospitality market (TTG Asia, 2025).

Sustainability Strategy and Initiatives

Banyan Group aims to contribute to sustainable tourism through integrating Environmental, Social, and Governance (ESG) principles across its operations. Under its guiding framework, "Embracing the Environment, Empowering People", the company aims to reduce its environmental impact, uplift local communities, and maintain strong governance standards. This sustainability strategy is aligned with international standards such as the United Nations Sustainable Development Goals (SDGs), the Singapore Stock Exchange (SGX) guidelines, and the Task Force on Climate-related Financial Disclosures (TCFD).

Banyan Group's goal is to achieve net-zero emissions by 2030, and its operations reflect a holistic approach to sustainability. This includes the integration of renewable energy sources, water conservation strategies and waste reduction practices (Banyan Group, 2024). The company also prioritises community empowerment by supporting local economies, enhancing cultural preservation, and ensuring ethical sourcing of materials. To fulfil its targets, Banyan Group monitors the progress of its various environmental, social responsibility and governance initiatives. Along the way, it adapts its strategies to meet global challenges.

Environmental Initiatives

The company's environmental strategy focuses on minimising its carbon footprint, reducing waste, and protecting ecosystems, and has achieved some results.

Sustainable Architecture and Eco-Friendly Resorts

Banyan Tree incorporates sustainable architecture and eco-friendly design in the construction of its resorts. The company employs local materials and traditional building techniques that not only reduce environmental impact but also promote cultural preservation. These architectural designs are tailored to harmonise with the surrounding natural environment, while creating a low-impact, sustainable footprint. The company ensures that each of its properties implements energy-efficient lighting and Heating, Ventilation and Air Conditioning (HVAC) systems, as well as passive cooling techniques. In 2023, these sustainable architectural practices contributed to a 22% reduction in emissions per occupied room, demonstrating the company's reduction of its environmental footprint through design innovation (Banyan Group, 2024).

Reducing Emissions

By 2030, Banyan Group aims to reduce its greenhouse gas (GHG) emissions by 42% from its 2022 baseline of 272 ktCO$_2$e (Banyan Group, 2024). It has focused on reducing emissions through energy efficiency, renewable energy adoption and carbon offset initiatives. In 2022, Banyan Tree undertook 113 energy reduction initiatives across its properties, saving a total of 2.98 million kWh (Banyan Tree Group, 2023). In 2023, while its emission intensity per occupied room decreased, it is noted that its total emissions was 9% higher than 2022, indicating room for more emission-reduction efforts (Banyan Group, 2024).

Water Conservation

In conserving water across its operations, Banyan Group has implemented various practices including rainwater harvesting, greywater reuse and wastewater treatment. In 2023, Banyan Tree reduced water usage per occupied room by 8.4% when compared to 2022, which was achieved through the optimisation of water management practices. Additionally, the company sourced 2.3% of its water from recycled or alternative sources, and aims to increase this figure to 30% by 2030 (Banyan Group, 2024).

Biodiversity Protection

Banyan Group has long been committed to biodiversity protection, and its sustainability efforts include initiatives that support the restoration and preservation of ecosystems. In 2023, the company planted nearly 13,000 trees in partnership with associates, guests and volunteers (Banyan Group, 2024). The company also continued its marine biodiversity programmes. It has thus far planted more than 8,000 coral fragments in nurseries in the Maldives. Its resorts in Phuket and Bintan also organised annual turtle conservation events which saw the release of turtles and hatchlings into the sea. The company's efforts to protect biodiversity also include its rewilding projects, such as planting 7,500 native trees in Phuket. These actions align with Banyan Tree's broader commitment to restoring ecosystems and mitigating the impacts of climate change on vulnerable species.

Social Responsibility Initiatives

Banyan Group's social responsibility initiatives focus on empowering local communities, promoting gender equality, and supporting cultural preservation. The company is committed to creating shared value for its stakeholders, particularly the communities surrounding its resorts. By providing local employment, fostering education, and supporting social initiatives, Banyan Group seeks to create positive and lasting impacts in the regions where it operates.

Local Employment and Gender Equality

Banyan Group is dedicated to promoting diversity and gender equality within its workforce. In 2023, 42.2% of the company's associates were women, and 18% of the Board members were female (Banyan Group, 2024). Banyan Group actively supports the professional development of women and underrepresented groups, ensuring that equal opportunities are provided to all employees. The company has implemented gender-inclusive policies to foster an inclusive work environment.

In addition to gender equality, Banyan Group offers local employment opportunities. A substantial portion of its workforce is hired from the communities in which its resorts are located, which helps stimulate local economies and provide valuable training to the workforce.

Community Development and Education

Banyan Group actively engages in community development through its Seedlings Mentorship Programme, which supports the professional development of young people. In 2023, 119 young individuals participated in this programme, a 23% increase from the previous year (Banyan Group, 2024). The company also supports education initiatives, such as enrolling 140 children in the Step-Up International Laguna Kindergarten (SILK) in 2023 and supplying 55,454 litres of safe drinking water to a school in China. Additionally, the company continues to procure products from artisan communities, with 406,475 products sourced in 2023 and supporting 240 local artisan communities (Banyan Group, 2024). These initiatives provide income opportunities for communities.

Cultural Preservation and Guest Engagement

Banyan Group's cultural preservation efforts also offer guests the opportunity to participate in cultural activities and engage with local traditions. Guest engagement included letting guests participate in sustainability-related activities. In 2023, 16,000 guests took part in 539 conservation and awareness activities (Banyan Group, 2024).

Governance Initiatives

Banyan Group's commitment to good governance is reflected in its pursuit of ethical business practices, transparency and regulatory compliance. The company places a high priority on maintaining strong governance standards that ensure its operations are conducted with integrity and accountability.

Ethical Sourcing and Supplier Compliance

Banyan Group is dedicated to ethical sourcing and ensuring that its suppliers adhere to high standards of social and environmental responsibility. In 2023, the company sourced 5% of its seafood sustainably, with plans to increase this to 100% by 2030 (Banyan Group, 2024). Additionally, Banyan Tree is committed to sourcing 100% of its eggs from cage-free suppliers by 2025. These initiatives are part of Banyan Tree's broader commitment to responsible sourcing and ensuring that its supply chain aligns with its sustainability values.

Anti-Corruption and Data Protection

Banyan Group's commitment to ethical governance includes its focus on anti-corruption measures and data protection. In 2023, 98.4% of associates signed the company's Code of Conduct, and 92% completed anti-corruption training (Banyan Group, 2024). The company has a strong track record in maintaining data security, with no reported data breaches in 2023. These initiatives underscore the company's commitment to conducting its business with integrity and transparency.

Table 1: Banyan Tree's 2023 Governance Metrics

Topic	Metric	Unit	2023 Metric	Source
Ethical Behaviour	Anti-corruption disclosures	Discussion and number of standards	98.4% of all associates signed the Code of Conduct declaration.	GRI 205-1, GRI 205-2 and GRI 205-3
	Anti-corruption training for employees	Number and Percentage (%)	10,861 Associates or 92.02%	GRI 205-2, WEF core metrics

Source: Banyan Group, 2024

Future Goals and Next Steps

Looking ahead, Banyan Group has outlined ambitious goals to further reduce its environmental impact, increase community engagement, and promote diversity and inclusion. It also aims to increase its landfill waste diversion to 50% by 2030 and expand its biodiversity protection efforts through the launch of more than 10 global rewilding projects (Banyan Group, 2024).

In terms of diversity and inclusion, Banyan Group plans to strengthen its efforts to align with the UN Women's Empowerment Principles, further increasing the representation of women in leadership positions. The company also aims to increase its support for local initiatives through the Greater Good Grants programme, fostering social development and environmental sustainability in the communities it serves. Through

these initiatives, Banyan Group continues to demonstrate its commitment to sustainability, creating long-term value for the environment, society and its stakeholders.

Strategic Analysis

Competitor Benchmarking

After examining Banyan Group's sustainability strategy in depth, it is useful to compare its performance with that of other major players in the luxury hospitality sector, mainly Four Seasons, Mandarin Oriental, and Ritz-Carlton (Marriott). We performed a benchmarking analysis across seven areas: Carbon Reduction Strategy, Plastic & Waste Elimination, Green Certifications, Water Management, Community Engagement, Biodiversity & Conservation, and ESG Transparency & Governance, which can offer a clearer picture of how Banyan Tree positions itself relative to its competitors.

Figure 1: Radar Chart Comparing Selected Hotel Players' Sustainability Performance Across ESG Dimensions
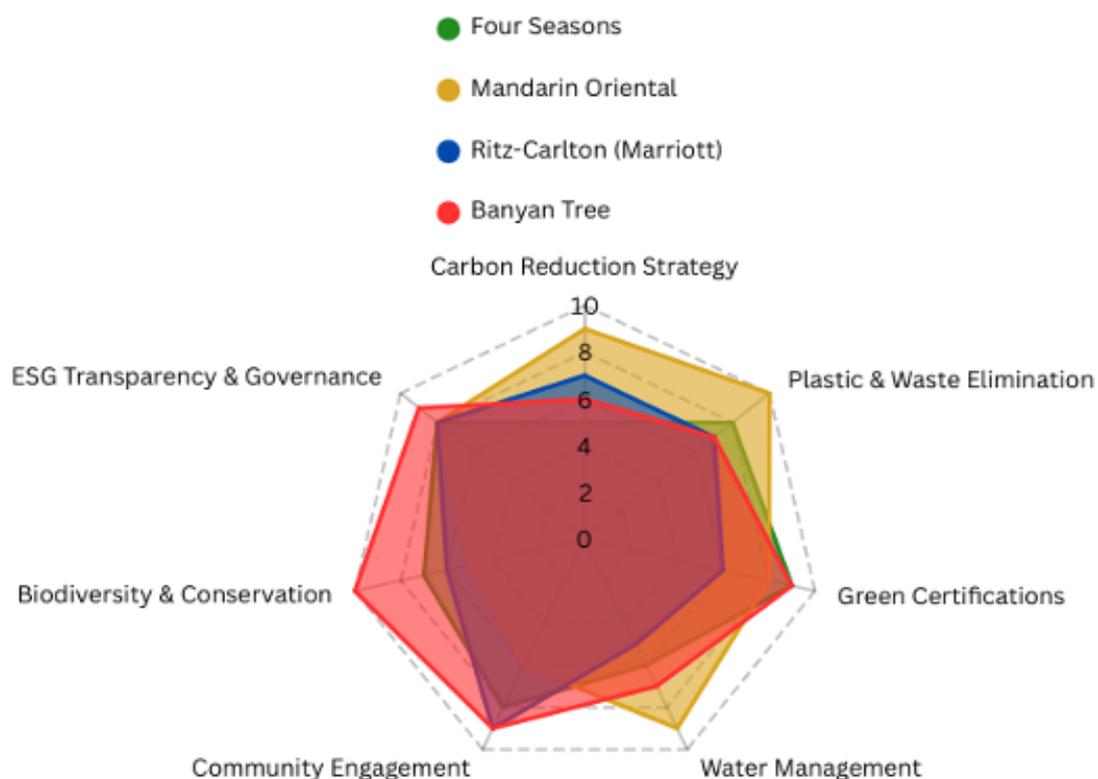
Source: Figure created by the authors, based on the four players' sustainability reports.

As can be seen from the radar chart, Banyan Group performs particularly well in biodiversity and conservation, where its initiatives in marine restoration and turtle protection stand out. The group also scores strongly in community engagement, thanks to programmes like Stay for Good and Seedlings, and in governance, where it has many years of sustainability reporting and clear alignment with the SDGs (Banyan Group, 2024).

However, the benchmarking also highlights some areas where Banyan Group could improve. In terms of carbon reduction, the group has made progress, with 3% emissions cut from 2022 to 2023, but it is further away from its 2030 carbon reduction target (Banyan Group, 2024), compared to competitors like Mandarin Oriental. Similarly, while Banyan Group has reduced single-use plastics by 32% (Banyan Tree Group, 2023), others have gone further; for example, Mandarin Oriental has eliminated 99% of plastic items as of 2022 (Mandarin Oriental Hotel Group, 2024). In water management, Banyan Group has implemented rainwater harvesting and recycling, but total water use increased in 2022, suggesting that efficiency gains may not yet be keeping pace with operational growth (Banyan Tree Group, 2023).

Strategic Challenges

While Banyan Group's sustainability model is widely seen as a leader in the industry, putting this approach into practice comes with some challenges. These challenges pertain to its long-term resilience, as the group's commitment to going beyond basic compliance and making sustainability part of every resort's daily operation sets it apart but also creates complexity. The most immediate challenge is cost. Banyan Group's sustainability programmes require significant investments, both to set up and maintain. In regions where there are no strong green finance incentives, these costs fall entirely on the company. Another issue is the uneven performance across properties.

While the group achieved a 22% reduction in emissions per occupied room in 2023 and improved water efficiency by nearly 8%, it remains slightly behind competitors like Mandarin Oriental, which reported a 12% reduction in water intensity over a longer baseline (Banyan Group, 2024; Mandarin Oriental Hotel Group, 2024). Some resorts have advanced systems in place, while others lag due to different local contexts and staff capacity. This lack of consistency could become a reputational risk, especially as travellers and booking platforms begin to expect proof of performance at each location. Finally, Banyan Group's exposure to climate risks is high. In general, resorts located in coastal areas face the threat of rising sea levels, coral bleaching and extreme weather (International Finance Corporation, 2024). These threats affect not just the environment but also the business itself, since much of Banyan Group's appeal depends on the health of its natural surroundings. Preparing for these risks will require new investments in infrastructure and insurance, as well as long-term planning to protect the value of its assets.

Impact and Business Performance

Banyan Group's Sustainability Initiatives

Banyan Group's commitment to sustainability has helped to boost its brand image, nurture customer loyalty, and positively impact its financial outcomes. As a trailblazer in weaving sustainability into the fabric of luxury hospitality, Banyan Group showcases how environmental and social initiatives can not only lead to business success but also tackle pressing global issues. This analysis delves into how these sustainability efforts bolster the brand's reputation and customer loyalty, looks at key metrics tied to environmental and social impacts, and assesses the financial ramifications of these initiatives.

How Sustainability Initiatives Enhance Brand Reputation and Customer Loyalty

Banyan Group's sustainability initiatives have played a crucial role in shaping its image as a purpose-driven luxury hospitality brand. The company's guiding principle of "Embracing the Environment, Empowering People" resonates strongly with eco-conscious travellers who are increasingly making sustainability a priority in their travel choices. By weaving environmental conservation and community empowerment into its operations, Banyan Group has established itself as an ethical leader in the industry.

The group's Green Imperative Fund allows guests to contribute small amounts to local conservation and community projects, enabling guests to directly contribute to meaningful change. The guests' donations are also matched by the group (Banyan Group, 2024). Initiatives like coral planting programmes, turtle conservation efforts, and reforestation projects safeguard biodiversity and offer unique experiences that set Banyan Group apart from its competitors. These initiatives cultivate a strong brand and customer loyalty.

Moreover, Banyan Group shines when it comes to engaging with the community, which helps build a solid reputation among local stakeholders. Their initiatives, such as vocational training for underprivileged youth and collaborations with artisans, empower these communities and offer guests genuine cultural experiences. This blend of sustainability and luxury deepens the emotional bond between the brand and its customers, which could lead to repeat visits and word-of-mouth publicity.

Key Metrics on Environmental Impact

Banyan Group has a thorough approach to measuring the effects of its sustainability efforts, focusing on both environmental and social aspects. On the environmental side, it has lowered its carbon emissions per occupied room by 22% in 2023 compared to

2022 (Banyan Group, 2024). Additionally, single-use plastics per occupied room decreased by 33.5%.

The group's water conservation efforts saw 2.3% of water saved across their properties. Protecting biodiversity is a priority, as shown by its programmes in coral restoration, clownfish breeding and conserving sea turtles. In 2023, it worked with the China Environmental Protection Foundation to breed over 4,000 endangered juvenile clownfish and release over 2,700 clownfish. As of 2023, the total number of turtle hatchlings released at the group's Laguna Bintan since 2008 was over 7,700 (Banyan Group, 2024).

Financial Implications of Sustainability Efforts: Costs Versus Long-Term Profitability

While there are initial costs associated with rolling out sustainability initiatives, Banyan Group shows that these efforts can pay off. In 2024, the group secured a S$70 million sustainability-linked loan from Maybank (Tan, 2024). This green financing lowers capital costs and strengthens investor confidence in the brand's long-term potential. Banyan Group is achieving revenue synergies by showcasing that its operations are financed through sustainability-linked loans, reinforcing an eco-friendly image in customers' minds. This loan came on the back of the group's 23% year-on-year sales increase in 2023, bringing in S$267.8 million in revenue.

Banyan Group's Future Outlook: Sustainability-Driven Growth and Innovation

In an interview, Philip Lim, Banyan Group's Senior Vice President of Regional Operations and Group Specialist Services, said that the company sees growth opportunities in sustainability, amidst a general outlook of a stagnant world economy and heightened geopolitical tensions (Landsey, 2025). To ensure the company adopts sustainable tourism practices, it established a sustainability framework named "Brand for Good" at an early stage. Using that framework, Banyan Group is building its path in the global tourism landscape with sustainable initiatives and innovation.

Strengthening Net-Zero Commitments

In striving for a net-zero future and achieving its target of reducing emissions by 42% by 2030, Banyan Group needed to determine the biggest source of emissions among its business activities. The material hotspots turned out to be electricity and food (Terrascope, 2024). Therefore, these two sectors become the main concerns in its decarbonisation strategies.

Solar Energy and Sustainable Battery-Powered Off-Grid Accommodations

In recent years, Banyan Group has been exploring the use of renewable energy to reduce its electricity emissions on its sites. This led to a pilot solar project in 2023 in Laguna Phuket Kindergarten, the same area as Banyan Tree Phuket. Partnering with a Singapore-based solar developer, New Energy Capital Asia, Banyan Group supported the transition of Laguna Phuket to become a green tourism destination in Thailand (Banyan Group, 2023). Together, they built rooftop photovoltaic panels on the kindergarten that met 43% of its energy needs for the year (Banyan Tree Group, 2023). In 2023, solar panels were installed at the Laguna Lakeside condominium project, which would reduce electricity consumption by 18% (Banyan Group, 2024).

The ambition for energy transformation does not stop at having more solar panels installed. Going beyond, Banyan Group realises the importance of the use of batteries to store solar energy so as to enable off-grid electricity usage. Banyan Group co-founder Ho Kwon Ping shared his vision of creating accommodations that fully rely on sustainable energy (Design and Architecture Magazine, 2024). Inspired by innovations in the electric vehicle landscape, Ho sees the possibility to develop the same system where accommodations can store the solar energy collected during the day to power their activities day and night. This could lead to more cost-saving and sustainable daily operations.

As great as it sounds, this solution may not be applicable for all Banyan Group accommodations due to differences in sunlight levels. In the same interview, Ho expressed that the group is exploring these energy trials in a few island resorts. If successful, Banyan Group would be the pioneer of such innovation in the tourism sector. However, it needs to work with other stakeholders, such as the local governments and solar developer companies, to make the scheme work. In addition, due diligence needs to be done to ensure that forming the supply chains for the solar panels and batteries will not create larger emissions.

Greening Food Supply Chains

Banyan Group has, as its mission, to green its food supply chain, as it is its second-highest emission-generating business activity (Terrascope, 2024). In its Sustainability Report 2023 (Banyan Group, 2024), the company has set an ambitious target for 100% of its seafood to be from sustainably certified sources by 2030 and 100% cage-free eggs by 2025. Its progress then was 5% of sustainably sourced seafood and 8% of cage-free eggs. The report also shows the average ratio of cage-free eggs used in its hotels being 16% in Southeast Asia, 2% in China and 2% in the rest of the world (Banyan Group, 2024). Despite efforts to green its hotels' food supply chains, difficulties remain for the company to reach its targets.

One way to improve is to scale up the "farm-to-table" concept in all its properties. The company can work hand-in-hand with nearby communities to provide locally sourced food, hence reducing emissions related to the transportation of food. Moreover, it can be included in the "Stay for Good" programme, which aims to encourage tourists to practise regenerative tourism. Guests could experience "farming" with the local communities and enjoy fresh, locally sourced food. To take it a step further, Banyan Group could launch initiatives or training that encourage local communities to adopt regenerative farming or sustainable fisheries. To create a special menu, restaurants could partner with famous chefs. For example, Banyan Group had worked with Grassroots Pantry, a Hong Kong cuisine brand, to launch a plant-based menu (Mark, 2020). These initiatives could add value for the business, considering the growing market of sustainable and health-conscious consumers nowadays.

Expansion Opportunities with Sustainability Framework

Banyan Group is expanding. At the end of 2022, it had 63 properties and aimed to double this number to 113 by 2025 (Carruthers, 2023). However, expansions can also imply more emissions, posing challenges to its sustainability commitment. Ways to expand the hospitality business without incurring a large environmental footprint include promoting more sustainable ways of tourism and forming partnerships with other players.

Pioneer in Promoting Sustainable Tourism

Banyan Group started strong with its sustainable philosophy when it acquired an abandoned tin mine site in Phuket and converted it into profitable accommodation (Banyan Group, 2024). Promoting sustainable tourism becomes its unique value proposition. Under its Build for Good concept, properties are built to incorporate local elements and minimise disturbance to the natural landscapes (Banyan Tree Group, 2021). Banyan Group's new developments include Ubuyu in Tanzania, which will be the group's first safari resort (Birch, 2025). It will embrace the wilderness of the region and, at the same time, promote biodiversity preservation. In this way, practices related to tourism could be comparatively more responsible.

Business Expansion by Existing Hotel Acquisitions

While building new developments might incur costs to sustainability, Banyan Group has alternative options to grow by rebranding existing hotels and forming strategic partnerships with other players. Embracing its business model as hotel management rather than real estate development, Banyan Group has carved out room for navigation. As a hotel management player, it is not limited to building new constructions. Rather, it could acquire existing hotels from other companies. It has formed partnerships with other hospitality players, such as Accor, to manage hotels

(Tan, 2023). In this way, it expands the brand without a large capital expenditure and emissions from building new developments. Besides, acquiring and managing existing hotels will also mean more hotels adopting the company's principles on sustainable tourism practices. Hence, more hospitality players can be influenced to commit to more responsible business operations and create impactful outcomes for larger communities.

Conclusion

Banyan Group has firmly established itself as an industry leader in sustainable luxury tourism by successfully integrating ESG principles throughout its business operations. The company's guiding philosophy, "Embracing the Environment, Empowering People", serves as the foundation for its comprehensive sustainability strategy, which influences everything from resort design to daily operations and community partnerships. Key environmental achievements include a 22% reduction in emissions per occupied room in 2023, an 8.4% improvement in water conservation, and extensive biodiversity programmes featuring coral restoration and large-scale tree planting initiatives. On the social front, Banyan Tree demonstrates a strong commitment through its diverse workforce (42.2% female representation), community development programmes like Seedlings Mentorship, and ethical partnerships with local artisans. The company maintains rigorous governance standards, including progressive goals for ethical sourcing and robust anti-corruption measures, with 92% employee training compliance.

These sustainability efforts have translated into tangible business benefits such as measurable cost savings from energy efficiency measures. However, challenges persist, including inconsistent sustainability performance across properties, the significant financial investment required for green initiatives, and vulnerability to climate-related risks at coastal locations. Looking ahead, Banyan Group has set ambitious targets, including achieving net-zero emissions by 2030, sustainable food supply chains, and expansion into new sustainable tourism markets like its planned safari resort in Tanzania. The company's holistic approach demonstrates that environmental responsibility and business success can be mutually reinforcing, positioning Banyan Group as both a model for the hospitality industry and a catalyst for broader change in sustainable tourism practices. By maintaining its pioneering spirit while addressing current challenges, Banyan Group is well-positioned to strengthen its leadership role in the evolving landscape of responsible luxury travel.

Banyan Group's Role in Sustainable Tourism

Banyan Group exemplifies how luxury hospitality can harmonise profitability with planetary and social well-being. Its holistic approach—from eco-friendly resorts to community empowerment—sets a benchmark for the industry.

By leveraging partnerships, green financing and scalable solutions, Banyan Group can further solidify its role as a transformative force in sustainable tourism. Its journey underscores a critical lesson: true sustainability is not a trend but a long-term commitment that balances ecological stewardship, social impact and business resilience. As the hospitality sector evolves, Banyan Group's model offers a compelling blueprint for others to follow.

Discussion Questions

1. How might Banyan Group's deep integration of sustainability into its business model create both advantages and vulnerabilities compared to competitors who treat environmental initiatives as optional add-ons?

2. The hospitality industry often frames sustainability as a cost centre. How does Banyan Group's model reframe environmental and social responsibility as a driver for innovation and market expansion?

3. Banyan Group operates in culturally and ecologically diverse regions, from coastal resorts to safari destinations. What inherent tensions arise when applying a unified sustainability framework across these contexts, and how might the company maintain operational coherence without compromising local ecological or cultural authenticity?

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DBS: Driving Sustainable Finance in Asia

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Introduction

Vision, Mission and Strategic Blueprint

DBS Bank is headquartered in Singapore, and it envisages being the "Best Bank for a Better World" by integrating sustainability into its core operations. The mission of the bank is centred upon leveraging its financial expertise to drive positive environmental and social outcomes while delivering sustainable financial performance (DBS Bank, 2025b). DBS's strategic sustainability blueprint is guided by three core pillars:

- **Responsible Banking:** Facilitating sustainable finance and responsible investment to support clients in their decarbonisation and sustainability transitions.

- **Responsible Business Practices:** Ensuring sustainable operations within DBS by incorporating robust governance, responsible tax policies, cybersecurity and ethical financial practices.

- **Impact Beyond Banking:** Driving social impact through DBS Foundation, employee volunteerism and financial inclusion initiatives.

DBS's sustainability blueprint aligns with various global and regional frameworks related to the United Nations Sustainable Development Goals (SDGs), the Task Force on Climate-related Financial Disclosures (TCFD), and the Monetary Authority of Singapore's Green Finance Industry Taskforce (MAS-GFIT). The bank is committed to net-zero emissions by 2050, embedding Environmental, Social and Governance (ESG) considerations into decision-making and stakeholder engagement (DBS Bank, 2025b).

Sustainability Goals

DBS has set ambitious sustainability goals that address climate action, responsible finance, social inclusion and ethical governance. Its key objectives (DBS Bank, 2025b) include:

- **Sustainable Finance Commitments:** This targets S$89 billion in sustainable finance as of 2024, with ongoing support for clean energy, circular economy initiatives and green bonds.

- **Operational Carbon Footprint Reduction:** This envisages implementing an enhanced decarbonisation strategy with energy efficiency improvements and sustainable procurement practices.

- **Financial Inclusion:** This covers extending banking services to underserved communities, including disbursing over S$3.4 billion in Priority Sector Lending in India and S$1 billion in microfinance loans in Indonesia.

- **Workforce Diversity and Inclusion:** This includes promoting diversity, equity, and inclusion (DEI) across its workforce, achieving a 91% employee engagement score in 2024.

- **Community Engagement:** This encompasses committing S$1 billion over ten years for social impact programmes through DBS Foundation.

Overview of DBS' ESG Framework

DBS has adopted ESG considerations while also considering the economic implications of its activities to guide its sustainability strategy. This comprehensive approach ensures a balanced approach to financial performance while addressing key sustainability imperatives.

Economic Factors

DBS looks at integrating economic resilience with sustainability by investing in transition finance, green bonds and climate risk management. As an Asia-centric bank, it also plays a pivotal role in financing Asia's decarbonisation through innovative financial solutions such as sustainability-linked loans and green infrastructure financing (DBS Bank, 2025b).

Environmental Factors

DBS has developed a robust climate strategy focusing on:

- **Net-Zero Transition:** Aligning financed emissions with science-based targets.

- **Operational Sustainability:** Reducing its environmental footprint by integrating sustainable procurement and energy-efficient operations.

- **Green Finance Growth:** Increasing investments in renewable energy projects and low-carbon technologies.

Social Factors

DBS seeks to enhance financial inclusion, employee development and community impact through:

- **Accessible Banking Solutions:** Focused on promoting digital banking solutions for underserved populations.

- **Employee Development:** Conducted sustainability training programmes for over 22,000 employees to develop their sustainability knowledge.

- **Community Support Initiatives:** Actively encouraging employee volunteerism, with over 270,000 hours dedicated to social impact projects in 2024 (DBS Bank, 2025b).

Governance Factors

The governance structure of DBS ensures accountability and transparency in sustainability efforts through:

- **Board Oversight:** The Board Sustainability Committee (BSC) is a critical committee of the board, and it oversees climate commitments along with ESG risk management.

- **Regulatory Compliance:** It aims to align with MAS-GFIT guidelines, TCFD recommendations, and the International Financial Reporting Standards (IFRS) Sustainability Disclosure Standards.

- **ESG Risk Management:** It targets implementing a climate risk framework to assess sustainability risks across lending portfolios.

While the above information provides an overview, the following sections will detail how DBS implements sustainability through the economic, environmental, social and governance dimensions.

Economic Dimension

DBS strategically aligns economic resilience with sustainability by leveraging its financial expertise and Asia-centric focus. Recognising the growing importance of climate-related risks and opportunities, DBS has positioned itself as a pioneer in sustainable finance, supporting both corporate clients and governments in their transition to low-carbon economies.

Transition Finance

"With transition finance and our taxonomy, we want to be transparent," said Yulanda Chung, former head of sustainability, institutional banking group at DBS (DBS Bank, 2020).

- **Transparency:** Sustainability-Linked Loans (SLLs) that offer preferential interest rates for companies that meet predefined ESG targets (e.g. reducing carbon intensity).

    *"We need good greenhouse gas profile data from our customers. At DBS, through the offer of SLLs, we are able to incentivise companies to be more transparent in their greenhouse gas disclosure." – Yulanda Chung (*DBS Bank, 2020)

- **Context-driven:** DBS helps clients develop and execute robust climate strategies, aligning their business models with global sustainability goals related to the Paris Agreement, net-zero commitments and the Science-Based Targets initiative (SBTi).

As a market-driven solution, SLLs are more flexible than pure policy regulation and could effectively reduce the risk of greenwashing. However, there is still a lack of accuracy and consistency in enterprises' carbon emissions data.

Green Bonds

DBS is a key player in the issuance and structuring of green, social and sustainability-linked bonds, which help mobilise capital for environmentally and socially beneficial projects.

Key initiatives include:

- **Corporate and Sovereign Green Bonds:** Assisting clients in raising funds for renewable energy, energy efficiency and sustainable infrastructure.

- **Sustainability-Linked Bonds (SLBs):** Linking bond terms to sustainability performance targets (e.g. carbon emission reductions).

- **Developing Asia's Growing Green Bond Market:** DBS has also been instrumental in developing ASEAN's sustainable debt market, including Singapore's first sovereign green bond. The efforts help to finance the fight against climate change.

Compared with traditional green bonds, SLBs are more innovative in that they directly link the cost of financing to the sustainable performance of the enterprise, thus enhancing dynamic binding. However, in order to prevent problems such as "labelling abuse", where the user could self-define Key Performance Indicators (KPIs), the certification criteria for green bonds and the regulation of specific uses of funds still need to be strengthened.

DBS's economic strategy successfully combines business interests with social values. While Asia's green finance sector is growing fast, DBS' first-mover status can help it gain long-term market share. But at the same time, there needs to be dynamic adjustment of the strategy due to possible political and economic volatility in the region.

Environmental Dimension

Climate

Climate change is a critical global challenge, with far-reaching consequences that affect ecosystems, economies and communities (United Nations, n.d.). As the first bank in Singapore and among the first 100 worldwide to join the Net-Zero Banking Alliance (NZBA), DBS has pledged to address these challenges by aligning its financing activities with net-zero goals, driving the transition to a low-carbon economy (DBS Bank, 2022).

The focus of this subchapter, under the environmental dimension of sustainability, is on two key pillars of DBS's net-zero strategy: operational emissions, which involve efforts to reduce the bank's direct carbon footprint, and financed emissions, which outline strategies to decarbonise its lending and investment portfolios.

Pathway to Operational Decarbonisation

From an operational perspective, DBS is committed to achieving net-zero emissions by 2050, with an interim milestone set for 2030, aligned with the Carbon Risk Real Estate Monitor (CRREM) 1.5°C pathway (DBS Bank, 2025b). In 2017, DBS became the first Asian bank and Singaporean company to join RE100, a global initiative of businesses committed to 100% renewable electricity (Williams, 2017).

The bank's efforts focus on reducing Scope 1 and Scope 2 emissions, primarily from electricity and chilled water consumption across its owned and leased properties, as mentioned in their 2024 Sustainability Report.

To meet these targets, DBS applies a structured four-lever approach (DBS Bank, 2025b):

- **Lever 1:** Reducing consumption of resources

- **Lever 2:** Generating renewable energy

- **Lever 3:** Purchasing green products, energy and Renewable Energy Certificates (RECs)

- **Lever 4:** Purchasing carbon offsets

Pathway to Decarbonising Financed Activities

Given that financed emissions represent a significant source of climate change (Fogarty, 2022), committing to setting ambitious emissions reduction targets in their financing portfolios is critical for banks to drive a sustainable future (WWF Singapore, 2024). By joining the NZBA in October 2021, DBS pledged to align its financing activities with a net-zero emissions goal by 2050. The bank has committed to specific Scope 3 emissions reduction targets, redirecting capital away from high-carbon industries towards sustainable alternatives to accelerate the global low-carbon transition, while ensuring that growth remains inclusive.

Before joining the NZBA, DBS had already restricted its coal financing in 2018, limiting funding for coal-fired power projects to only those using advanced technology and ceasing financing for new thermal coal mining projects. By 2019, the bank committed to phasing out funding for all new thermal coal assets and has since progressively phased down its coal exposure (DBS Bank, n.d.-b). DBS continued its efforts through its 2022 "Our Path to Net Zero" report (DBS Bank, 2022), establishing some of the most detailed Scope 3 emission targets in the banking sector.

These science-based targets cover DBS's corporate financing (Institutional Banking Group (IBG) portfolio), equity capital markets (ECM), and debt capital markets (DCM) transactions, ensuring comprehensive accountability for financed emissions. These targets are based on internationally recognised pathways, such as the International Energy Agency's Net Zero Emissions by 2050 Scenario, and cover nine key sectors for decarbonisation. For two sectors, Food & Agribusiness and Chemicals, DBS has set data coverage targets, where DBS is improving emissions reporting before setting reduction targets.

Figure 1: DBS' Targets Covering Nine Key Sectors

Source: DBS Bank, 2025b

As of 2024, DBS has made considerable progress, with five of the seven sectors with emission reduction targets aligning with reference scenarios. Nonetheless, challenges such as the availability of viable decarbonisation technologies—especially relevant for sectors like steel and shipping—and the need for a supportive policy environment persist. Despite these challenges, DBS is partnering with clients to ensure an inclusive transition to net zero as outlined in its 2024 sustainability report.

Beyond decarbonisation, DBS also integrates climate risk management into its governance framework, aligning with the TCFD standards to embed climate considerations into board-level decision-making and scenario analysis.

Green Finance

Sustainable Finance Portfolio

DBS Bank has increased its amount in sustainable finance to S$89 billion in 2024, growing by S$70 billion when compared to 2023. The bank focuses on green, sustainable, and socially linked loans to support projects that align with the UN Sustainable Development Goals (Singapore Business Review, 2025). In addition, DBS launched the ESG Ready Programme in Singapore and enhanced its ESG risk management capabilities through personalised training for its staff and strengthened its artificial intelligence for data analysis.

Low-Carbon Projects

DBS is a leader amongst Asia's banks, especially in the renewable energy field. Since 2018, the bank has sponsored 29 renewable energy projects worth around S$3.6 billion across Asia (DBS Bank, n.d.-d). A notable project is Singapore's first large-scale floating solar plant at Tengeh Reservoir, covering 45 hectares, launched for supporting the country's clean energy goals. DBS also served as a financial adviser for Taiwan's floating solar project and its biggest ground-mounted solar farm, supporting Taiwan's transition to renewable energy. In the transition finance space, DBS structured a green loan for Rexus Bioenergy in 2024 for a biomass power plant in Singapore that integrates carbon capture technology (DBS Bank, 2024). Transition financing supports

decarbonisation in traditionally carbon-intensive sectors such as energy, infrastructure, and manufacturing.

Social Dimension

Recognised as the world's best bank for corporate responsibility in 2023 by Euromoney (Euromoney, 2023), DBS adheres to three key sustainability philosophies: reliable banking, responsible business practices and creating impact that goes beyond the banking industry. The following section will detail DBS' initiatives to promote corporate social sustainability in these three areas.

Reliable Banking

Inclusive Financial Services

A substantial number of individuals and businesses across Asia today still do not have access to good banking services. To address this issue, DBS has launched innovative financial products and services for underserved groups.

The bank has implemented the Ecosystem Lending (ESL) initiative to support the Indonesian government's goal of promoting financial inclusion by partnering with a number of fintech and multi-financial companies, disbursing more than S$1 billion in loans to the country's low-income groups (DBS Bank, 2025b).

For China, the programme supported low-income earners with monthly incomes at a maximum of S$320 by providing unsecured micro-cash loans with partners, with a credit line of more than S$15 million by 2024.

In rural India, DBS partnered with a local Corporate Business Correspondent (CBC) to provide basic banking services, including access to money, money transfers, and access to account information in remote areas. As of the end of 2024, DBS, with its 142 branches in India, predominantly in the state of Tamil Nadu, has reached out to 134 villages and 231 administrative districts (DBS Bank, 2025b).

Supporting Micro, Small and Medium Enterprises (MSMEs)

In recent years, MSMEs have faced a rapidly evolving and complex economic environment. In response, DBS has disbursed about 4,000 unsecured loans totalling S$500 million to Singaporean MSMEs and provided a simplified application process without documentation for working capital requirements up to S$50,000 by the DBS Quick Finance programme (DBS Bank, 2025b).

In Hong Kong, DBS Hong Kong is an active participant in the SME Financing Guarantee Scheme (SFGS), in partnership with the Hong Kong government and

HKMC Insurance. SFGS aims to enhance cash flow support for local SMEs, helping them to access the financing needed for business development. Also in India, DBS Bank India Limited (DBIL) provides unsecured loans of up to S$333,000 to SMEs through the Credit Guarantee Fund Trust for Micro and Small Enterprises (CGTMSE) programme (DBS Bank, 2025b).

Developing Financial Literacy for Different Age Groups

DBS has diversified its education programmes to provide different generations with different knowledge and skills. For primary and secondary school students, DBS launched the POSB Smart Buddy in 2017, which is the world's first on-campus integrated savings and payments system that supports 230,000 students in more than 250 schools in Singapore to make payments using a Smart Buddy watch or card. This programme also includes a national savings campaign that aims to help one-third of primary and secondary school students save an additional S$35 million by 2026 (DBS Bank, 2025b).

Through these initiatives, DBS hopes to foster financial awareness and responsibility among young people, as well as boost their confidence and ability to manage their own finances.

For the elderly who might be unfamiliar with digital tools and have little awareness of fraud prevention, DBS focuses on fraud prevention education and tools. In Singapore, DBS has conducted 94 workshops and learning programmes involving more than 19,000 seniors in 2024 (DBS Bank, 2025b).

Responsible Business Practice

Employee Development and Rights

To break down silos and maximise team effectiveness, DBS has established many mechanisms, including Managing through Journeys (MtJs) and Horizontal Organisation. In addition, DBS supports staff to communicate with senior managers through initiatives such as DBS Open, Tell Piyush, and regular executive visits to staff offices for face-to-face interaction. More importantly, its Building Great Managers programme was designed to give executives strategies and guidance on how to deal with a diverse workforce (DBS Bank, 2025b).

To enhance employee recognition, DBS introduced the MtJ Performance Development & Compensation as a KPI framework, under which employees are recognised and valued for their work. This framework helps the employees to better understand themselves and their strengths. DBS also leverages AI to support its employees, allowing them to focus their time and energy on more complex and

meaningful tasks. This not only enhances their work efficiency but also boosts their self-confidence and sense of self-worth.

In terms of protecting employees' physical and mental health, DBS provides comprehensive resources. Its iOK programme and relevant service providers offer mental health support, legal advice and caregiving support for employees and their families. To encourage employees to stay healthy, DBS iFit records employees' annual health metrics, and rewards are offered to the top performers. DBS has also set up Well-being Wednesday and Focus Fridays. Finally, DBS is guided by the Workplace Safety and Health (WSH) Act, which provides comprehensive measures for workplace safety and health (DBS Bank, 2025b).

Talent Development

To promote the workplace development of employees and increase the talent pool, DBS Bank conducts corresponding measures in three main areas, which are nurturing talent, skills building and leadership development.

- **Developing Talent:** DBS conducts a comprehensive talent assessment every year. The entire assessment process follows a mature framework, under which DBS evaluates more than 250 succession plans every year and conducts about 20 sessions of talent assessment.

- **Skills-building:** DBS has adopted the Triple E framework, which provides support for employees' career development from the three aspects of Education, Exposure and Experience. For Education, the bank provides employees with structured study channels and courses. For Exposure, DBS encourages employees to actively participate in the Be My Guest programme to gain experience and broaden their horizons, and for Experience, DBS encourages internal mobility so that employees can experience different roles and strengthen their abilities to become all-rounders.

- **Leadership development:** DBS conducts regular training for managers, organises hundreds of structured experiential workshops, and establishes leadership communities, where experienced individuals mentor the next generation of managers (DBS Bank, 2025b).

Diversity and Inclusion

DBS embraces diversity and fosters an inclusive workplace environment, which can be primarily demonstrated by women making up 20% of its Board of Directors, 23% of its Group Management Committee members and 41% at the senior management level (DBS Bank, 2025a; DBS Bank, n.d.-c). In addition to gender diversity, DBS also focuses on other aspects of diversity, ensuring that the hiring process is not influenced

by age, race, religion, marital status or physical disability, and prioritising the professional competence and work experience of candidates to promote cognitive and experiential diversity (DBS Bank, 2025b).

Creating Impact That Goes Beyond the Banking Industry

Community Development Programmes

The DBS Foundation provides funding to businesses across Asia to support causes such as poverty alleviation, education and environmental sustainability. In December 2023, DBS partnered with the China Guanghua Science and Technology Foundation to donate RMB1 million and books valued at RMB1.4 million through the DBS Foundation and provided online financial education to about 140,000 youths in 20 rural schools (Zhao, 2023). DBS also works with non-profit organisations to support food security programmes to ensure that low-income families have access to nutritionally balanced meals.

Volunteerism Programmes

DBS volunteerism programmes provide employees with a wide range of volunteering opportunities and resources in areas such as education, environment and health (DBS Foundation, n.d.-a). To incentivise participation, employees are also provided with paid volunteering leave. These volunteering activities are aimed at providing employees a sense of self-worth and fulfilment and deepening their ties with the community. In group volunteering activities, employees are able to enhance their teamwork spirit, helping their ability to work better as a team in the workplace. For DBS, organising volunteering activities can further promote the bank's social responsibility objectives, expand the bank's social influence in the community and build a good reputation.

Governance Dimension

DBS demonstrates strong governance practices through its robust board structure, regulatory compliance and risk management framework. Its governance framework aligns with international best practices, ensuring accountability and transparency in sustainability efforts.

Board Structure of DBS

At DBS, the top of the governance structure is the Board of Directors, which is collectively responsible for the long-term success of the bank and has ultimate responsibility for the firm's sustainability strategy and reporting. It provides

constructive challenges and strategic advice to management. Three key committees are responsible for sustainability governance:

- **Board Sustainability Committee (BSC):** Oversees the bank's progress on sustainability strategy and climate commitments.

- **Audit Committee:** Oversees disclosure and reporting matters.

- **Board Risk Management Committee:** Oversees climate-related risk management.

Figure 2: DBS's Sustainability Governance Structure
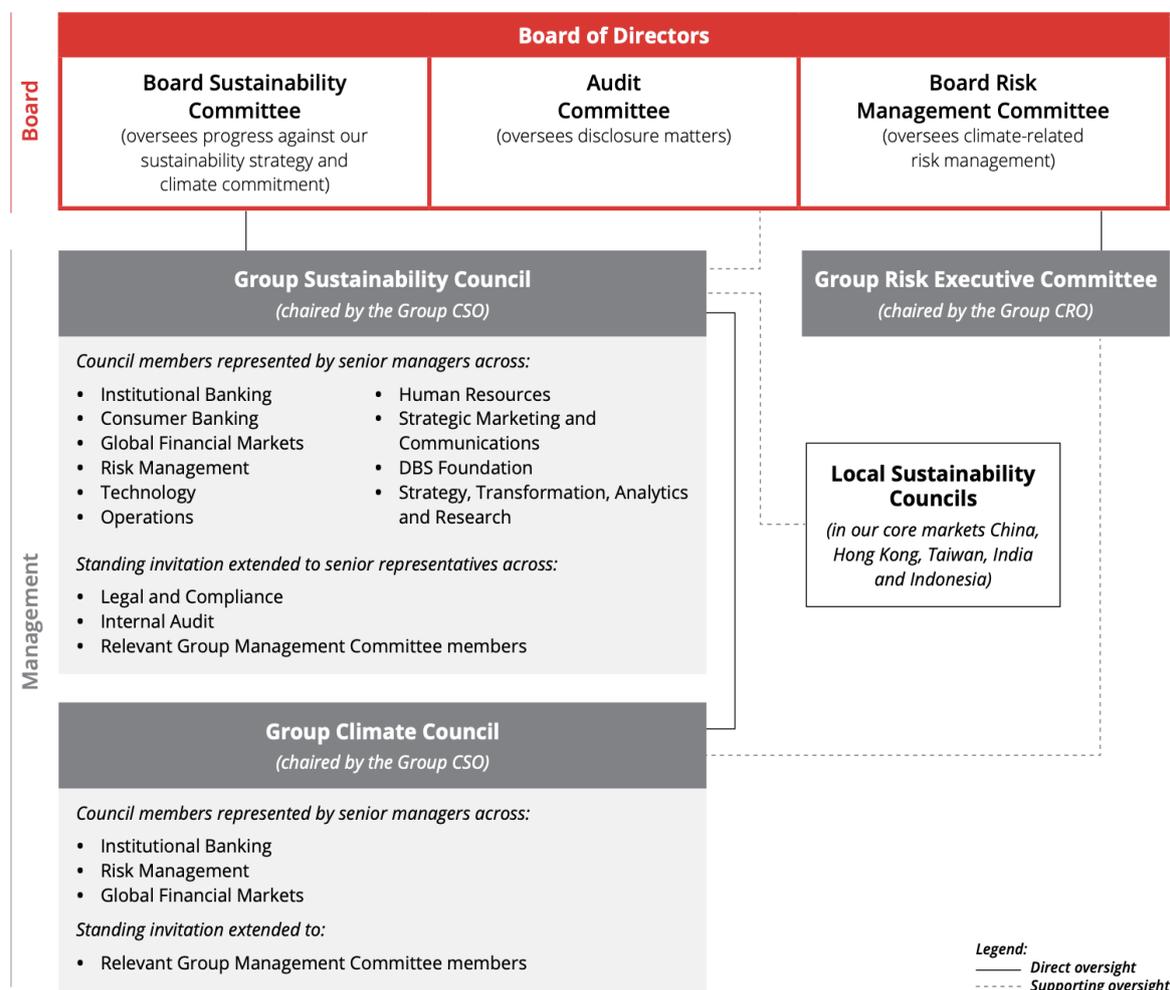
Source: DBS Bank, 2025b

Furthermore, DBS has established the **Group Sustainability Council (GSC)** to operationalise the board's direction. It is chaired by the Chief Sustainability Officer. This council is responsible for setting the strategic direction of DBS' sustainability agenda and ensuring the execution of sustainability initiatives. Council members

include senior members from key business and support units across the bank. The GSC is further advised by the BSC, which provides oversight on the Bank's sustainability agenda. It is chaired by the DBS CEO, and its members comprise some DBS board members as well as a non-director member who is a sustainability expert (DBS Bank, 2025b).

In 2024, to ensure robust governance to oversee the execution of its climate strategy and net-zero commitment, DBS has institutionalised a new **Group Climate Council (GCC)** as a sub-committee of the GSC. Its members comprise representatives from key units, who possess the requisite knowledge and capabilities to set strategic direction for DBS' climate-related initiatives. Moreover, **Local Sustainability Councils** are the extension of GSC in core markets (Mainland China, Hong Kong, Taiwan, India, and Indonesia) and are responsible for executing sustainability initiatives while adapting to local market cultures and contexts.

In general, DBS has embedded sustainability into its core governance framework and business strategy. DBS' Board of Directors, through its BSC, has placed sustainability as a strong focus in the company. This ensures that the transparency and accountability of DBS's sustainability permeate through all levels.

Regulatory Compliance

DBS publishes an annual sustainability report prepared in accordance with several international governance regulations and standards to ensure comprehensive and transparent reporting. Some standards used by DBS are:

- The Financial Institutions Climate-related Disclosure Document by the MAS-convened Green Finance Industry Taskforce.

- Task Force on Climate-related Financial Disclosures (TCFD) Recommendations by the Financial Stability Board.

- International Financial Reporting Standards (IFRS) Sustainability Disclosure Standards by the International Sustainability Standards Board (ISSB).

These standards help to improve the quality of its sustainability and climate-related risk reporting and to comply with the regulatory requirements.

ESG Risk Management

DBS Bank has implemented a comprehensive framework to assess and manage sustainability risks, including climate-related risks, across its lending portfolios. This framework integrates ESG considerations into the bank's risk management

processes, aiming to enhance client engagement and ensure business resilience. Key components of the firm's ESG Risk Management Framework include:

- **Group Responsible Financing Standard:** DBS set out internal policy standards that include specific guidelines for sectors with elevated ESG risks, ensuring that ESG considerations are embedded in the credit approval process.

- **Integration of ESG into Risk Management:** DBS has developed quantitative models to assess climate-related risks and physical risks for borrowers. They ensure that ESG risks are assessed alongside traditional financial risks.

- **Use of Artificial Intelligence (AI):** DBS uses AI to enhance the climate and ESG risk assessments process in the bank, enabling more efficiency and consistency of ESG risk assessments across clients and portfolios (DBS Bank, 2025b).

Challenges

Certain risks and challenges remain in DBS' efforts to be a sustainable bank.

In 2023, DBS was among 12 banks that received human rights complaints for financing the Australian energy company Santos. A group of Indigenous people were unhappy with the energy firm's US$4.7 billion gas project in Barossa, Australia, which could cause negative impacts to their way of living. DBS responded that it had not provided direct financing for that gas project (Hislop, 2023). Still, the incident could cause reputational risks.

Reputation loss could also occur from governance lapses. The Hong Kong Monetary Authority fined DBS's Hong Kong subsidiary HK$10 million in 2024 for breaching anti-money laundering (AML) and counter-terrorism financing regulations. In addition, its investigation (covering 2012–2019) also found that DBS HK had failed to monitor certain high-risk customer relationships continuously because it lacked enhanced due diligence measures and did not maintain proper client records for some customers (Hong Kong Monetary Authority, 2024).

In 2023, the Monetary Authority of Singapore fined DBS S$2.6 million as DBS failed to update customer due diligence information and customers' money laundering risk ratings. These breaches were tied to 11 corporate accounts. Further, DBS had failed to adequately enquire into the background and purpose of unusually large transactions that were not consistent with its knowledge of the customers or had no apparent economic purpose (Monetary Authority of Singapore, 2023). These scandals were detrimental to DBS' reputation.

Conclusion

DBS has positioned itself as a sustainable finance leader in Asia by implementing sustainability practices into its core operations. The bank uses a comprehensive ESG framework that also integrates economic resilience, ensuring a balanced and sustainable approach to financial performance. With a strong commitment to achieving net-zero emissions by 2050, DBS has pioneered green and transition finance initiatives. The firm contributes significantly to Asia's decarbonisation through innovative financial solutions such as sustainability-linked loans and green infrastructure financing.

On the environmental aspect, DBS has developed a comprehensive climate strategy that focuses on net zero transition, operational sustainability and green finance growth. Socially, DBS is prioritising inclusive financial growth through financial literacy programmes, support for underserved communities, and a focus on employee well-being and development. DBS internal practices emphasise a culture of responsible banking with diversity and equity being a focus. On the governance dimension, DBS ensures accountability and transparency in sustainability efforts through board oversight, ESG risk management, and compliance with international standards such as TCFD, MAS guidelines and IFRS.

However, despite its strong sustainability performance, DBS still faces reputation and regulatory risks related to the companies that it finances. To overcome this challenge, DBS must reinforce its due diligence processes and prioritise stakeholder transparency. These steps will be crucial in maintaining DBS' long-term credibility in the sustainability journey.

Discussion Questions

1. In early 2025, there was an exodus of banks from NZBA. Discuss the factors that DBS should consider when deciding whether to stay or leave the alliance.

2. What are the financial mechanisms that DBS could use to contribute further to the climate change transition?

3. Given that financial institutions are at the epicentre of the climate change transition owing to their power and responsibility in funding projects, what recommendations would you give DBS regarding such funding?

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Grab: ESG with Economics in Southeast Asia

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Introduction

Grab Holdings Limited (Grab) is one of the leading super-apps in Southeast Asia. It is best known for its transport and food delivery services. Anthony Tan and Tan Hooi Ling started the company in Malaysia in 2012. Later, Grab moved its main office to Singapore. The app quickly became popular in the region because its easy-to-use digital tools helped people with their daily tasks. Today, Grab works in over 700 cities across eight countries—Cambodia, Indonesia, Malaysia, Myanmar, the Philippines, Singapore, Thailand and Vietnam (Grab, 2024). It offers ridesharing, food delivery, and financial services.

Grab serves a massive audience base, with over 35.5 million active monthly users, supported by over 6 million driver-partners and another 6 million merchant-partners and agents, facilitating more than 3.5 billion transactions (Grab, 2024). Regarding revenue, delivery services contribute the most at 55.5%, followed by mobility (ridesharing) at 36.9%, financial services at 7.5%, and other enterprise services at 0.1%.

Globally, Grab maintains 13 office locations, and over 88% of its employees are based in Southeast Asia (Grab, 2024). The company employs more than 10,000 full-time workers, about 1,400 fixed-term contract employees, and roughly 4,000 temporary workers. Grab has also earned international recognition for its innovation and social impact, including TIME magazine's 100 Most Influential Companies and Fast Company's Most Innovative Companies of 2023. Additionally, Grab has consistently maintained an MSCI "AA" rating since 2022. MSCI ESG ratings are a comprehensive measure of a company's long-term commitment to socially responsible investments (SRI) and Environmental, Social and Governance (ESG) investment standards. In particular, the MSCI ESG ratings focus on a company's exposure to financially relevant ESG risks (Hayes, 2022).

Industry Development: Food and Cab Services

Early Beginnings (2010–2014)

The rise of ride-hailing in Southeast Asia began with local startups addressing mobility challenges. After 2010, numerous ride-hailing and food delivery apps, including Grab, emerged rapidly, all aiming to dominate the Southeast Asian market. Gojek, founded in Indonesia in 2010, initially operated as a call-centre dispatching motorcycle taxis (ojeks) before launching its mobile app in 2014, providing efficient solutions to Jakarta's heavy traffic (Davis, 2018). Around the same period, Uber entered Southeast Asia, introducing private car-hailing via smartphones, thereby influencing the region's transport dynamics. These early entrants laid the groundwork for a transformative urban transport ecosystem.

Rapid Growth and App Expansion (2015–2017)

Widespread smartphone adoption and investor funding fuelled explosive growth in on-demand ride services. Grab, which started with taxi-hailing, quickly broadened its services to include private car rides (GrabCar) and motorbike taxis (GrabBike) around 2015–2016, allowing it to compete directly with Uber. Other players joined the market with their strategies. Gojek, for instance, made a strong debut in Indonesia by offering not just rides, but also courier and food delivery services from the very start. By 2017, Grab and Gojek had become "unicorns" with massive venture capital backing (Grab's investors included Microsoft and SoftBank, while Gojek attracted Google and Tencent) (Ajene, 2020). Consumer adoption climbed quickly. By 2018, an estimated 35 million Southeast Asians were actively using ride-hailing services, booking about 8 million trips a day (over four times higher than in 2015) (Google & Temasek, 2018). Still, this represented only a fraction of the region's population, leaving huge room for growth.

Major Milestones and Consolidation (2018–2019)

The year 2018 marked a turning point in Southeast Asia's ride-hailing history. In March, Uber decided to exit the region after years of intense competition and heavy losses. It sold its Southeast Asian operations to Grab in exchange for a 27.5% stake in Grab (Ajene, 2020). This consolidation handed Grab a dominant position in markets like Singapore, Malaysia, the Philippines, and Vietnam, effectively eliminating its main rival in those countries. Grab swiftly integrated Uber's services. For example, Uber Eats was folded into GrabFood, which Grab expanded aggressively across the region by late 2018 (Grab, 2018). But Grab soon faced new pressure from Gojek, which had started to expand outside of Indonesia. By 2019, the two companies were competing in many countries. This pushed both companies to grow and produce new ideas. The industry's Gross Merchandise Value (GMV) showed this fast growth: Southeast Asia's online transport and food delivery market went from around US$2.9 billion in 2015 to US$12.7 billion in 2019 (Google et al., 2019).

New Competitors and Evolving Landscape (2020–Present)

By 2021, further market consolidation occurred, for example, Gojek merged with Tokopedia, forming GoTo Group (Daga & Potkin, 2021), and Grab became publicly listed via a merger with a special purpose acquisition company (SPAC) (The Brand Hopper, 2023). The evolving market landscape also saw the emergence of new competitors aiming to capture a share of the burgeoning super-app market. Notably, AirAsia introduced AirAsia Move, integrating ride-hailing with its travel services to offer seamless airport transfers and other travel-centric solutions (Farid, 2025). Additionally, platforms like inDrive and Maxim entered the scene, each bringing unique value propositions to cater to diverse user preferences. Nowadays, ride and food-hailing apps have become an integral part of Southeast Asia's urban fabric. The industry's GMV is projected to continue its strong growth, on track to reach roughly US$40 billion

by 2025 (Google et al., 2019). The industry continues evolving, emphasising profitability, strategic expansion into smaller cities, and addressing regulatory challenges.

Economic Initiatives

Creating Value for Stakeholders

Investors

Grab is committed to enhancing its financial and sustainability performance to maximise investors' returns and create enduring shareholder value. The company is also focused on delivering transparent disclosures on business updates through earnings calls and its published reports.

Partners (Drivers and Merchants)

Through its platform, Grab has created many jobs for gig workers by bringing them on as drivers and delivery partners. Besides earning an income, drivers enjoy flexible working hours, insurance protection for work-related accidents, milestone incentives, professional development and career transition guidance. Furthermore, GrabFood and GrabMart allow food stores and mom-and-pop shops to gain access to a wider customer base, which helps to boost their business and growth. The GrabMerchant app provides merchants with insights on their business (such as whether they need to shorten their preparation time) and to more efficiently manage orders (Grab Editorial, 2023b).

Consumers

Grab's one-stop super app delivers consumers convenience and accessibility to multiple services, one-click away and round the clock. Consumers also enjoy user privileges, such as through means of in-app rebates and vouchers.

Employees

Grab has taken active steps to be an equal opportunity employer, advocating diversity and inclusion, and creating a safe, respectful workplace. The company also values its human capital and invests in employees through the provision of training, opportunities and benefits that contribute to employees' long-term success.

Grab partners with regulators in various countries where they operate to facilitate the training of and improve the well-being of driver-partners.

Grab's Business Model

Grab started as a ride-hailing services app but has over time transformed into a super app offering other services, including food and grocery delivery and financial services. The diversified business model has helped reduce the risk and extent of adverse effect resulting from any economic shocks. For instance, movement restrictions during the COVID-19 pandemic saw a drop in its Mobility segment (rides booked). However, this negative impact on Grab's business was offset by an increase in demand in the Deliveries segment (food, groceries, courier), which contributed nearly half of Southeast Asia's total food delivery GMV in 2020 (Teng, 2021).

Through diversification, Grab has created an ecosystem of products and services with multiple touchpoints for its users, increasing the number of monetisation opportunities for the business (Grab Editorial, 2025a). Noting that many Southeast Asians are underbanked and underserved, Grab branched out into the financial services sector, offering digital wallet (GrabPay), digital banking (GXS) and financial products. Financial products such as loans are extended to Grab platform users (merchants, consumers and drivers). This enhanced stickiness promotes continuous user traffic on Grab's platform, in turn fostering long-term growth for the business.

Environmental Initiatives

Grab has committed to their platform being carbon-neutral and having zero packaging waste by 2040.

Climate Action

To achieve this goal, Grab has set a four-lever mechanism in which **Lever 1** includes transitioning their driver partners towards low or zero emission vehicles, **Lever 2** being moving into renewable energy in Grab's buildings, **Lever 3** being developing sustainable technology practices, and **Lever 4**, as the last step, entails mitigating any remaining carbon emissions through targeted removal programmes. Over 96% of Grab's greenhouse gas emissions are Scope 3 emissions incurred from its delivery partner value chain (Grab, 2024). A major move to reduce these emissions is to transition to electric vehicle (EVs). Unfortunately, in 2023, Grab's emissions increased in alignment with the demand of the mobility sector, with Grab only reducing emissions via Scope 3 Category 11 (Use of Sold Products). To dive deeper into what actions they took to decrease their emissions, we can take a look at their lever-based actions.

Figure 1: Total Emissions in 2023
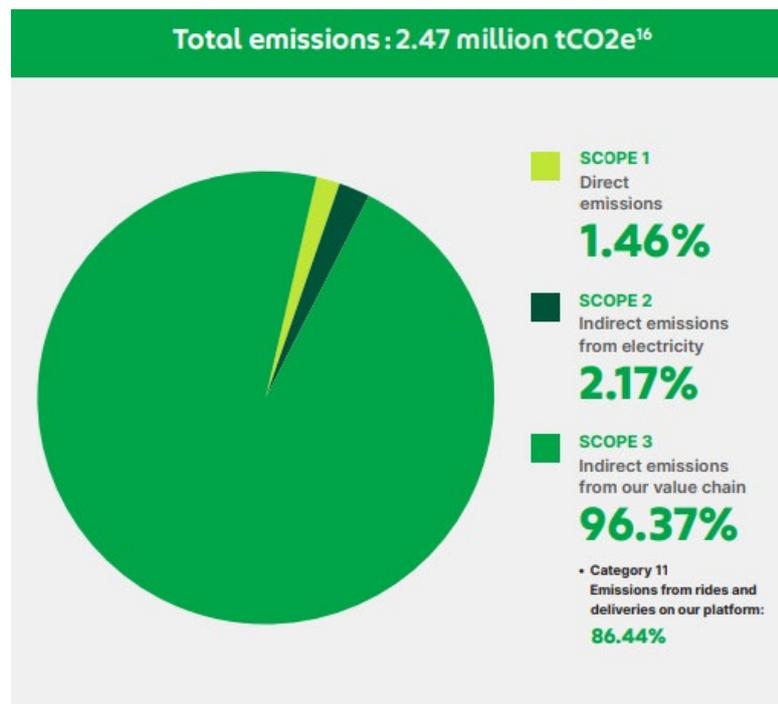
Source: Grab, 2024

Lever 1 Strategy - Reducing Scope 3 Driver-based Emissions

When it comes to the delivery industry, there is a large debate on the strategy to cut emissions, i.e. which delivery method will achieve both sustainability and profitability targets. In Grab's case, it moved with market trends to adopt EVs. To ensure that the move is progressing in the right direction, Grab has adopted the following activities.

Firstly, Grab acts as the liaison between driver-partners and solution providers. As a result of this endeavour, by 2023, Grab had the biggest EV fleet in Indonesia, especially targeting low-income segments who cannot afford to purchase an EV themselves. Another example of their success is the Grab EV programme launched in Thailand with a "Drive to Own" clause, where driver-partners can pay daily instalments to own the vehicle that they drive. It also offers the "End-to-End EV Rental" programme, a model that provides a daily rental service to partner-drivers instead of requiring them to purchase cars on their own. Another way that Grab promotes EV adoption is by supporting infrastructure development through partnerships with energy providers in Southeast Asia. For some regions, its app also allows consumers to choose more eco-friendly options (e.g. bicycles) for the rides or food delivery. With this change, in Singapore, "over 1 in 3 food delivery orders are fulfilled by walkers and cyclists" (Grab, 2024).

Lever 2 Strategy - Renewable Energy for Grab's Premises

Grab's offices and outlets account for 2.17% of Grab's greenhouse gas emissions, i.e. Scope 2 emissions (Grab, 2024). Grab has committed to 100% renewable energy by 2030 in all its offices. This is done through purchasing renewable energy certificates for all their offices.

Lever 3 Strategy - Sustainable Technology Practices

As Grab is a technology-based company, any refinements in its products could lead to exponential changes in the overall system. To this end, Grab has developed batching and sharing practices within their delivery systems. Through the development of algorithms, Grab's driver-partners can pick up separate orders in nearby locations. This ensures driver efficiency, customer satisfaction and lower emissions.

Figure 2: Batching in Delivery
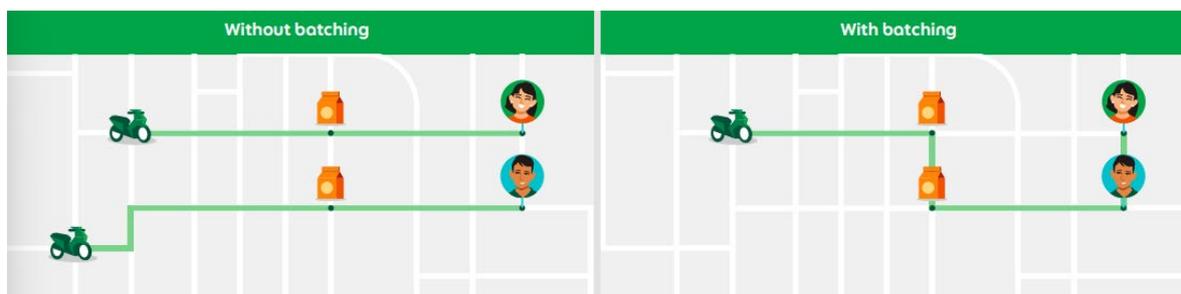
Source: Grab, 2024

Lever 4 Strategy – Further Carbon Removal Strategies

Grab allows customers an option to donate around US$0.10 to offset their carbon footprint, and the contributions are channelled towards projects in biodiversity conservation and solarisation. This included the Katingan Mentaya forest restoration project in Indonesia and the Keo Seima Wildlife Sanctuary conservation project in Cambodia (Grab, 2024).

Sustainable Packaging

As mentioned above, Grab did not make major advancements in its zero-plastic packaging goal. This could largely be because, when it comes to traditional packaging, the use of expanded polystyrene has always dominated the market with its lightweight and cheap qualities (Mekler, 2025). Even more troubling for Grab's goals, food packaging waste is problematic in Southeast Asia due to less developed waste management processes that do not prioritise reuse, recycling and reduction of plastic waste. The lack of a mature collection process and related infrastructure leads to "70%

of waste generated being illegally dumped" (Grab, 2024). Though Grab has not found a desirable solution to attain its 2040 goal of zero packaging waste, it executes the following activities to promote zero waste.

In the app, the cutlery opt-out status for food delivery is the default, leading to a saving of 3.1 billion cutlery packets since 2019 and over 7,365 tonnes of single-use plastic waste reduction just in 2023 (Grab, 2024). Another way is through their research and development partnerships, with one example being the Reverse Vending Machines (RVMs) that accept consumers' food packaging waste (e.g. containers) for recycling. This change has achieved significant progress in Malaysia and Indonesia. Grab also taps into its ecosystem to ensure consumers are pro-recycling. For example, Grab has partnered with companies like Coca-Cola and Waste4Change to launch the "Recycle me" programme in Indonesia, where the Grab fleet picks up bottles from consumers to send to collection centres, and consumers in turn receive a digital payment. This has resulted in 160,000 PET bottles being collected and recycled.

Social Initiatives

Grab's social sustainability framework is built around its core mission to "Drive Southeast Asia forward by creating economic empowerment for everyone". As a leading superapp operating across eight countries, Grab has positioned itself as a critical enabler of inclusive economic participation. Through initiatives targeting underserved populations, informal workers, small businesses and youth, Grab has created a wide-reaching platform for livelihood generation in one of the world's most diverse and unequal regions. However, as the company scales, it faces structural challenges in ensuring equity, consistency and long-term social resilience across its ecosystem.

Economic Empowerment: A Reimagined Gig Economy

Grab's most significant social impact lies in its ability to provide accessible, low-barrier income opportunities to millions across Southeast Asia. In 2023, more than 13 million partners, including drivers, merchants, and agents, were active on the platform, collectively generating over US$11 billion in earnings. This contribution is particularly relevant in a region where informal employment remains widespread, and access to traditional labour markets is frequently constrained by factors such as education, geographic remoteness and limited physical mobility. A critical expression of this inclusivity is Grab's ongoing effort to integrate persons with disabilities (PWDs) into its platform economy. In 2023, over 3,100 PWDs were active partners, with the company targeting 4,200 by 2025 (Grab, 2024). In particular, Grab's Indonesian initiative, the GrabGerak initiative, developed in collaboration with Rexona and the Indonesian Disabled Persons Association (AUDISI), offers a service catered for passengers with disabilities as well as disability-sensitive driver training (Irta, 2018). Complementing

this, the "Break the Silence" programme, created in partnership with Gerkatin (the Indonesian Association for the Welfare of the Deaf), empowers hearing-impaired individuals to become driver-partners, promoting inclusive participation within the platform (Nathalia, 2019).

These programmes demonstrate a strong operational commitment to accessibility, underpinned by moral responsibility, concrete partnerships and system-level interventions. Moreover, they reflect Grab's proactive approach to Sustainable Development Goal (SDG) 10 (Reduced Inequalities) by empowering groups that are often excluded from digital and labour markets. However, the company has not publicly disclosed data on long-term outcomes for these partners, such as earnings progression or retention, making it difficult to assess the depth of this inclusion.

Figure 3: Grab's SDG Commitments

Source: Grab, 2024

Fair Compensation and Work Efficiency

Grab has made measurable strides in improving partner earnings and addressing systemic imbalances within the gig economy. In 2023, 99% of its driver-partners earned at or above local minimum hourly wages, a result enabled by a revised fare structure that includes pick-up distances and idle time, ensuring drivers are fairly compensated even before a trip begins. Additional enhancements, such as hyper-batching and real-time navigation support, have contributed to a 9% year-on-year increase in driver earnings per transit hour and a 14% reduction in wait time between orders (Grab, 2024).

Skills Development and MSME Integration

Grab is actively working to strengthen the resilience and upward mobility of its partners, especially micro, small and medium enterprises (MSMEs) and informal workers. This is done by breaking down barriers to education, digital access and inclusive market participation. A key part of this effort is GrabAcademy, an in-app learning platform offering mobile-friendly training in areas like safety, hygiene, customer service and financial literacy. In 2023, over 1.2 million partners completed a course in GrabAcademy. Grab also supports microentrepreneurs through the "Small Business, Big Dreams" programme, launched with Mastercard in Indonesia, the Philippines and Vietnam, offering free training in digital marketing, pricing strategy, and operational efficiency. These are critical skills for digital transformation and growth. To deepen impact, Grab integrated over 500,000 new MSMEs into its ecosystem in 2023 via the GrabMerchant Portal, giving them access to tools for tracking sales, managing inventory, and improving logistics. MSMEs contributed 67% of GMV for GrabFood and GrabMart in 2023 (Grab, 2024).

While these initiatives support SDG 8 (Decent Work and Economic Growth), challenges remain. GrabAcademy certifications might not be recognised outside the platform, and digital access issues still affect rural areas. Many MSMEs also struggle with long-term growth due to limited capital and visibility beyond Grab's platform.

Driver-Partner Welfare, Safety, and Protection

Creating a safe and secure work environment is central to Grab's commitment to social sustainability. In 2023, even with an 11% increase in rides and deliveries, 99.99% of all rides went smoothly without any incidents (Grab, 2024). This impressive safety record is thanks to AI-powered tools like AudioProtect (an audio recording feature with user consent), real-time alerts for speeding, and fatigue detection systems. On top of that, all driver-partners are covered by basic accident insurance (Figure 4). Grab's support for its partners goes beyond day-to-day operations. For example, in Singapore, it teamed up with security services firm Secura in 2022 to launch a pilot programme that opened up opportunities for 200 drivers to transition into new careers in the security industry (Noordin, 2022). However, these types of initiatives are still small in scale and have not been rolled out more widely yet. To help strengthen long-term social protection, Grab is working with governments across the region. For example, in Indonesia, it partners with BPJS Ketenagakerjaan (Social Security Agency for Employment) to enrol drivers in social security and welfare programmes (Grab, 2024).

Figure 1: Grab's Safety Measures for Both Drivers and Passengers
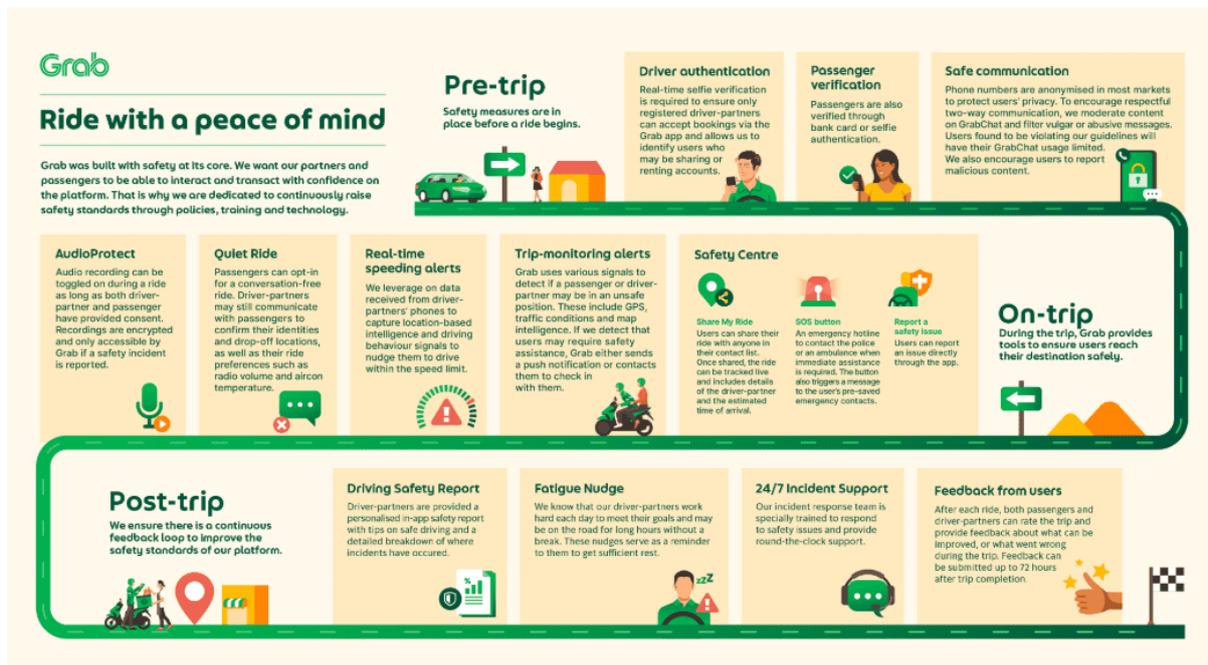
Source: Grab Editorial, 2025b

Financial Inclusion as Social Empowerment

At the heart of Grab's social sustainability strategy is a clear mission: expand financial inclusion for gig workers and MSMEs, groups often overlooked by traditional financial institutions in Southeast Asia. Many in this region lack access to formal banking or a credit history, limiting their ability to build financial security or grow their businesses. To bridge this gap, Grab has embedded custom financial services into its platform. Using alternative data like ride completion rates, user ratings and past earnings, Grab offers financing solutions that do not rely on traditional credit checks. In 2023 alone, over US$1.5 billion in loans were disbursed, with about a third of drivers using cash advances to manage everyday needs like fuel, repairs or emergencies, expenses that could otherwise disrupt their cashflow (Grab Editorial, 2023a).

Going further, Grab launched GXBank (Malaysia) and GXS Bank (Singapore), digital banks offering daily interest savings and credit products tailored to those with unpredictable income, like gig workers. By leveraging platform data, these banks bring financial services to people who are typically excluded from conventional lending systems.

Equity, Community, and Long-Term Impact

Beyond its operational objectives, Grab is committed to generating broader societal value through initiatives focused on education, inclusion and community resilience. The GrabScholar Programme exemplifies this commitment by offering school

allowances and university scholarships to the children of its partners, thereby fostering intergenerational upward mobility. This initiative reflects a long-term strategy aimed at addressing systemic inequality across Southeast Asia.

Internally, Grab prioritises diversity and inclusion. As of 2023, women held 36% of its leadership positions, reflecting a two-percentage-point increase from 2022 (34%). Its 2023 figure is also closer to its goal of 40% women representation in leadership by 2030 (Grab, 2024). Additionally, the company's gender pay parity index (calculated by comparing the average earnings of women to those of men within the same organisation/sector) improved to 0.98, up from 0.97 in the prior year, indicating near-equal compensation and a continuous improvement in addressing gender disparity within the company. Initiatives such as Women at Grab and Accessibility at Grab are designed to enhance representation in both leadership and technical roles. Nonetheless, disparities remain across regions, most notably in India and Taiwan, where fewer than 20% of roles are held by women in 2023 (it is noted that Grab has fewer than 20 employees in Taiwan, hence there may be a more pronounced gender disparity gap as each person can significantly impact the overall gender distribution). Structural, policy-driven interventions to address these imbalances have yet to be implemented.

Governance Initiatives

Grab has established its governance framework involving the board of directors, management and employees. The framework has clarified the accountability system for the progress of ESG goals.

ESG Governance Structure

To further integrate ESG into its business strategy, in 2023, Grab established a formal structure composed of C-level executives, including the Board of Directors and management, to oversee the progress of ESG goals. The structure clearly defines roles and responsibilities, and performance is tracked through regular reports to enable the right actions (c).

Board of Directors

The Audit Committee was designated as the oversight body for ESG on behalf of the Board. The Audit Committee Charter was updated to include ESG under its purview, to maintain oversight for sustainability with key metrics across all material topics.

Management

Internal governance has been established to incorporate ESG considerations into Grab's business and strategic development plans, and regular reporting to department heads, functional heads and the Executive Committee (EXCO) ensures transparency of actions and clear accountability.

ESG Responsibilities and Commitments

Grab's Sustainability Team reports directly to the Chief Executive Officer on ESG progress, with a dotted line reporting to the Chief Operating Officer. This allows for strategic coordination across business units to effectively execute ESG matters (Grab, 2024).

Data Privacy and Cybersecurity

Grab has adopted data and cyber protection measures for its products. In 2023, it received zero substantiated complaints of data privacy violations from third parties or regulators. For data privacy, Grab highlights the importance of transparency by obtaining consent on personal data usage, protection of personal data, and the lack of data retention for non-business uses. Grab also maintains a robust cybersecurity programme designed to assess, manage, mitigate and respond to cybersecurity, based on the framework established by the National Institute of Standards and Technology (NIST), the International Organisation for Standardisation (ISO) and other applicable industry standards. Prevalent cyber risks are also addressed internally and through third-party assessments, and by sharing threat intelligence with relevant organisations (Grab, 2024).

Anti-Corruption and Ethical Business Practices

Grab is committed to anti-corruption and ethical business practices and has developed a series of policies and procedures, including the Anti-Bribery and Corruption Policy, Conflict of Interest Policy, Donations Policy, Gifts, Entertainment and Meals Policy, and Whistleblowing Policy (Grab, n.d.). Grab also continuously updates internal controls to adapt to legal and ethical compliance in areas such as health and safety, data privacy, employment, marketing practices, financial practices, intellectual property, combating money laundering and terrorist financing.

Grab: Competitor Landscape Analysis

Though it is leading in Southeast Asia, Grab still faces intense competition from the second-largest regional player, Gojek. Gojek's app launch in 2014 was a breakthrough. Within its first 14 months, it "logged 100 million" bookings in Indonesia

(Davis, 2018). Unlike Uber and Grab (which initially focused only on rides), Gojek offered multiple services from the outset – not just motorbike rides (Go-Ride), but also courier deliveries (Go-Send) and food ordering (Go-Food) in the same year. This multi-service strategy kept drivers busy all day and attracted more users. In Southeast Asia, Gojek is still Grab's strongest competitor, especially in Indonesia. In this country, Gojek and Grab compete directly in almost every area—ride-hailing, food delivery, digital payments, and logistics. Gojek entered the Indonesian market early. It also has a strong local brand and is a big part of people's daily lives.

These factors have helped Gojek keep a large share of the market. As of January 2023, Gojek's market share by order volume in Indonesia's ride-hailing transportation industry reached 50 per cent (Romero, 2024). In the food delivery sector, Gojek's GoFood platform accounted for 35% of Indonesia's food delivery GMV in 2024, placing it second only to Grab (Tech in Asia, 2025). While the threat of new entrants is relatively lower due to high capital requirements and complex regulatory frameworks, industry competition is still rife as Gojek presents substitution risks to Grab's core services.

On the environmental front, similar to Grab, Gojek also aims to be zero-waste and transition fully to electric fleets. Both companies are committed to reducing single-use plastics and have taken efforts to create a zero-carbon emissions ecosystem. However, Grab's environmental initiatives are not unique, with both companies partaking in the same goals with similar methods of reducing emissions and managing their waste. The major difference lies in Grab's market presence and larger platform, allowing for a wider reach, whereas Gojek focuses more on Indonesia's needs. Gojek, through its GoTix ticketing service, offers access to local events (including eco-friendly events), which could add to the impression that its sustainability approach is more localised.

When it comes to social impact, Grab and Gojek focus heavily on supporting their driver-partners and have implemented comprehensive structures to ensure their well-being. They also have similar initiatives for supporting microentrepreneurs and digital payment. A difference may be that Gojek tends to focus more on its local market in Indonesia, where it has a strong presence.

In terms of governance, both companies must adhere to industry regulations around user safety, data privacy and inclusion. The adherence requirement also applies to local safety laws and labour regulations. However, due to the different range of partnerships they engage in, especially in the delivery space, there may be slight challenges regarding transparency in governance. This could potentially reduce the direct responsibility each company has in the entire industry's supply chains, particularly when it comes to delivery partners and logistics.

Performance Assessment

Since 2022, Grab has maintained an AA MSCI ESG Rating and has been identified as an industry leader. However, there is still room for improvement. Grab's sustainability performance thus far will be discussed in the following economic, environmental, social and governance dimensions.

Economic Dimension

Diversification and growth of Grab's business over the years have contributed to its healthier financial position and improved financial performance today. Year-on-year, Grab recorded a 19% growth in total revenue for FY2024. While the company is still in an overall loss position for FY2024, the loss position has narrowed significantly, from US$485 million (FY2023) to US$158 million (FY2024). Its net cash from operating activities in FY2024 was also increased tremendously by 891% to US$852 million (Grab, 2025).

However, there remain challenges in Grab's pathway towards profitability as its operations are highly reliant on driver and merchant partners (supply side) and customers (demand side). With competitor platforms offering similar products and services, partners and customers have low switching costs. Hence, Grab needs to balance between profitability and affordability, and continues to expand and enhance the Grab ecosystem, to retain and attract partners and customers.

Environmental Dimension

Grab has set two major environmental goals—achieving carbon neutrality and zero waste by 2040. A growth in demand for Grab's services might add to its emissions, a factor that Grab has to manage carefully. Another challenge in fostering an EV ecosystem in Southeast Asia lies in the lack of infrastructure support. Because EV charging stations are not prevalent and the cost of maintaining an EV vehicle is not lower than that of a conventional gas-powered car, driver-partners are hesitant to invest in EVs. Top-down regulations are needed to implement a large-scale change, along with newer energy-saving vehicle technologies.

Regarding its 2040 zero-waste goal, Grab aims to divert 30% of its plastic packaging from landfills by 2030 (Grab, 2023). While its ESG Report 2023 (Grab, 2024) indicated the number of cutlery sets saved from its default opt-out option in GrabFood, it did not indicate the amount of plastic waste and packaging waste incurred through GrabFood in 2022 and 2023. This lack of transparency could suggest that the impact of its environmental initiatives has plateaued. As such, unless Grab comes up with a better strategy for waste reduction, it might not be able to reach its zero-waste goal.

Social Dimension

Grab has made significant progress in advancing social sustainability, particularly in terms of empowering its partners and promoting financial inclusion across Southeast Asia. In 2023, the company disbursed over US$1.5 billion in loans to driver- and merchant-partners, reflecting a 57% increase year-on-year. This move highlights Grab's role in bridging the financial inclusion gap for populations often underserved by traditional banking systems. Additionally, Grab's upskilling initiatives, such as GrabAcademy, provided training to over 1.2 million partners in 2023, helping improve their skills and earning potential. These efforts, paired with safety features like AudioProtect and fatigue alerts, showcase Grab's commitment to creating a secure and empowering environment for its partners.

However, despite these accomplishments, Grab faces challenges that may hinder its social sustainability goals. While the company has seen significant revenue growth in FY2024, it still reported a net loss. This indicates that achieving profitability while maintaining its social responsibility initiatives remains an ongoing challenge.

Furthermore, Grab operates in a complex regulatory environment across Southeast Asia, where labour laws vary greatly. This makes it difficult to ensure uniform protection for gig workers, and Grab must navigate these inconsistencies to ensure fair benefits and working conditions for its diverse partner base. In conclusion, while Grab's programmes contribute to a more inclusive and equitable ecosystem, participation in many of these programmes is discretionary, not institutionalised, for its employees and customers. This limits the full potential of the programmes.

Governance Dimension

At present, Grab's ESG governance involves the whole company, from the Board of Directors and management to the staff on the ground. This ensures that the realisation of ESG goals is a part of the company's strategic development. At the same time, an ESG team is formed, which is supervised by the audit committee and reports directly to Grab's Chief Executive Officer. Regarding internal governance, the company has also put in measures to ensure data privacy, network security, anti-corruption and ethical business. Externally, Grab has cooperated with governments in different countries to promote the sustainable development of the platform and compliance with local laws.

However, Grab still faces challenges in sustainable governance. First, because Grab operates in multiple countries in Southeast Asia, it faces regulatory coordination difficulties in governance. For example, in Malaysia, the delayed launch of the Public Service Vehicle training module resulted in drivers being unable to complete the training requirements on time (Lee, 2019). Secondly, as a platform that involves multiple stakeholders, addressing the interests of all parties can be a complex matter.

Its acquisition of Uber's Southeast Asian operations in 2018 also resulted in a S$6.4 million fine by the Competition and Consumer Commission of Singapore (CCCS) for anti-competition (CCCS, 2018).

Future Outlook and Recommendations

Looking ahead, the ride-hailing, food delivery, digital payment and digital bank industries in Southeast Asia are projected to grow considerably over the next few years:

Table 1: Growth in Ride-Hailing, Food Delivery, Digital Payment and Digital Bank Industries

Industry (Southeast Asia only)	Compound Annual Growth Rate ("CAGR") from *Statista*
Ride-hailing (2025 – 2029)	5.19%
Online food delivery (2025 – 2030)	10.75%
Digital payment (2025 – 2030)	16.78%
Digital bank (2025 – 2029)	5.45%

Source: Table created by the authors. (Statista, n.d.-a; Statista, n.d.-b; Statista, n.d.-c; Statista, n.d.-d)

Whilst Grab currently has substantial market share in many of the regions it operates, strong competition from existing and new industry players, as well as the challenge of moving towards monetisation through organic growth and operational efficiency, will likely remain (Li, 2025).

In its growth, a key transformation will be adhering to a circular economy approach of reducing waste for all links across the supply chain. While Grab does not have large Scope 1 or 2 emissions, its Scope 3 emissions are large due to delivery activities and residual waste in its supply chain. In contrast with a traditional linear model, Grab could engage in a more closed-loop system that encapsulates the reuse, reduce and recycle mindset, pushing a more regulated approach on all its activities. In this way, Grab can move beyond just government regulation to create an ecosystem where internal and external stakeholders align with core sustainability values. A step in the right direction is their move in the Philippines with Fortuna Cools, piloting a project that integrates eco-friendly insulation into food delivery bags (Mekler, 2025). Another example could be to only partner with organisations that follow its policies, rather than allowing any food delivery or ride-hailing partners to onboard its platform. These actions could

further maintain Grab's position as an industry leader with a strong reputation in Southeast Asia.

The outlook for the ride-hailing industry entails competition with autonomous vehicle firms. An example is Waymo, which has already rolled out its robotaxi service in certain cities in the United States (Elias, 2024). The development is set to revolutionise the ride-hailing and delivery industries, posing a challenge to Grab and its employees.

Additionally, as Grab expands into financial services with GXBank and GXS Bank, the need for independent oversight grows. Grab should continue to ensure transparency in its financial services and engage with regional bodies to harmonise standards.

The unpredictability of gig work remains a structural issue. Partner income still fluctuates with platform demand, which varies daily and seasonally. Drivers in lower-density areas may face underutilisation, and rising costs (fuel, vehicle maintenance, inflation) can further erode earnings. While Grab has introduced financial tools such as cash advances and savings options to support partners during low-income periods, these short-term solutions cannot fully mitigate the vulnerability inherent in gig-based employment. Employee benefits and labour protection remain important. Grab has rolled out initiatives in the right direction but will need to contend with varying regulations across countries.

From a ride-hailing firm, Grab has developed into a diversified services firm and a leading super app in Southeast Asia. At present, Grab has gradually established a sustainable development system and shown positive intentions in the environmental, economic, societal and governance dimensions analysed in this article. Although clear ESG accountability mechanisms are present, the realisation of ESG goals still faces many challenges in the operational process.

From an economic dimension, Grab has achieved positive revenue growth and narrowing losses. However, in the environmental dimension, Grab is bound to face problems such as rising Scope 3 emissions, a slow transition to electric vehicles and unclear waste management data. In the social dimension, Grab has been committed to economic empowerment, financial inclusion and community fairness. However, it needs to continuously consider how to better protect gig workers and navigate the trade-offs between profitability and social sustainability. In the governance dimension, Grab has established a top-down responsibility framework and aims to comply with various regulations across countries. For the future, whether Grab can move from "compliance" to "creating shared value" will affect its leading position in the industry.

Discussion Questions

1. Grab's business expansion is historically correlated with rising emissions, particularly from its driving and delivery fleet. How can the company reconcile its growth ambitions with its 2040 carbon-neutral pledge while addressing systemic challenges like Southeast Asia's fragmented EV infrastructure and fossil fuel dependency?

2. Grab's platform empowers millions with flexible earnings but faces criticism over income instability and unequal labour protection. What structural reforms could redefine gig work to prioritise both flexibility and equitable welfare without undermining the firm's financial viability?

3. Grab's sustainability initiatives, such as tree-planting campaigns and plastic reduction, risk being perceived as incremental rather than transformative. How might the company shift its ESG strategy to create cascading societal and environmental value, and what non-financial indicators could authentically reflect this progress?

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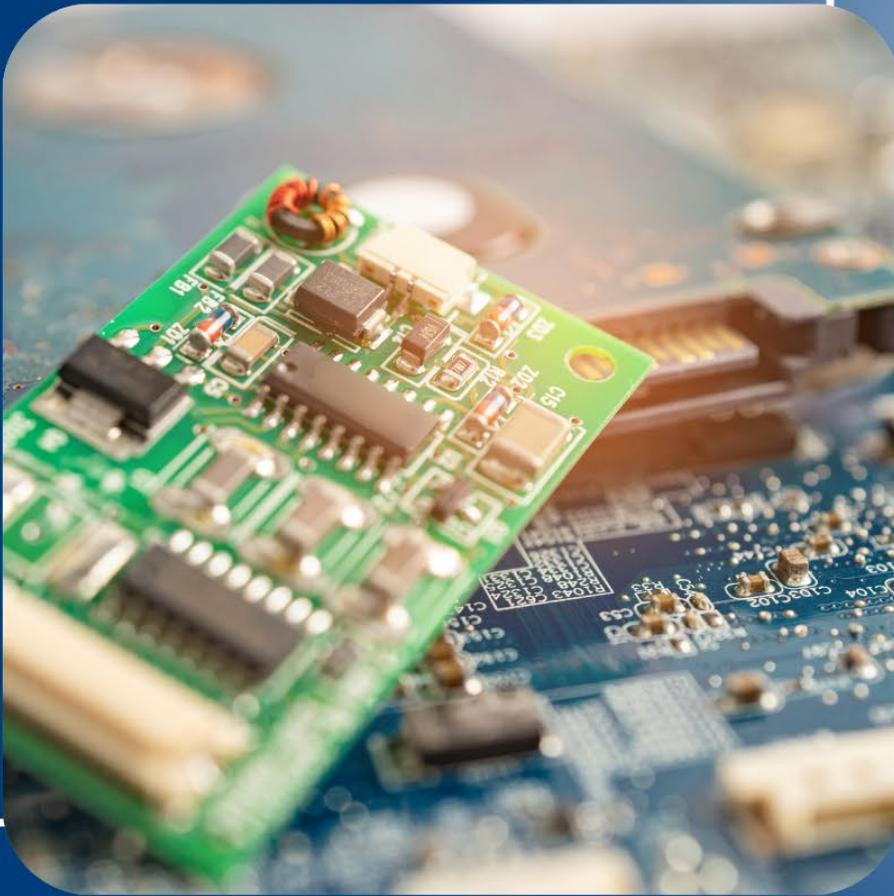
NVIDIA: Pursuing Green AI and Computing

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Introduction

NVIDIA Corporation was established in 1993 by Jensen Huang, Chris Malachowsky and Curtis Priem. It is an American multinational technology firm based in Santa Clara, California. NVIDIA's core business in its early stage is primarily based on graphics processing units (GPUs), mainly used for games (NVIDIA, n.d.). As there was a rise in demand for GPUs, NVIDIA was able to maintain a competitive edge due to its pioneering contributions to GPU technology.

This report explores NVIDIA's business evolution and its sustainability initiatives, analysing how the company's strategic decisions expanded its influence from GPUs for gaming into sectors such as artificial intelligence (AI), data centres, autonomous vehicles and the emerging metaverse. This analysis includes NVIDIA's current sustainability initiatives and environmental impact, underscoring its progress and ongoing challenges within the broader context of the semiconductor industry's environmental concerns. Additionally, it provides an in-depth comparative assessment of NVIDIA's competitive position relative to its key market players. Through detailed case studies, the report highlights NVIDIA's strategic contributions to sustainability, including its energy-efficient computing solutions and ambitious initiatives like Earth-2.

By comprehensively examining NVIDIA's past achievements, current status and future prospects, this analysis provides valuable insights into why NVIDIA remains a crucial entity in discussions about technological advancement and sustainable development.

Company and Product Overview

The COVID-19 pandemic expedited the world's transition to remote work and increased the demand for cloud computing, which significantly increased the need for data centres. As Nvidia was appropriately positioned to take advantage of this increased demand, its revenue rose remarkably. As of January 2025, Nvidia ranked second at just over US$3 trillion, trailing only behind the industry giant Apple (Statista, 2025a).

For better understanding, two relevant products in the computer environment must be described. Current computers, servers and data centres are equipped with a Central Processing Unit (CPU) and a Graphics Processing Unit (GPU). While the CPU sequentially manages the operating system, defines capacity allocation to different applications, the GPU performs more complex tasks such as rendering visuals, mathematical calculations or AI-driven simulations in parallel.

Evolution of Nvidia's Core Business

Early 2000s: The Rise of GPU Dominance

In the early 2000s, NVIDIA operated mainly as a hardware processor company for gaming applications. The GeForce 256 launch in 1999 transformed NVIDIA into the market leader for GPU production because it introduced hardware-powered transformation and lighting capabilities (Singh, 2024). Moreover, NVIDIA drove its core business supplying PC gaming hardware and CAD software, along with workstation graphics products at this time. NVIDIA obtained partnerships with Sony for the PlayStation and Microsoft for the first Xbox to extend its gaming market to consoles.

The strong revenue increases did not translate into expanded opportunities beyond gaming since NVIDIA still depended heavily on this sector, and other GPU applications had not been correctly explored. NVIDIA achieved a breakthrough in 2006 through its Compute Unified Device Architecture (CUDA) product release that enabled developers to use NVIDIA GPUs for parallel processing, thus enabling scientific computing alongside finance and AI applications (Clark, 2023).

The 2010s: Era of Computing and AI Technology

During the middle of the 2010s, deep learning and AI research fields began adopting NVIDIA GPUs as they provided the most effective processing capabilities for training large-scale AI models. The market changes allowed NVIDIA to develop the Tesla GPU series, which focused exclusively on data centres and AI processing needs. The organisation entered autonomous driving by creating the Drive PX platform as an AI-based solution for self-driving automobiles. The year 2019 represented a pivotal business transformation for NVIDIA because data centre revenue surpassed gaming revenue for the first time (Britannica, 2025).

2020 and Beyond: AI, Metaverse and Omniverse

Throughout the 2020s, NVIDIA established itself as the worldwide leader for hardware components of AI solutions and cloud computing, along with enterprise solutions. The mass deployment of AI applications skyrocketed demand for GPUs, which find primary use in data centres while also serving autonomous driving and industrial automation. A100 and H100 GPUs became essential tools for AI training and deep learning because major companies across the industry, including OpenAI, Microsoft and Google, ramped up GPU capacity.

Furthermore, NVIDIA released Omniverse, a real-time simulation and collaboration platform, which targets developing a virtual world landscape dedicated to architecture and industrial design, as well as the gaming and filmmaking industries (NVIDIA, 2025b). Then, NVIDIA increased its presence in AI-smart pharmaceutical

development and medical image analysis and the genomic science field. The company pursued a US$40 billion acquisition of Arm to achieve dominance in the GPU and CPU market sectors. Although regulatory obstacles prevented the acquisition deal (NVIDIA, 2022b), it demonstrated NVIDIA's dedication to becoming the leading force in AI hardware development.

Figure 2: Cloud Computing Concept using Edge Computing
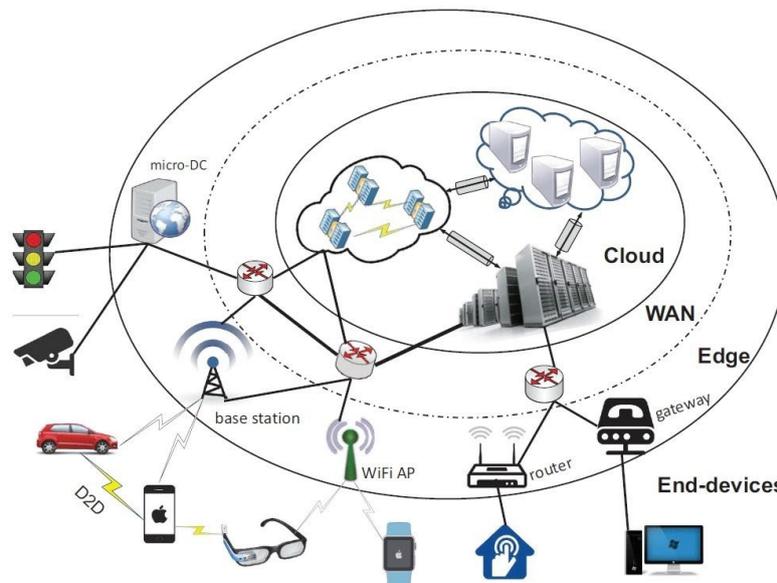
Source: Zhou et al., 2019

Today, NVIDIA's AI and data centre business is its largest revenue driver, surpassing gaming, automotive, and cloud computing. While it started as a gaming company, its strategic pivots into parallel computing, AI and enterprise solutions have positioned it as among the most valuable tech giants globally.

Market and Competitive Analysis

Market Trends: NVIDIA's Global Footprint

NVIDIA's significant global revenue comes from various regions. From fiscal year 2017 to 2025, the revenue has grown 18-fold. A revenue breakdown by revenue is shown in the graph below (Statista, 2025b).

Figure 2: NVIDIA Global Revenue from 2017 to 2025

Nvidia revenue worldwide from fiscal year 2017 to 2025, by region (in million U.S. dollars)
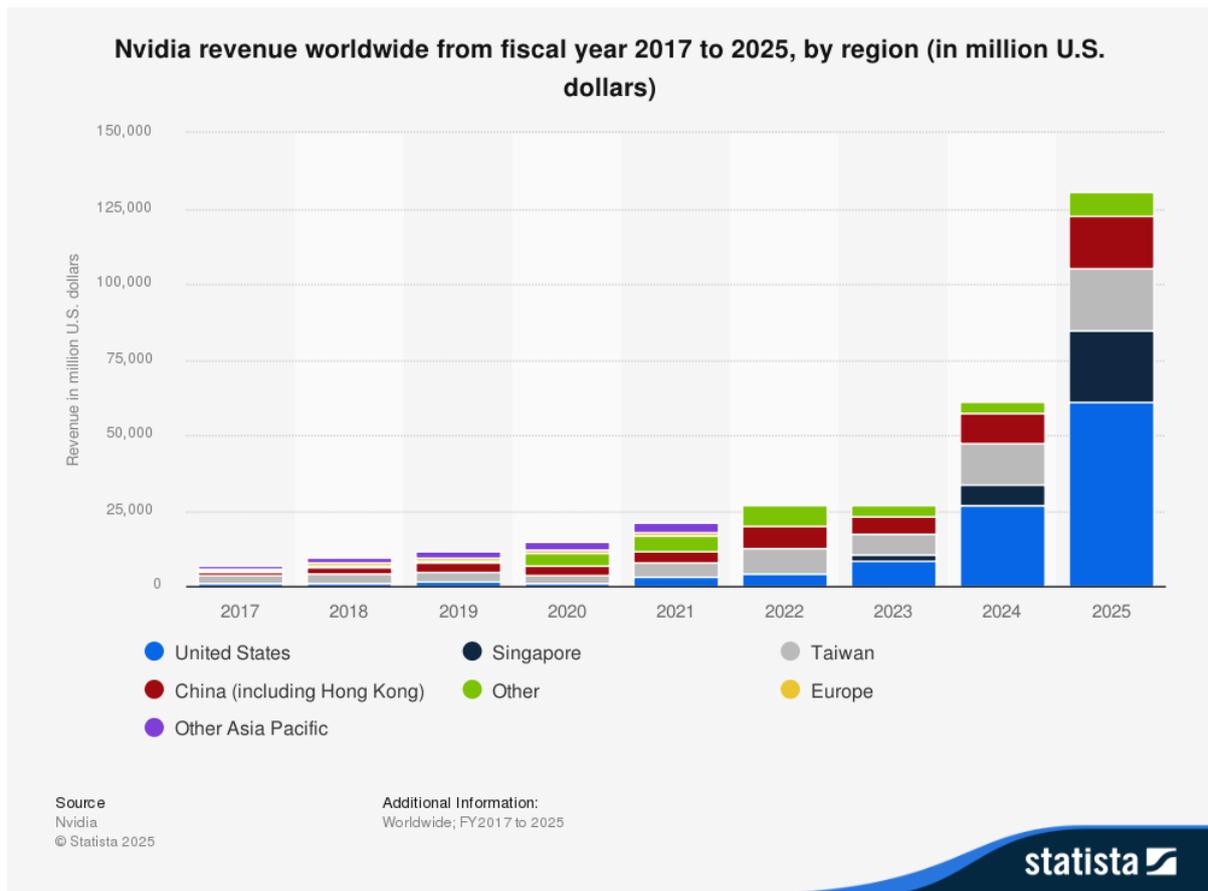
Source: Statista, 2025b

There has been a considerable year-after-year rise in revenue. This astronomical growth is led by sales in the United States, which experienced the most drastic growth, with revenue jumping from US$29.97 billion in 2024 to US$61.25 billion in 2025. Singapore too is observing a 247% rise to US$23.68 billion. Meanwhile, revenue from China (including Hong Kong) grew to US$17.11 billion. The rise in revenue is due to NVIDIA's leadership in AI and data centre technologies, especially GPUs, which are essential for generative AI and large-scale computing. The observed 2025 results display a major shift in the focus of NVIDIA's business priorities from gaming to AI-driven solutions, which makes NVIDIA a key player in the AI industry. While Singapore's revenue growth shows strategic regional expansion, growth in the US reflects Silicon Valley's AI boom.

Competition and Comparative Analysis

The worldwide computer semiconductor market contains intense competition between NVIDIA, AMD and Intel, which are currently the dominant players. The three companies have similar business activities but display significant variation across market penetration levels, product development capabilities and performance abilities.

NVIDIA holds an unchallenged position in data centre GPU (98% market share) (HostingJournalist, 2024) and desktop GPU (88%) (Shilov, 2024) markets during 2023 and the first part of 2024. AMD and Intel, while formidable players, face significant challenges from performance setbacks to strategic restructuring. As of Q3 2024, AMD made gains in desktops (28.7%) and servers (24.2%) (Li, 2024). Intel, however, maintains a dominant position in the desktop and mobile CPU markets, especially in laptops (77.7%) (Li, 2024).

Nvidia capitalised on its first-mover advantage compared to Intel and AMD, companies that have long been established leaders in the CPU segment but have struggled to keep pace in the GPU market.

Sustainability Strategy and Initiatives

NVIDIA's innovations in AI and accelerated computing are powering a more sustainable future. In terms of climate and efficiency, NVIDIA has reached certain achievements, powering the top efficient supercomputer on the Green500 list as of June 2024 (NVIDIA, 2024).

Current Status

According to NVIDIA's annual sustainability reports, the table below shows its GHG emissions in recent years.

Table 1: NVIDIA's Emissions from FY2022 to FY2024

	FY22	FY23	FY24
Scope 1 (MT CO2e)	4,612	12,346	14,390
Scope 2, market-based (MT CO2e)	78,210	60,671	40,555
Scope 2, location-based (MT CO2e)	133,569	142,909	178,087
Scope 3 (MT CO2e)	2,701,477	3,514,000	3,637,478
GHG emissions intensity (Scope 1 and 2 MT CO2e/$M revenue)	3.1	2.7	0.9

Source: Adapted from NVIDIA, 2024

NVIDIA claims to cut all scope 2 market-based emissions by the end of the fiscal year ending January 26, 2025 (NVIDIA, 2024). However, even though it has made progress in operational efficiency and renewable energy, the company still faces criticism for lacking a net-zero strategy and reporting systems for its environmental impact (Manier,

2023). Meanwhile, the entire semiconductor sector faces difficulties meeting sectoral sustainability targets. For instance, Samsung's semiconductor facility in Austin ceased operations for about a month in 2021 due to severe winter storms that resulted in power system disruptions in Texas. NVIDIA designs chips while outsourcing manufacturing to partners such as TSMC; yet its dependence on global supply chains exposes it to industry-wide risks, including resource-intensive fabrication and electronic waste.

Sustainability Commitments

NVIDIA has several sustainability commitments regarding climate and energy efficiency, as well as in people, diversity and inclusion.

Climate and Energy Efficiency

- **Product Energy Efficiency:** NVIDIA targets improving the energy efficiency of its products. Its remarkable progress will be analysed in a case study in a later section. NVIDIA's GPUs are projected to be generally 20 times more energy-efficient than traditional CPUs for specific AI computing workloads (NVIDIA, 2024).

- **Supply Chain Emission Reduction:** By the end of FY2026, NVIDIA targets to engage manufacturing suppliers comprising at least 67% of NVIDIA's scope 3 category 1 GHG emissions (NVIDIA, 2024).

- **Renewable Energy Usage:** In Fiscal Year 2024, it increased the amount of renewable electricity use to 76% (compared to only 38% in FY2022). From FY2025 onwards, NVIDIA targets to achieve 100% renewable energy usage for its direct operations (NVIDIA, 2024).

People, Diversity and Inclusion

- **Employment:** NVIDIA is committed to creating an inclusive culture that supports employees, regardless of gender, gender identity or expression, veteran status, race, ethnicity or disability. For example, the gender pay ratio of its global workforce is 99.5:100 (women:men) in FY2024 (NVIDIA, 2024).

- **Community Engagement:** NVIDIA supports nine community resource groups (CRGs), which have executive-level sponsorship and dedicated budgets, including Asian Pacific Islander, Black NVIDIAN Network (BNN), Early Career Network (ECN), Hispanic-Latino Network, NV Pride (LGBTQ+ employees and allies), etc. (NVIDIA, 2024).

Environmental, Social and Governance (ESG) Policies

ESG principles are an essential part of NVIDIA's corporate strategy, and the progress made is outlined in its annual sustainability report. Given its global activities, NVIDIA complies with several different reporting standards.

Global Reporting Initiative (GRI): Comprehensive Impact Disclosure

NVIDIA reports its ESG disclosures applying the GRI Standards (2021). The full GRI Content Index is listed in NVIDIA's Sustainability Report appendix. The company prioritises metrics critical to its operations, including energy consumption (GRI 302) and GHG emissions (GRI 305).

Task Force on Climate-related Financial Disclosures (TCFD): Climate Governance

NVIDIA uses TCFD guidelines to assess and disclose climate-related risks and opportunities. Measures are taken accordingly. Sustainable governance is practised through board oversight via the Nominating and Corporate Governance Committee. Its strategy is informed by climate scenario analysis, and its risk management entails supplier climate resilience evaluations.

Sustainability Accounting Standards Board (SASB): Investor-Centric Metrics

NVIDIA applies SASB to meet financial accounting requirements. For instance, NVIDIA uses SASB TC-SC-140a.1 to measure its water management, a crucial element in the semiconductor industry which requires a lot of cooling during production.

UN Sustainable Development Goals (SDGs): Technology-Driven Alignment

NVIDIA contributes by aligning its business operations to several SDGs, such as SDG 5 (Gender Equality) when it achieves pay parity; SDG 9 (Industry, Innovation and Infrastructure) by driving innovation-leadership in the AI-hardware field; and SDG 13 (Climate Action) through enhanced use of renewable energy (NVIDIA, 2024).

Case Studies

Following NVIDIA's corporate sustainability strategy, this chapter depicts NVIDIA's strategic service development of AI tools and applications towards more sustainable business models. NVIDIA launched its product portfolio of sustainable computing, but the entire portfolio underlies the principle of increasing performance while reducing energy consumption. For this report, two segments of green AI will be analysed closely, namely, GPU-accelerated energy effectiveness and sustainability computing.

Case Study 1: Increasing Energy Efficiency

Energy efficiency plays a crucial role for all computer-related applications, given the constraints of power grid capacity and available green energy sources. NVIDIA puts focus on GPU-accelerated efficiency as well as data centre optimisation.

NVIDIA's GPU-accelerated computing parallelises CPU and GPU tasks at a higher speed, hence cutting process time and energy consumption. According to NVIDIA, switching from CPU-only operations to GPU-accelerated systems will result in an estimated annual energy savings equivalent to "the electricity needs of nearly 5 million US homes" (Harris, 2024). Separately, NVIDIA's Grace Hopper Superchip proved time savings and energy reduction in a test phase with a France-based trading and risk management software company (Ramamoorthy, 2024).

Data centres will account between 3 to 13% of the global energy consumption by 2030 (Andrae & Edler, 2015). NVIDIA underlined its market leadership with 65% market share in data-centre AI chips in 2023 (TechInsights, 2025). One key factor is the BlueField-2 DPU (Data Processing Unit), which manages data flows, ensuring data security by encryption or decryption.

Figure 3: NVIDIA's Holistic Data Centre Design Approach
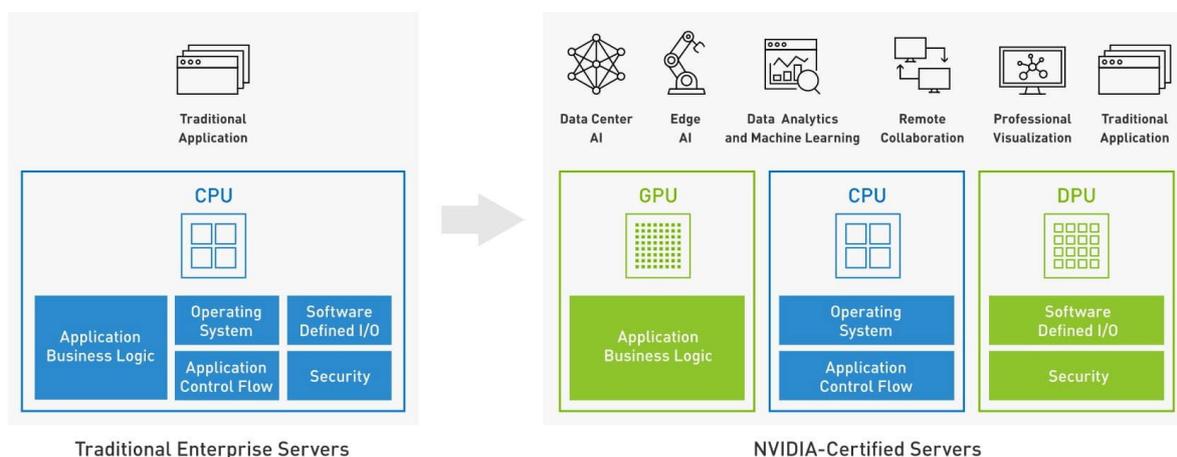
Source: Meritt, 2021

NVIDIA's innovations increase energy efficiency in four ways (NVIDIA, 2022a):

- CPU microsleeps during downtimes, combined with network offloads, can reach energy savings of up to 23% at full capacity.

- Open vSwitch (OVS) data traffic management allows shifting traffic load from the CPU directly to the DPU, speeding up processing time while saving up to 29% of energy.

- Encryption/Decryption protocols for client-server-client communication accumulate a huge share of the overall power consumption. Given the increasing threat of hacking attacks, reducing protocol standards is not applicable, and hence, optimising encryption models remains the only option to save energy. NVIDIA's IPsec protocols run through the BlueField-2 DPU show up to 21% server energy savings and 34% savings at the client side at full capacity.

- An NVIDIA collaboration with VMware on offloading traffic management to the DPU proved a significant freeing of servers (by 15%) while moderately increasing performance.

Considering the four proof-of-improvement examples, NVIDIA's BlueField-2 enables tremendous cost cuts in capital expenditure due to fewer servers and lesser data centre infrastructure required. It also reduces the operating expenditure related to energy consumption, maintenance and cooling. At the same time, performance can be increased by leveraging the efficiency of modern data centres (NVIDIA, 2022a).

NVIDIA's innovation strategy includes close cooperation with market partners and customers. On top of the aforementioned cooperations, NVIDIA also partnered with German firm Siemens to build a digital twin production line in Mexico for electronics manufacturer Foxconn, targeting a 30% annual energy savings (Walker, 2024). The Siemens Xcelerator platform, which integrates the NVIDIA Omniverse service, allows Foxconn to simulate production predictions, leading to time and energy savings, as well as reduced waste (Siemens, 2025).

NVIDIA's innovations promise an important contribution to global energy consumption. Nonetheless, its impact is subject to constraints. Energy savings will only be achieved if data centres run at high utilisation rates due to scaling and synergy factors. However, overcapacities in data centres will incur higher expenditure and higher overall energy use. In addition, advances in AI and microchips can shorten product life cycles, leading to earlier replacements and hence higher resource use. Regulatory changes related to the approval for building new data centres, such as in Ireland, can impact the sector's growth (Vincent, 2025).

Case Study 2: Earth-2 Climate Modelling

AI climate modelling is undergoing a revolution thanks to NVIDIA. Traditional climate models have advanced significantly since their early stages, with grid spacing being reduced from 100 km to 25 km. However, much finer resolutions, down to 1 km or even 100 meters, are required to capture storm and cloud dynamics accurately (Anandkumar et al., 2022). "We're seeing more extreme weather events and natural disasters than ever, threatening lives and property," said Jensen Huang, founder and CEO of NVIDIA, in a press release on Earth-2. As he highlighted, climate change is an escalating crisis, with extreme weather events causing economic losses exceeding US$2 trillion over the past decade (NVIDIA, 2025d). At the same time, traditional climate models, despite advancements, still face computational limitations, reducing their ability to provide high-precision forecasts essential for effective planning and response.

NVIDIA's response to this challenge is Earth-2, an initiative aimed at developing a full-scale, real-world digital twin of the Earth that is being updated in real-time to produce precise forecasts and simulations (NVIDIA, 2025a). The digital twin can generate an impact both in the short and long term. On one hand, it empowers faster and more effective emergency responses to incoming natural disasters. For example, Taiwan's Central Weather Administration (CWA) is among the first agencies to deploy Earth-2, which allows earlier detection of typhoons and more accurate assessments of the typhoon strength. This is especially crucial for Taiwan, which has experienced at least 77 typhoons in the last 40 years that have grown 35% stronger over the same period (Amos, 2024). On the other hand, Earth-2 can predict broader climate outcomes by simulating how multiple variables influence one another.

Figure 4: Digital Twin of NVIDIA's Earth-2 Initiative
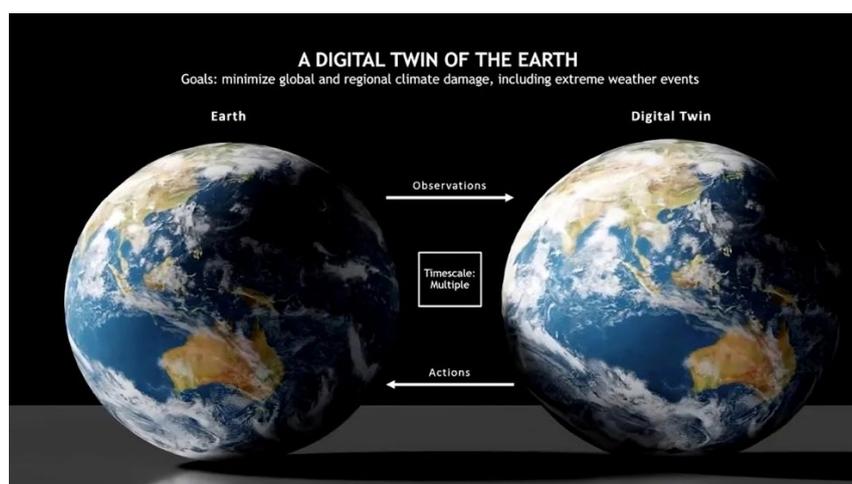
Source: Anandkumar et al., 2022

NVIDIA's Role in Advancing AI-Driven Climate Science

Besides NVIDIA, other parties have also developed modern climate models, mainly at the governmental level. One major example is the project Destination Earth (DestinE), a key initiative of the European Commission's Green Deal and Digital Strategy. It aims to create a highly accurate digital model of Earth to simulate, monitor and predict natural phenomena, as well as test policies (Destination Earth, 2025).

While both DestinE and NVIDIA's Earth-2 are still in their early stages, the latter claims that its approach is more sustainable, as it is more energy-efficient than other computing methods, resulting in fewer emissions compared to models of similar scale.

NVIDIA's Earth-2 Technology

NVIDIA's full-stack technologies make a big difference in the development of modern climate models. The technologies used are NVIDIA Omniverse, Physics-ML/ Modulus, GPU-acceleration, Omniverse nucleus and OVX superpod. (Anandkumar et al., 2022)

Figure 5: NVIDIA's Know-how in Earth-2
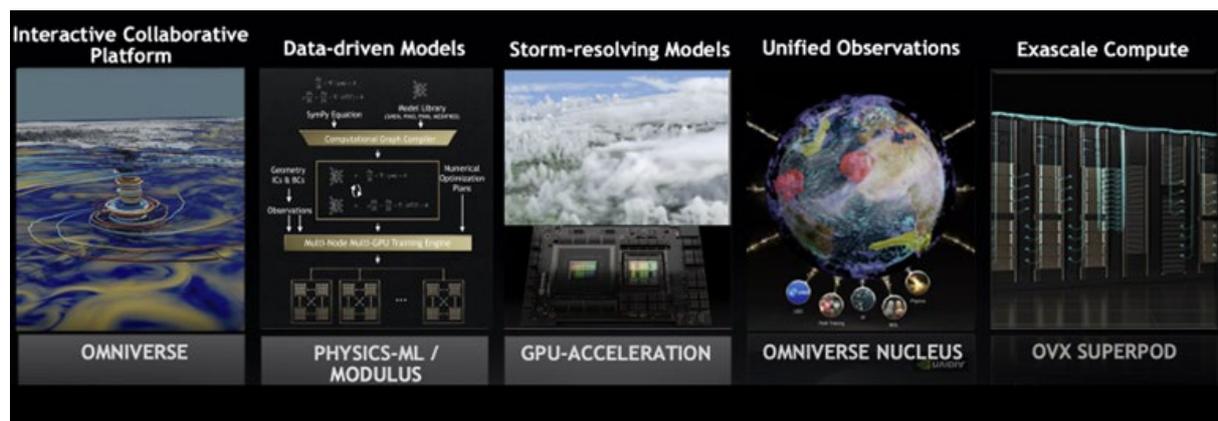
Source: Anandkumar et al., 2022

NVIDIA Omniverse is a real-time simulation and collaboration platform that enables users to build and visualise systems in a digital environment before they take place in the real world. In the Earth-2 project, Omniverse serves as the backbone for the creation of the digital twin of the Earth (NVIDIA, 2025b). At the core of the Omniverse is the nucleus, which is a centralised data server that stores and manages all the data. Furthermore, it allows real-time sharing of changes (data resources and programming) for all collaborators in a workspace tailored for complex 3D environments. NVIDIA Modulus is an advanced Physics-Informed Machine Learning (Physics-ML) platform that combines deep learning with physics-based modelling. It helps develop predictive models that understand and replicate the behaviour of the physical world. In Earth-2, Modulus accelerates the creation of high-fidelity simulations that are traditionally

expensive and time-consuming to compute, delivering faster and more efficient results (NVIDIA, 2025c).

To run these complex simulations, NVIDIA's OVX systems provide the necessary computational power. These high-performance platforms are designed for large-scale digital twins, AI-driven modelling, and real-time collaboration (NVIDIA, 2022c). In Earth-2, OVX systems allow for the simulation of planetary systems, including weather patterns, ocean dynamics, and atmospheric behaviour, at incredibly high resolutions and in real time. This is essential for producing dynamic, up-to-date climate models and environmental forecasts. Underpinning much of this performance is GPU acceleration. As explained in the previous case study, it enables climate simulations that span decades or centuries, models cloud formation and ocean currents, tracks greenhouse gas behaviour, supports high-resolution regional forecasting, and integrates satellite data on a massive scale.

Outlook and Strategic Recommendations

Supply Chain Decarbonisation: Urgent Need for Scope 3 Leadership

In the sustainability report for its fiscal year 2024, NVIDIA reported that it expected to power every office and data centre it directly operates with 100% renewable electricity by the end of 2025. While this commitment is laudable, it is noted that this only affects Scope 1 and Scope 2 emissions, which make up only about 1% of its total greenhouse gas emissions for FY2024 (NVIDIA, 2024).

Its Scope 3 emissions (related to the supply chain) stood at over 3.6 million MT CO_2e in FY 2024, with "purchased goods and services" the dominant driver. NVIDIA's Scope 3 emissions had risen from FY2022 to FY2024 (NVIDIA, 2024).

To curb this impact, NVIDIA committed to engaging manufacturing suppliers responsible for at least 67% of its Scope 3 Category 1 emissions and ensuring supplier adoption of science-based targets by the end of FY 2026 (NVIDIA, 2024). While that represents a meaningful first step, the company's approach remains more focused on engagement and encouragement rather than binding requirements. Strengthening supplier expectations and enforcement mechanisms, therefore, represents a significant opportunity for the company to demonstrate climate leadership and achieve deeper decarbonisation across its value chain.

Asia as a Living Laboratory: From Pilot Projects to Systemic Change

Asia is a significant source of revenue for NVIDIA (Statista, 2025b). The firm's sustainability initiatives on the continent present potential opportunities.

For example, NVIDIA is working with the government in Vietnam on an AI research and development centre. The firm is investing in sovereign AI, where countries harness AI for domestic computing infrastructure and needs. Indonesia has announced initiatives to tap into sovereign AI aided by NVIDIA technology. Thailand is also in talks with NVIDIA for sovereign AI development (Salian, 2024). These governmental partnerships throughout Asia will help to build the foundation for more ambitious sustainability initiatives that could serve as a global model.

Conclusion

NVIDIA has evolved from a niche graphics processing unit designer to a global market leader in artificial intelligence and data centre hardware in just over 20 years. The firm has stepped up to its responsibility as a pioneer in the GPU market to continue innovation, offering more energy-efficient and longer-living products. Its software solutions, such as the Earth-2 initiative, shows its broadened portfolio and commitment to technology leadership to solve crises such as climate change. While the above efforts are all laudable, it still has room for improvement in sustainability, such as in the reduction of its Scope 3 emissions.

Discussion Questions

1. With the rapid adoption of AI, what ethical responsibilities should NVIDIA prioritise as it continues to develop advanced technologies?

2. What could be the potential impact of geopolitical shifts, especially in terms of AI policy, semiconductor regulations and global market access, on companies like NVIDIA?

3. As a global leader in the GPU market, how can Nvidia set the tone for the future of sustainability in the technology and semiconductor industry?

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Schneider Electric: Road to Sustainability Excellence

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Introduction

Schneider Electric is a global industrial technology leader focusing on electrification, energy management, digitisation and automation. They provide an array of products and services for a variety of industries.

Schneider Electric has been named the World's Most Sustainable Corporation 2025 by Corporate Knights and is the only company to rank first in its Global 100 ranking twice (Schneider Electric, 2025d).

Schneider Electric's vision stems from the basic principle of engaging everyone in sustainability in its value chain, from employees to its customers and suppliers. It has developed technological innovations for measuring and reporting its key deliverables and milestones, allowing it to stay on its path to a sustainable future.

Sustainability for Schneider Electric is an all-inclusive agenda that covers net zero transition plans and encompasses environmental, social and inclusion transformation.

Company Overview

Schneider Electric started more than 180 years ago as a steel and armaments company based in France. Today, it operates in over 100 countries across the globe. Its employee strength is over 177,000 (Schneider Electric, 2025a), and it would like to be known as the most local of global companies, which can be coined as "GLOCAL". Schneider Electric bases its work on the below four pillars and strives to follow them in its ethos (Schneider Electric, 2025a).

Figure 1: Four Pillars of Schneider Electric

Four pillars

Schneider Electric is characterized by a number of key markers and strengths which make us unique. These elements combine together to allow us to successfully execute on our strategy and serve our customers.

Technology leader
- The Digital Flywheel enhances recurring revenue and provides a compelling value proposition to customers.
- From EcoStruxure to CONNECT: A complete digital architecture for the benefit of customers.
- Accelerating the pace of innovation through our future-ready R&D program

Customer Centric
- Key 2024 innovation offers across both businesses with more to come in 2025.
- Committed to a unique ecosystem based on long-term partnerships.
- Customer centric integrated service offers to address customers' needs across the lifecycle.
- Capex to Opex to Recurring Experience.

Impact Company
- Leading ESG in our ecosystem.
- Commit to a Net-zero CO_2 value chain by 2050.
- Recognized by TIME magazine and Statista as "World's Most Sustainable Company".

People Company
- Defined by our unique culture and model.
- Committed to a Multi-hub operating model decentralized for people empowerment.
- Committed to our people & culture leading us into new frontiers.

Source: Schneider Electric, 2025a

Key Areas of Expertise

- **Electrification:** Providing solutions for the safe and efficient use of electricity.

- **Automation:** Developing systems that automate processes and improve efficiency.

- **Digitisation:** Integrating technology to create smarter and more connected systems.

Target Industries

- **Smart industries:** Manufacturing, logistics, and other industrial applications.

- **Resilient infrastructure:** Power grids, water management, and other critical infrastructure.

- **Data centres:** Ensuring the reliability and efficiency of data infrastructure.

- **Intelligent buildings:** Optimising building performance and energy consumption.

- **Homes:** Developing smart home technologies for energy efficiency and comfort.

Economic Dimension

Schneider Electric's economic performance in 2024 is marked by significant growth across key financial metrics (Schneider Electric, 2025a).

Revenue and Profits

The company achieved a consolidated revenue of €38.15 billion, representing a 6.3% increase from €35.90 billion in 2023. Organic growth was 8.4%, driven by strong demand in energy management solutions, particularly within the data centre and infrastructure sectors (Schneider Electric, 2025c).

Segment Performance

- **Energy Management:** Generated €31.13 billion in revenue, accounting for 82% of total sales, with an organic growth of 12%.

- **Industrial Automation:** Reported revenues of €7.02 billion, experiencing an organic decline of 4%, primarily due to market softness in discrete automation.

This results in its adjusted earnings before interest, taxes and amortisation (EBITA) increasing to €7.08 billion, up 10% from €6.41 billion in 2023, with an organic growth of 14.2%. Net income rose to €4.27 billion, a 7% increase from the previous year's €4.00 billion (Schneider Electric, 2025c).

Regional Highlights

- **North America:** Achieved 18% organic growth in Energy Management, driven by robust demand in the data centre market.

- **Western Europe:** Recorded 5% organic growth in Energy Management, with notable contributions from Italy and Spain.

- **Asia-Pacific:** Experienced 6% organic growth in Energy Management, led by strong performance in India (Schneider Electric, 2025c).

These results underscore Schneider Electric's strategic focus on energy management and automation, positioning the company for continued growth amidst evolving global energy demands.

The company's sustainable impact revenue accounted for 74% of total revenue, with projections to increase this proportion to 80% by 2025 (Saul Electric, 2024).

These figures underscore Schneider Electric's ongoing efforts to integrate sustainability into its core business operations and revenue streams.

Figure 2: Schneider's Capital Allocation

Source: Schneider Electric, 2025a

Schneider Electric's financial performance reflects its clear direction in providing for a sustainable ecosystem. Its strong financial results are evidence that its strategy is working. The firm is on a path to grow ambitiously and keep its myriad of customers and suppliers engaged on the path to a sustainable future.

Environmental Dimension

Aligning with the Global Sustainable Development Goals

Schneider Electric's sustainability initiatives are based on several United Nations Sustainable Development Goals (SDGS), which address challenges such as poverty, inequality and environmental degradation. One of the goals it supports is SDG 7 (Affordable and Clean Energy), with a focus on energy efficiency and solutions relating to renewable energy. The company aims to achieve 100% renewable electricity by 2030 and make clean and reliable energy more available globally (Schneider Electric, 2024c).

For SDG 13 (Climate Action), Schneider Electric commits to carbon-neutral operations by 2025 and net-zero emissions by 2050. The firm strives to keep global warming below 1.5 °C, a figure agreed upon at the 2015 Paris Agreement (Cronin, 2025).

In terms of suppliers, Schneider Electric launched initiatives such as the Zero Carbon Project Workshop and webinars to bridge suppliers' knowledge gaps on

decarbonisation. The efforts have led to a 40% reduction in carbon emissions from Schneider Electric's top 1,000 suppliers' operations (Schneider Electric, 2025a).

Promoting the Circular Economy

Schneider Electric's commitment to the circular economy—for example, by reducing waste and increasing efficiency—is central to its sustainability strategy. Its EcoStruxure platform integrates the Internet of Things (IoT), artificial intelligence (AI), and digital tools to facilitate competent resource management. Through accurate real-time tracking of energy consumption, the platform helps to make businesses less wasteful and more efficient, promoting a circular approach to the economy where products are reused and materials are recycled.

Figure 3: Schneider Electric's Circular Economy System
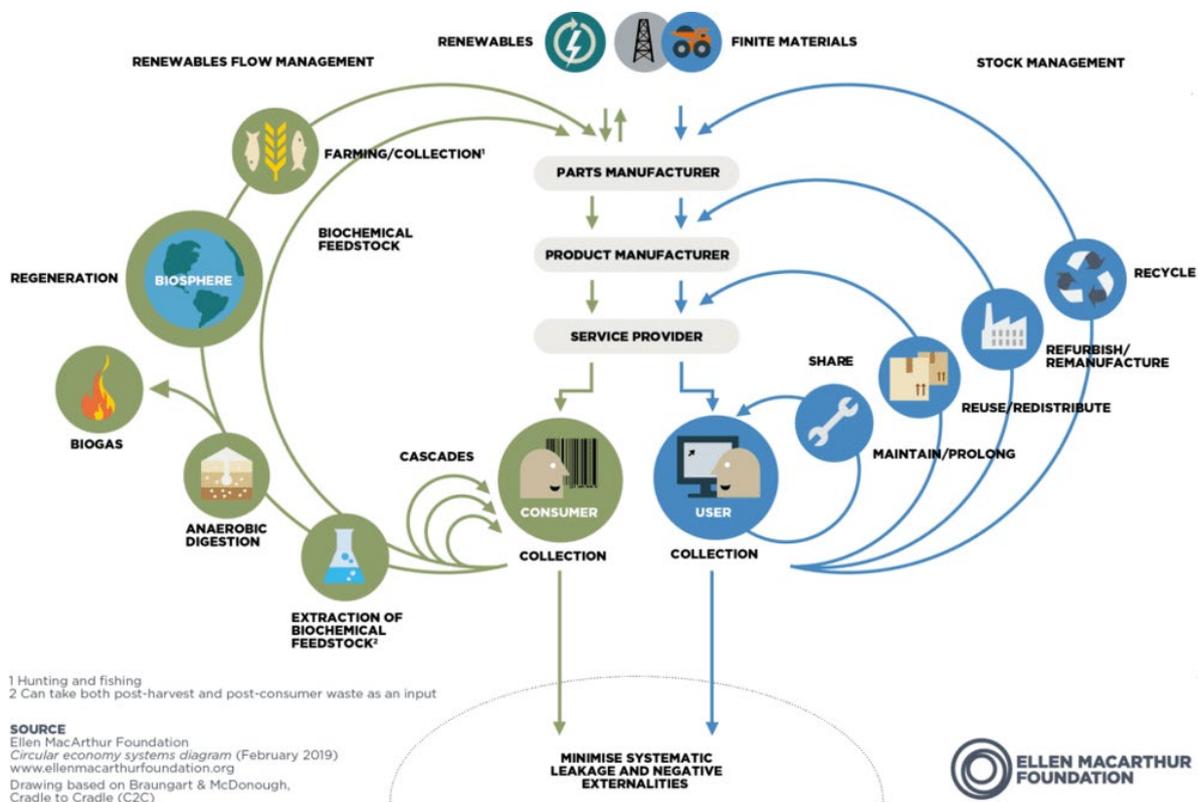
Source: Schneider Electric, 2023a

Product design is not neglected in Schneider Electric's micro-circular economy. The company manufactures durable, upgradeable, and recyclable products, and waste is minimised. Designing goods with extended life cycles reduces demand for raw materials and reduces their customers' environmental footprint.

Challenges in Scaling Environmental Sustainability

However, Schneider Electric's environmental efforts are not without challenges. Regulations are more stringent in developed than in emerging markets (including the European Union), and growing demand for renewable energy and sustainable materials is impacting prices and putting pressure on profit margins. For example, Schneider Electric faces spiralling electricity procurement costs from renewable sources (Schneider Electric, 2023b).

Social Dimension

Educational and Career Support

Sustainable measures in education

Schneider Electric's global Go Green competition offers students the chance to engage in sustainable development strategies and tackle climate change, while also exploring careers at the company (Agorize, 2024).

Top participants get to receive mentorship from business leaders. Winners can also be offered internships or jobs at Schneider Electric. This initiative allows the firm to identify talent demonstrating organisational values, hence contributing to cost efficiency in recruitment processes.

Beyond the competition, Schneider Electric provides extensive training and internship opportunities. In 2019, it had 4,939 hiring opportunities for interns, apprentices and new graduates. It aimed to double this number by 2025, and as of 2023, its number was 1.52 times its 2019 baseline (Schneider Electric, 2024c).

Figure 4: Schneider Electric's Efforts Towards Social Progressiveness

Equal	8.	Increase gender diversity in hiring (50%), front-line management (40%) and leadership teams (30%)	2020: 41/23/24	41/28/29	50/40/30
	9.	Provide access to green electricity to 50M people	2020: 30M	+16.6M	50M
Generations	10.	Double hiring opportunities for interns, apprentices and fresh graduates	2019: 4,939	x1.52	x2.00
	11.	Train people in energy management	2020: 281,737	578,709	1M
Local	+1.	Country and Zone Presidents with local commitments that impact their communities	2020: 0%	100%	100%

(1) The baseline year is indicated in front of each SSI baseline performance.
(2) Each year, Schneider Electric obtains a "limited" level of assurance on methodology and progress from an independent third party verifier for all the SSI and SSE indicators (except SSI #+1 and SSE #12 in 2023), in accordance with ISAE 3000 assurance standard (see Independent verifier's report on page 236). The 2023 performance is also discussed in more details in each section of this report.
(3) Per Schneider Electric definition and methodology. For the reporting requirements under the European Taxonomy Regulation, please refer to pages 211 to 227.

Source: Schneider Electric, 2024c

Schneider Electric has made good progress in Diversity, Equity, and Inclusion (DEI). DEI means ensuring that people from different backgrounds have fair opportunities and feel included. Schneider Electric shows this commitment through its Global Student Experience (Schneider Electric, n.d.) and its Youth Education and Entrepreneurship Programme which has worked with partners to enhance gender equality and job opportunities for underrepresented groups (Schneider Electric, 2024c).

Supporting Employees

Schneider Electric supports employees with its 2023-launched Spice+ platform, a centralised hub that streamlines workflows, enhances productivity, and aligns with SDG 8: Decent Work and Economic Growth. The platform allows staff to personalise their experience, access benefits, stay updated, and manage schedules. According to the firm's 2023 Human Resources Report (Schneider Electric, 2024), 81% of employees reported that they benefited from flexible work arrangements, reflecting the platform's role in promoting an employee-centric culture.

Community Benefit

Impact Investing

Schneider Electric has significant efforts in community building and services (Schneider Electric, 2024b). In 2023, the Schneider Electric Foundation invested €4 million in more than 140 projects, supporting 180,845 youth and contributing with 17,083 days of volunteering.

It also has impact investing vehicles, supporting start-ups and companies to improve energy access in resource-poor areas. This helps vulnerable groups improve their quality of life (Schneider Electric, 2024b).

Amplifying Training of External Stakeholders

In addition, Schneider Electric is collaborating with external stakeholders to amplify its impact. In 2023, it announced that it planned to train one million youths in Africa on energy management and industrial automation by 2025. This supports its United Nation Sustainable Development Goals (SDGs) on quality education, as well as decent work and economic growth (Fasogbon, 2023).

In all, Schneider Electric contributes to social sustainability by providing energy access to remote areas, thereby improving their living conditions. At the same time, it carries out skills training programmes in energy management, improving the communities' employment prospects. Its impact is further enhanced through employee volunteering efforts and cross-border cooperation.

Governance Dimension

For global electrical enterprises like Schneider Electric, governance on sustainability serves as a cornerstone for aligning corporate strategy with considerations for the planet and society.

Strategic Positioning and Governance Structure

Schneider Electric promotes its sustainable development strategy by building a systematic governance framework. The company has established a comprehensive management system covering strategic planning, execution, dynamic monitoring and stakeholder collaboration, deeply integrating sustainable development goals into the company's full life cycle management. Its innovative practices are reflected in establishing a quantitative evaluation system (Schneider Sustainability Impact, SSI), driving strategies through data-based indicators while ensuring the collaborative execution of various business units.

The 2024 SSI comprehensive score reached 7.55/10 (Schneider Electric, 2025a), exceeding the annual strategic goal of 7.40/10. This achievement reflects the company's achievements in the coordinated improvement of environmental and economic benefits.

Transparency and Accountability

Schneider Electric focused on information transparency, making disclosure and responsibility mechanisms the core strategy of sustainable development governance. At its 2023 shareholders' meeting, the firm's climate strategy was an agenda item, which achieved an approval rate of nearly 98% (Schneider Electric, 2023c). There is limited external insurance from an independent third-party verifier for most of its Schneider Sustainability Impact indicators (Schneider Electric, 2024c), indicating transparency of its results. Schneider also participates in international rating systems. As of February 2025, for 14 consecutive years, Schneider Electric was selected for the Dow Jones Sustainability Index (DJSI) and the CDP's A List, as well as earned the MSCI ESG's AAA rating (Schneider Electric, 2025b). Additionally, Schneider Electric has an anti-corruption policy and ethics hotline that provides stakeholders with a channel to report misconduct (Schneider Electric, 2024c).

The above sections have explored Schneider Electric's sustainability efforts from the Economic, Environmental, Social and Governance dimensions. Moving on, the following sections will examine in closer detail their efforts in sustainability standards and reporting; climate change and actions; and sustainable supply chain.

Sustainability Standards and Reporting

Schneider Electric demonstrates a high level of transparency and leadership in sustainability reporting, aligning with top international standards and consistently scoring well in third-party benchmarks. However, its data-heavy reporting structure presents challenges for accessibility among mainstream stakeholders.

Alignment and Recognition

Schneider Electric aligns with multiple major sustainability reporting standards, including the Global Reporting Initiative (GRI), the Sustainability Accounting Standards Board (SASB), and the Task Force on Climate-Related Financial Disclosures (TCFD). It is preparing for the Corporate Sustainability Reporting Directive (CSRD) through its EU Taxonomy disclosures and assurance practices. While some frameworks don't offer numerical scores, Schneider's consistent CDP A List status and top-tier ESG rankings reflect strong performance and comprehensive, transparent reporting.

Figure 5: Overview of Schneider Electric's EU Taxonomy-eligible Activities
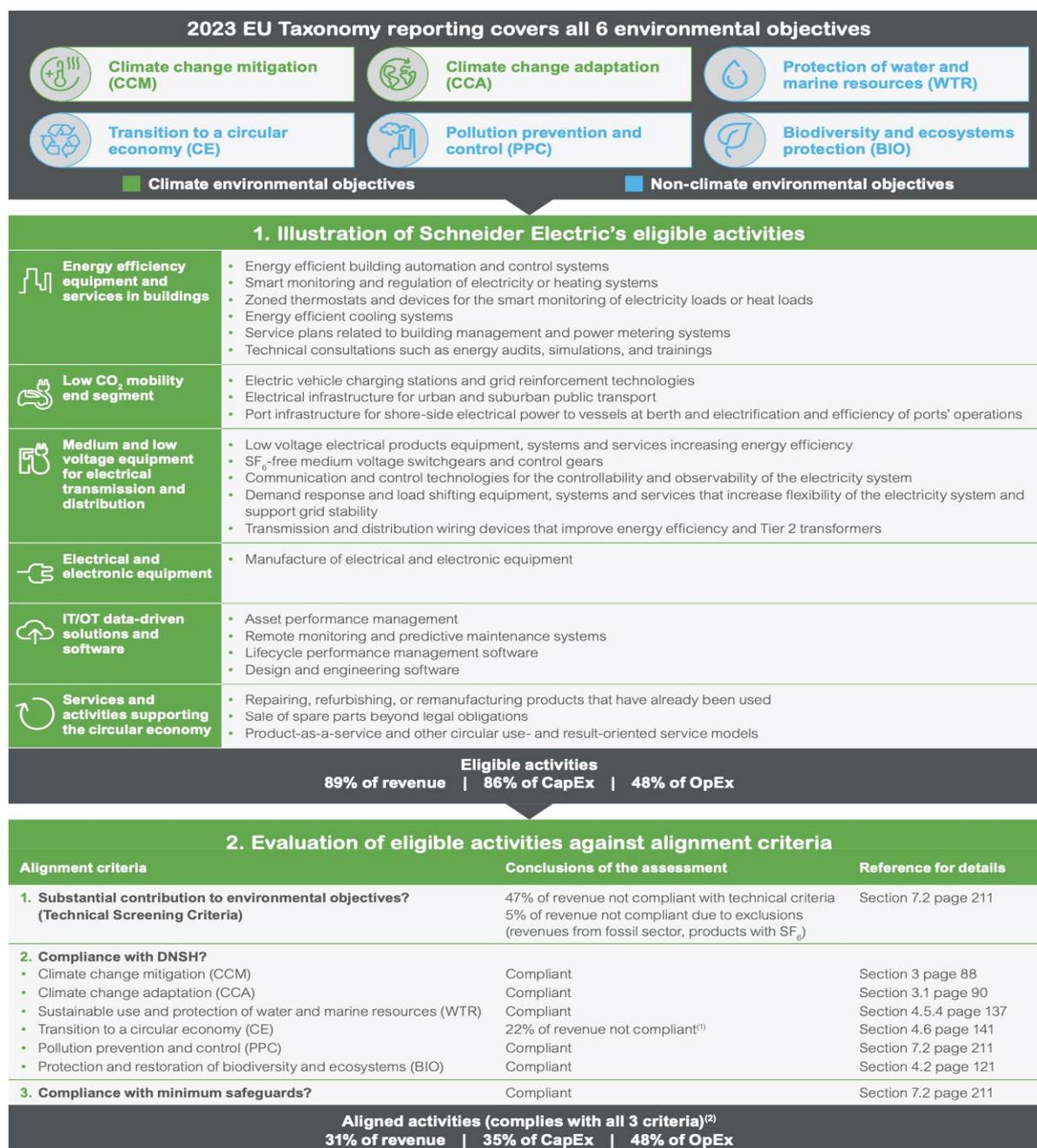
Source: Schneider Electric, 2024c

Figure 6: Sustainability Ratings for Schneider

Sustainability external ratings	DJSI	CDP Climate Change	Vigeo Eiris Moody's Analytics	EcoVadis(1)	MSCI ESG Ratings	Sustainalytics
2023 Schneider score	88/100	A	73/100	88/100	AAA	Low risk
Industry average score	21/100	C	39/100	47/100	BBB	Low risk
Progress vs. 2022	-2 pts	Unchanged	Unchanged	+9 pts	Unchanged	Unchanged
Highlights	13th year in world index	13th year in A List	World 120 and Europe 120 Indices	Platinum medal for 4th year	AAA for 13th year	1st in industry
Assessed universe (# companies)	9,400+	21,000+	4,800	90,000	8,500	15,100

Source: Schneider Electric, 2024c

Reporting Tools

Schneider Electric uses three internal reporting tools to track sustainability performance: the Schneider Sustainability Impact (SSI), Sustainability Essentials (SSE) and Local +1 programmes. These support alignment with global standards (e.g., GRI, SASB, TCFD) by providing consistent, verifiable KPIs across environmental and social goals. The SSI monitors 11 global commitments every quarter, including climate, resources, and equality.

The SSE covers 25 long-term metrics annually, offering deeper insight into circularity, packaging, and value chain impacts. Local +1 programmes track country-specific initiatives in over 100 markets.

Figure 7: Schneider Electric's Internal Reporting Tools

Tool	Schneider Sustainability Impact (SSI)	Schneider Sustainability Essentials (SSE)	Local Sustainability Impact programs (SSI #+1)
KPIs	11	25	~200
Scope	Global	Global	Local
Reporting	Quarterly	Annual	Annual
Assurance	Yes	Yes	No
Link to STIP	Yes	No	No

Source: Schneider Electric, 2024c

The SSI score of 6.13/10 in 2023 shows the firm outperforming its target (6.00), up from 4.91 in 2022. Schneider Electric is making steady progress towards its 2025 sustainability goals (SSI 10/10).

Materiality and Stakeholder Engagement

Schneider Electric conducts regular materiality assessments to ensure its sustainability priorities align with stakeholder expectations. Key focus areas include climate action, resource efficiency, equity, and leveraging digital in cyber secure solutions to boost positive impact. Input is gathered from a wide range of internal and external stakeholders through surveys, interviews, and collaborative initiatives. These priorities shape the company's SSI and SSE programmes.

Figure 8: Schneider Electric's Materiality Matrix
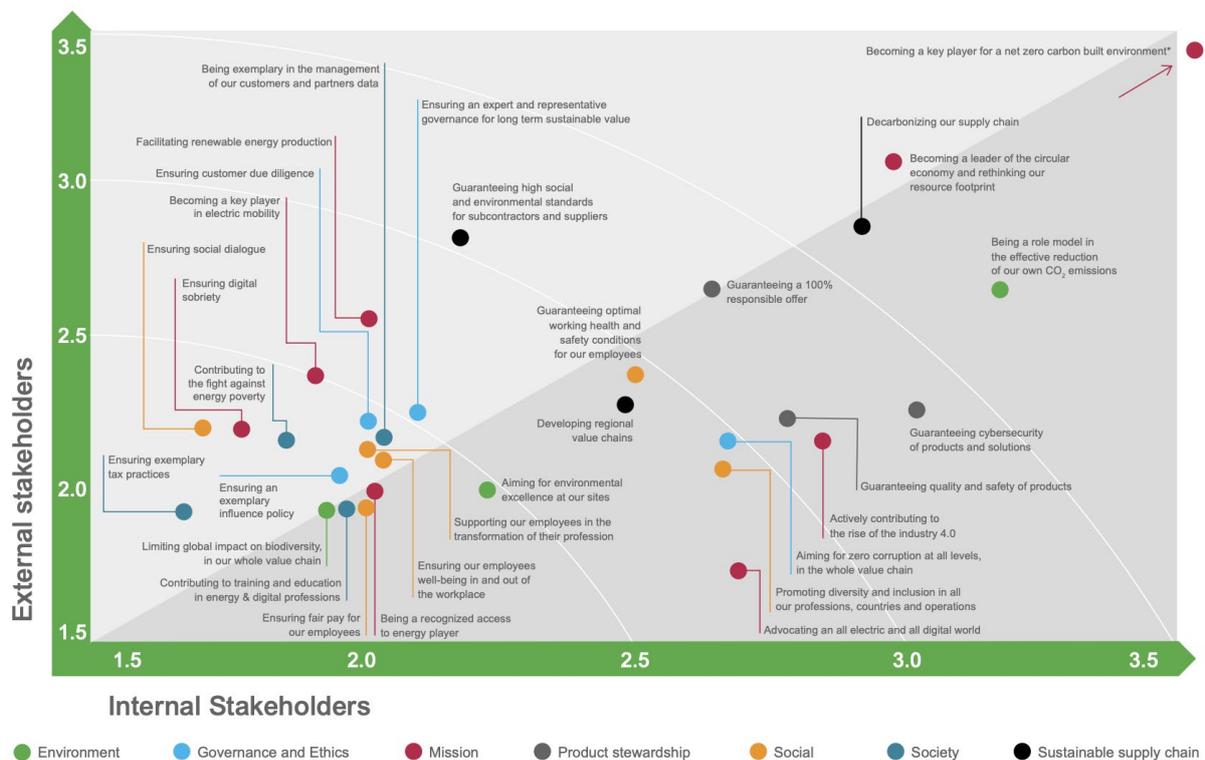
Source: Schneider Electric, 2024c

Although Schneider provides correspondence tables to map disclosures across standards, these are not fully integrated into a single materiality framework. The content reflects stakeholder concerns, but the complexity of managing multiple frameworks may reduce clarity for general audiences. There is a lack of information mapping the internal reporting tools to external frameworks. A more streamlined, stakeholder-centred reporting structure could improve coherence and accessibility.

Climate Change and Actions

Given the imperative of tackling climate change, this section delves into Schneider Electric's strategies and actions for this aim.

Decarbonisation

Mitigation chiefly involves reducing greenhouse gas emissions; Schneider Electric aims to be carbon neutral in its direct operations by 2025, and carbon neutral in its entire value chain by 2040 (Schneider Electric, 2024c). It improves performance by adopting renewable energy sources, optimising operational strategies, and reducing emissions across the cost chain, including Scope 1 (direct emissions) and Scope 2 (indirect emissions). By incorporating advanced technologies such as smart grids, building controls and automation, Schneider Electric is reducing its carbon footprint and enabling its customers to do likewise, creating a ripple effect beyond the organisation's internal operations.

Engaging with Climate Fresk

Schneider Electric's Swedish employees engaged in Climate Fresk, a game-based workshop, to deepen their climate literacy and connect global challenges to their roles. Participants reported heightened awareness of climate science and empowerment to act, with many expressing renewed motivation to align daily tasks with Schneider's sustainability goals. Employees advocated for clearer climate targets, follow-up workshops to sustain momentum, and internal "climate champion" programmes to normalise eco-conscious behaviours. This fosters a culture of sustainability learning within the company (Nordin and Wahlstrom, 2022).

Adaptation Strategies: Responding to Climate Change

Schneider Electric invests in building climate resilience throughout its supply chain, ensuring its infrastructure is robust enough to withstand climate-related hazards. It monitors events across 10,000 nodes (such as ports and critical supplier locations) for timely response (should hazards occur). It also tries to find dual sources for critical components, reducing the risks of climate-related disruptions in its supply chain (Schneider Electric, 2024c).

Integrating Biodiversity and Ecosystem Services into Climate Action

A frequently overlooked aspect of climate change is its impact on biodiversity. Ecosystems are increasingly impacted by rising temperatures, changing precipitation

patterns, and habitat destruction, and many businesses now recognise the interconnections between climate change and biodiversity loss. Schneider Electric incorporates biodiversity into its sustainability strategy by assessing the biodiversity impacts of relevant processes (Corru, 2024).

Carbon Disclosures and Management

Schneider Electric maintains comprehensive carbon disclosures and a science-based roadmap to net zero. Emissions data is reported across Scopes 1, 2 and 3 by the GHG Protocol and GRI 305 standards, with third-party assurance. In addition, the company integrates an internal carbon price into investment decisions (Schneider Electric, 2024c). While decarbonisation progress is evident, challenges remain in the transparency of carbon offsets and the granularity of Scope 3 upstream reductions.

2023 GHG Emissions Overview (Schneider Electric, 2024a)

- Scope 3 accounts for about 99% of Schneider's total emissions.

- Scope 3 emissions decreased by 7% compared to 2022.

- Scope 1 and 2 emissions decreased by 12% compared to 2022.

Table 1: Schneider Electric's 2023 Emissions

Scope	Emissions (tCO$_2$e)	Notes
Scope 1	112,792	Direct emissions (fuel, gas, vehicle fleet, SF$_6$ leakage)
Scope 2	89,440	Indirect emissions from grid electricity (market-based), district heating, estimated emissions of sites out of reporting perimeter
Scope 1 + 2 (combined)	202,232	Total operational emissions (GRI 305-1 and 305-2)
Scope 3 (total)	56,777,964	All categories combined (GRI 305-3), upstream and downstream
Scope 3 Upstream (categories 1–7)	7,766,994	E.g. purchased goods, transport, business travel
Scope 3 Downstream (categories 9,11,12)	49,010,970	Mainly the use of sold products

Source: Schneider Electric, 2024c

Net Zero Roadmap

Schneider's Net Zero roadmap is science-based and phased, emphasising operational decarbonisation before integrating offsets for hard-to-abate emissions.

Figure 9: Schneider Electric's Net Zero Roadmap

Long-term roadmap

2025 → **2030** → **2040** → **2050**

- Carbon neutral operations

- 25% absolute GHG emissions reduction across the entire value chain from a 2021 baseline
- "Net-Zero ready" operations

- Carbon neutral across the entire value chain (Scopes 1, 2, and 3), including carbon removals

- Net-Zero CO$_2$ emissions across the entire value chain
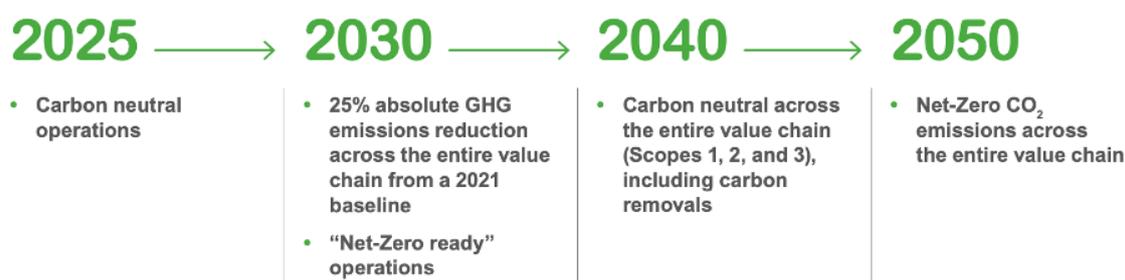
Source: Schneider Electric, 2024c

Internal Carbon Pricing

Schneider applies a shadow carbon price of €50–130 per metric tonne of CO_2e, scaled by investment time horizon and strategic planning context. The range accounts for regulatory uncertainty and supports alignment with a 1.5°C trajectory. It is embedded in its supply chain and research and development decisions to prioritise low-carbon options and assess climate risks. This mechanism internalises environmental costs and enables proactive decarbonisation ahead of future market or policy shifts. (Schneider Electric, 2024c)

Carbon Offset Strategy

Schneider Electric takes a cautious, forward-looking approach to carbon offsets, prioritising absolute emissions reductions across its operations and value chain.

- It aims to balance its residual Scopes 1 and 2 GHG emissions with carbon removal credits to achieve carbon-neutral operations by 2025 and carbon neutral value chain by 2040.

- Only high-quality carbon removal credits will be used.

- Removals must follow the "like-for-like" principle, meaning fossil emissions are balanced by fossil-equivalent removals, as defined by EU regulations and the Oxford Principles.

- Avoidance credits will not count towards net-zero targets (Schneider Electric, 2024).

To support future offsetting needs and social co-benefits, Schneider Electric has invested in the Livelihoods Carbon Funds (LCF, LCF2, LCF3) since 2011, which finance agroforestry and regenerative agriculture; reforestation and mangrove restoration; and rural energy access via fuel-efficient cookstoves (Schneider Electric, 2024).

Credits are certified by Gold Standard and Verra but have not been used for internal offsetting as of 2023—only in limited contexts (e.g. Schneider Electric Paris Marathon).

Scope 3 Emissions

In 2023, Schneider Electric reported 56.8 million tCO_2e in Scope 3 emissions, representing over 99% of its total carbon footprint. These are split into:

Table 2: Scope 3 Upstream Emissions Amounted to 7.77 million tCO2e

Category	Emissions (tCO$_2$e)	Key Notes
Purchased goods and services	6,829,733	Largest upstream source (12% of total footprint)
Transportation of goods (paid by Schneider)	563,643	Freight emissions, tracked using the Sightness tool
Capital goods	55,361	Machinery and infrastructure
Fuel- and energy-related activities	40,652	Indirect emissions from fuel extraction and distribution
Waste generated in operations	34,927	N/A
Business travel	60,702	Increasingly tracked with improved systems
Employee commuting	181,977	Includes hybrid and remote work profiles

Source: Schneider Electric, 2024c

Upstream mitigation includes the Zero Carbon Project (1,000 suppliers; 27% reduction achieved towards a 50% target by 2025), use of recycled materials through its Green Materials programme, and Product Carbon Footprints based on 43% volume data and 57% spend-based calculations. Freight and travel emissions are monitored via digital tools like "Sightness" (Schneider Electric, 2024c).

Table 3: Scope 3 Downstream Emissions Amounted to 49 Million tCO2e

Category	Emissions (tCO$_2$e)	Key Notes
Use of sold products	44,223,749	~78% of Scope 3; life cycle energy use (Joule effect) up to 30 years
End-of-life treatment	4,306,182	Mostly linked to SF_6-containing equipment
Transportation of goods (not paid by Schneider)	481,039	Customer-side logistics

Source: Schneider Electric, 2024c

Downstream mitigation includes the design of energy-efficient and SF_6-free products, alongside a shift in sales to regions with cleaner grids, which reduced 2023 use-phase emissions by 6% compared to 2022 (Schneider Electric, 2024c).

The company's Scope 3 strategy combines supplier engagement, product innovation, and lifecycle modelling. However, upstream data granularity remains limited, and downstream reductions depend largely on customer usage and grid emissions.

Sustainable Supply Chain

Upstream emissions (suppliers) in Scope 3 accounted for 7.8 million tonnes of CO2e, which is 14% of the total carbon footprint of the company. Purchase and transportation of goods are major sources of emissions. Schneider Electric is focusing on several initiatives to decarbonise its supply chain by 2050. Building a community with suppliers, collaborating with them, and establishing sourcing and purchasing criteria are identified as approaches to achieving supply chain decarbonisation (Schneider Electric, 2024c).

Figure 10: Scope 3 Upstream Emissions Trend (2019–2023)
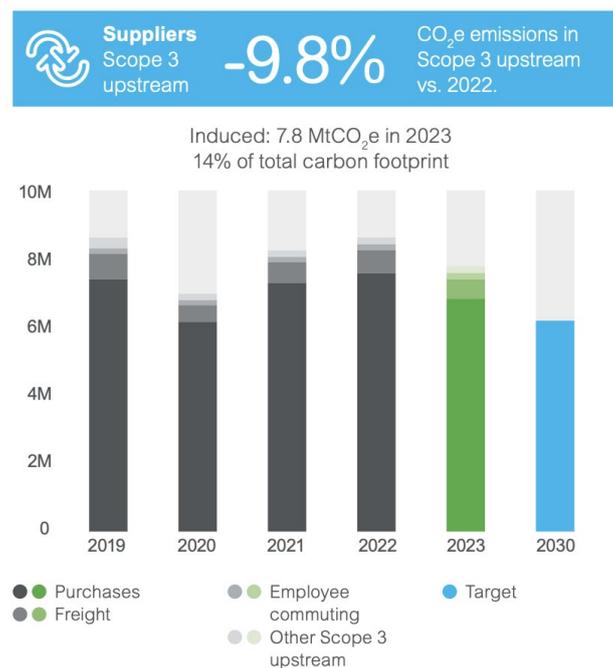
Source: Schneider Electric, 2024c

Zero Carbon Project

The Zero Carbon Project was launched in April 2021 as a step to reduce GHG emissions from Schneider Electric's suppliers. The goal of the project was to collaborate with their top 1000 suppliers and reduce operational (Scope 1 and 2) GHG

emissions by 50% by 2025. The programme supports participating suppliers in quantifying their Scope 1 and 2 emissions, setting reduction targets, and implementing specific decarbonisation plans. As of 2023, an average 27% reduction in operational emissions was achieved collectively by all the suppliers in the programme (Schneider Electric, 2024c).

Schneider Electric's efforts to decarbonise its supply chain through the zero-carbon project faced challenges due to wide differences in supplier knowledge and limited access to accurate CO_2 data. The suppliers in the project span over 60 categories globally, and around 75% had never measured their emissions before, making the standardised approach unfeasible. To enhance the project's reach and supplier engagement, Schneider provides supporting programmes and tools that establish a shared baseline understanding (Procurement Leaders, 2022). For instance, it conducts capacity-building workshops in key regions, deploying experts to conduct on-site diagnostics and advise on energy efficiency measures.

These workshops were focused on providing region-specific support, which helped increase supplier ownership of climate action plans, improving emissions accounting transparency. Apart from this, Schneider also developed digital platforms such as the Digital Emission Calculator and Zeigo Activate which offers customised support plans to reach reduction targets for suppliers, as their capabilities and digital infrastructure vary. The platform helps suppliers identify and prioritise decarbonisation actions, set timelines, and connect with localised partners for implementation (Schneider Electric, 2024c).

Supply Chain Renewable Initiative

Furthermore, Schneider identified that renewable procurement is more challenging for many small and medium suppliers as they have insufficient energy loads and lower power demand. To address this, Schneider launched the Supply Chain Renewable Initiative (Schneider Electric, 2024c), which focused on aggregating supplier demand to meet thresholds for collective Power Purchase Agreements (PPAs) as they allow SMEs to gain buying power, enabling them to access long-term renewables. This not only helps its suppliers reduce their Scope 2 emissions but is also beneficial to Schneider as this helps address its Scope 3 emissions. Part of the initiative also includes conducting training sessions on topics like Energy Attribute Certificates, financial and legal risks in PPAs, and onsite solar.

Green Material Sourcing

To commit to material traceability and reducing Scope 3 emissions from the manufacturing stage of the value chain, Schneider Electric set targets to source 50% of its materials from low-carbon alternatives by 2025 (Schneider Electric, 2024c). It developed its own green criteria, focusing on climate, resource use, biodiversity and

social impact. Prioritised materials such as thermoplastics, steel, and aluminium were selected for sustainability improvements, and Schneider Electric's procurement teams are working closely with suppliers to co-develop low-carbon alternatives and ensure their availability in the market. Additionally, the company has launched product lines using recycled materials, such as switches made from electronic waste and ocean plastics. The firm also joined industry forums that promote traceability and set stringent sourcing standards. (Procurement Leaders, 2022).

While these initiatives advance Schneider's circular economy goals and support compliance with regulatory frameworks, green materials sourcing continues to face broader challenges that include limited availability, increased procurement costs and complexities in green practice verification. These pose significant barriers to global manufacturing companies (Runtuk, Ng, & Ooi, 2024).

Logistics and Transportation Efficiency

Schneider Electric is moving towards regionalisation of manufacturing and enhancing optimisation of the related freight transportation system with a focus on reducing CO_2 emissions from the transportation of goods, which accounts for 1 million tonnes of CO_2e in 2023. To achieve this, the company shifted from air freight to multi-modal solutions that resulted in a 9% reduction in air freight volume and a 1.6% decrease in transportation emissions intensity. To align with global reporting standards and improve data robustness, it employs advanced logistics tools such as EcoTransIT World, an emissions calculations solution (Schneider Electric, 2024c).

Conclusion

To conclude, Schneider Electric's sustainability journey is marked by measurable progress across economic and ESG dimensions. Its initiatives, such as the Zero Carbon Project, green material sourcing, and efforts in inclusive education and community outreach, reflect a clear integration of sustainability into core business operations. While some challenges remain in areas like reporting complexity and supplier engagement, the company's structured frameworks and stakeholder collaborations position it well to meet its long-term goals.

Discussion Questions

1. How effective are Schneider Electric's regional workshops and digital platforms in addressing supplier knowledge gaps and data accuracy challenges?

2. How can Schneider Electric manage higher costs and supplier verification complexities while pursuing ambitious green material sourcing goals?

3. How can Schneider Electric better demonstrate the connection between internal reporting tools (SSI, SSE, Local +1) with the global reporting standards (GRI, SASB, SBTi, etc.)?

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Temasek: Capital with Impact through Investment Portfolios

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Introduction

Over the years, Temasek has developed into a worldwide investment powerhouse that stands out for its long-term vision and dedication to sustainable solutions. Temasek's success in including sustainability efforts into its investment strategies is in great part due to its governance structure. Governance at Temasek is the basis upon which value and long-term influence are developed. This enables the company to proactively integrate Environmental, Social and Governance (ESG) factors in many aspects of its investment strategy, from due diligence to post-investment engagement.

Company Overview

Founded in 1974 to manage state-owned assets and boost economic growth, Temasek is a global investment company headquartered in Singapore. Despite deploying funds across the world, Temasek still has a strong domestic focus, with over 50% of its funds invested in Singapore-based companies. Temasek's net portfolio value, as of 31 March 2024, was S$389 billion. Key areas of investment focus are transportation and industrials, financial services, telecommunications, media & technology, consumer and real estate sectors (Temasek, 2024a).

While Temasek is fully owned by the Singapore government, it is directed by a professional board and top-level management. Operations are independent. With innovation and resilience as part of its forward-looking strategy, Temasek has invested in emerging industries like biotechnology and artificial intelligence, as well as tech giants like Alibaba and Tencent (Temasek, 2024b).

Sustainability has long been a part of Temasek's philosophy, embedded in risk management and in creating a more inclusive and environmentally friendly future. It plans to reach net-zero carbon emissions by 2050 and currently makes investments in eco-solutions such as renewable energy, decarbonisation technologies and carbon market initiatives (Temasek, 2024b). Also, through the years, the company concluded a series of agreements and partnerships to promote sustainable innovation, such as GenZero, an investment platform that focuses on technologies that reduce and remove carbon emissions. Temasek also actively engages and collaborates with companies in its portfolio, fostering their adoption of ESG frameworks and climate-conscious corporate strategy (Temasek, 2024b).

Temasek's sustainability efforts go beyond environmental sustainability. It supports projects in education, public health, disaster relief and social innovation through its charitable arm, the Temasek Foundation (Temasek Foundation, n.d.). These initiatives reflect the company's goal of a more inclusive future.

Temasek Structure & Governance

History of Governance in Temasek

Temasek was created to own and manage the assets previously held by the government, as "it was not the business of government to operate the businesses it owned" (Temasek, n.d.-a). At the point of inception, Temasek had 35 companies in its portfolio, including well-known companies such as the Development Bank of Singapore (now part of DBS Group Holdings), Keppel Shipyard and Singapore Airlines (SIA).

Temasek owns the assets it invests in and acts as an investor, not a fund manager. While the government sets general investment mandates and long-term goals, Temasek, like GIC and the Monetary Authority of Singapore (MAS), operates fully independently when it comes to managing and making decisions. With an independent board of directors to oversee Temasek's management, the government's role now focuses on reviewing the overall portfolio risks of the three entities and allocating capital (Ministry of Finance, Singapore, n.d.).

Even though Temasek is not controlled by the state, it is still listed as a Fifth Schedule entity under Singapore's Constitution. Under the Constitution, Temasek must protect its past reserves, which form part of the national reserves. The President of Singapore does not take part in Temasek's business or investment decisions but must approve any use of past reserves and also agree to the appointment or removal of board members and the CEO. This requirement is known as the "second key" safeguard. Each year, Temasek's Board and senior management give updates to the President, the Council of Presidential Advisers, and the Ministry of Finance, sharing reports on the company's performance and investment strategies. (Temasek, n.d.-b).

Temasek plays an essential role in building Singapore's economy and industry by making investments that support long-term development both at home and abroad. Through its commitment to being independent, having strong and transparent governance, and actively working with the companies it invests in, Temasek remains a major force behind innovation and sustainable financial growth for the country.

Risk Management and Internal Governance Framework

At Temasek, managing risks is a key part of the company's overall governance structure. As shown in Figure 1, Temasek uses a multi-layered risk management framework.

Figure 1: Temasek Organisational Risk Management Framework

Organisational Risk Management Framework

Risk Return Appetite Statements

We have no tolerance for risks that could damage Temasek's reputation and credibility

- Temasek rigorously identifies potential sources of reputational risk and how each type of reputation risk is to be managed

We focus on performance over the long term

- We target a long-term portfolio return that exceeds our risk-adjusted cost of capital
- We are prepared to accept fluctuations in annual reported results provided we are compensated by superior longer-term returns and it does not affect our ability to survive

We have flexibility to take concentrated positions

- Where good investment opportunities allow for superior long-term performance, Temasek has the flexibility to take portfolio concentrations in specific sectors, geographies, themes, or individual assets
- We adopt a disciplined approach to investing, with end-to-end assessment frameworks and processes for each asset class
- For direct equity investments this includes developing a deep understanding of each investment in order to determine the intrinsic value for investment, divestment, and hold decisions

We maintain a resilient balance sheet

- We manage leverage and liquidity to ensure resilience and flexibility even in times of extreme stress

We evaluate the potential for sustained loss of overall portfolio value over prolonged periods, and use different scenarios to test our resilience

Risk Pillars

Investment Risk[1]	Liquidity & Leverage Risk	Portfolio Value Risk	Operational Risk	Cybersecurity Risk	Legal & Regulatory Risk

Macro and Geopolitical Risk

Source: Temasek, 2025

Temasek's risk management is organised around several major types of risk, or "pillars".

- **Investment risk** covers foreign exchange risk and Environmental, Social and Governance (ESG) risk. It is managed through in-depth research before decisions are made, using detailed financial models based on risk-adjusted cost of capital. Investment proposals are reviewed by appropriate committees depending on how complex or risky they are. ESG risks are considered by applying an internal carbon price and a social baseline risk assessment.

- **Liquidity and leverage risk** is controlled by keeping enough cash or liquid assets on hand, watching debt levels, and spreading out debt repayment dates to stay stable during market changes.

- **Portfolio value risk** is tracked and assessed under multiple risk scenario simulations.

- **Operational risk** is reduced through business continuity planning and by training employees in workplace safety and health. There is also a care supporters network to look after employees' mental well-being following a traumatic event.

- **Cybersecurity risk** is managed by internal teams and external experts. Temasek has an AI governance framework in place and champions cybersecurity best practices among its portfolio companies.

- **Legal, regulatory and tax risk** is managed worldwide by a specialised team and the use of the T-Code, Temasek's internal code of ethics and conduct.

- **Macro and geopolitical risk** is managed by actively monitoring policy developments in key markets.

Each of these areas is managed by dedicated teams who specialise in understanding and evaluating that specific type of risk. These teams provide regular updates to senior management, who monitor the overall picture. Risk management is present throughout Temasek's operations, including approval authority delegation, design of company policies and standard procedures, and how risk information is reported to the Board and the Board Risk & Sustainability Committee. These updates track how well Temasek is handling different risks, making sure both senior management and the board are aware of any current or new risks (Temasek, 2025).

Together, all these efforts build a strong governance system that helps Temasek handle challenges, protect its investments, and deliver long-term value.
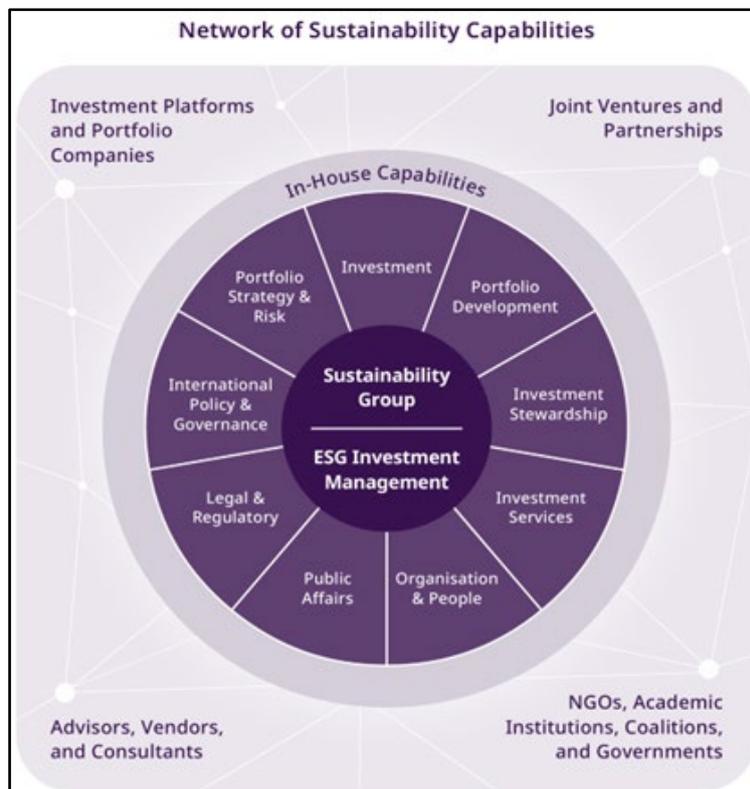
Sustainability Governance

Figure 2: Temasek Governance Structure
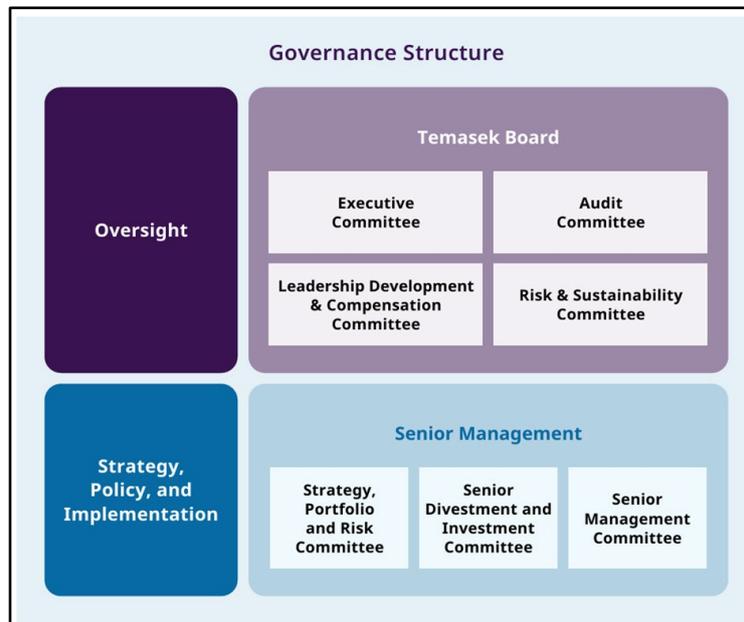
Source: Temasek, 2024a

Figure 3: Temasek Network of Sustainability Capabilities

Source: Temasek, 2024a

In Temasek's governance structure (Figure 2), the Board of Directors is responsible for setting overall long-term objectives and approving important decisions. These include approving yearly budgets, major investments and divestments, funding plans, appointing the CEO, planning for leadership succession, and managing portfolio risk. The Board has 11 members from around the world, with 82% being independent non-executive leaders. It works closely with the Chairman and CEO to protect Temasek's past reserves, in line with its duties under the Constitution (Temasek, 2024a).

Temasek's senior management is in charge of strategy, policy and implementation, running the company as "OneTemasek". Three main committees help with this: the Strategy, Portfolio and Risk Committee (SPRC), the Senior Divestment and Investment Committee (SDIC), and the Senior Management Committee (SMC). The SPRC keeps track of macro trends such as economic, industry, and social shifts; the SDIC handles investment and divestment decisions within its authority limits; and the SMC sets company-wide policies, such as the T-Code, Temasek's internal code of ethics and conduct (Temasek, 2024a).

The Sustainability Group, which reports to the CEO, leads Temasek's overall sustainability efforts. It works with both internal teams and external partners to create long-term positive change and help move towards a net-zero, nature-positive and socially inclusive future. The ESG Investment Management team, which reports to the Chief Investment Officer, plays a key role in applying ESG standards throughout the investment process. This includes reviewing risks before and after investment and helping companies prepare for climate transition (Temasek, 2024a).

Temasek's compensation system is designed to match employee rewards with long-term value creation. It includes a carbon charge on portfolio performance, where teams that meet emission reduction goals receive financial rewards from an incentive pool. This system supports Temasek's goal to reduce the net carbon emissions of its portfolio by 50% by 2030 (compared to 2010 levels), and to reach net-zero by 2050 (Temasek, 2024a).

In 2023, Temasek was ranked first in the Global SWF Governance, Sustainability, and Resilience (GSR) Scoreboard, showing its leadership in responsible investing and strong institutional governance (Global SWF, 2023).

ESG Integration in Investment Process

Temasek has integrated ESG considerations into its investment process.

Environmental Dimension

Figure 4: Pathway for Net Portfolio Emissions
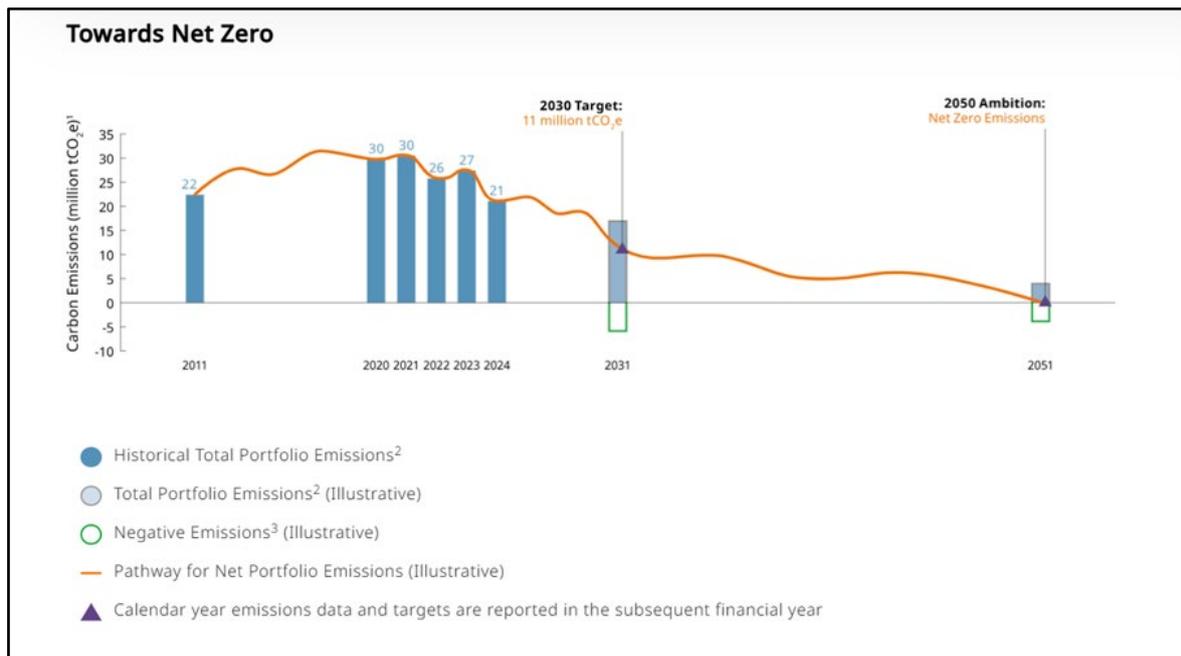
Source: Temasek, 2024a

Temasek rigorously assesses environmental and social factors before and after investing. The team evaluates a company's carbon intensity, climate- and nature-related risks and business practices related to social issues, among others (Temasek, 2024a).

To assess how a potential portfolio company might be impacted by low-carbon policies and market changes, Temasek uses internal carbon pricing. That is, they assign a cost to each investment to better gauge the impact of climate transition on the company. It is a means of testing whether a business can be competitive in a world that is moving towards cleaner energy (Temasek, 2024a).

After investment, Temasek continues to engage its portfolio companies to transition to renewable energy and implement cleaner business models. Its Sustainability Report 2024 indicated that the firm has engaged 19 major portfolio companies, which contributed 94% of its total portfolio emissions. Out of these 19 companies, 11 have set net-zero targets by 2050 (Temasek, 2024a).

Social Dimension

Figure 5: Community Health Initiatives
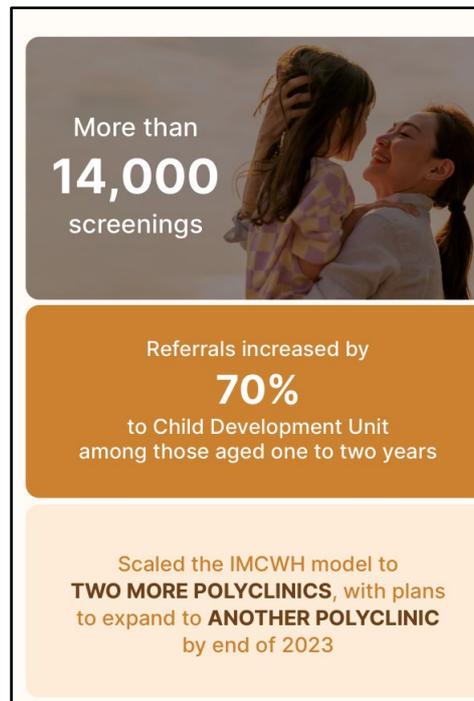
Source: Temasek Foundation, 2023

On the social side, Temasek looks closely at its prospective portfolio companies' workplace practices, such as their labour standards, human rights policies and supply chain responsibility. They also consider the firm's efforts in diversity and inclusion, talent management and data privacy.

Temasek contributes to society through the Temasek Foundation, in addition to its investments. The foundation provides grants for a range of projects, such as crisis resilience programmes, public health and healthcare readiness, education and scholarship programmes, and disaster relief (Temasek Foundation, 2023).

Figure 6: Philanthropic and Community Initiatives under Temasek
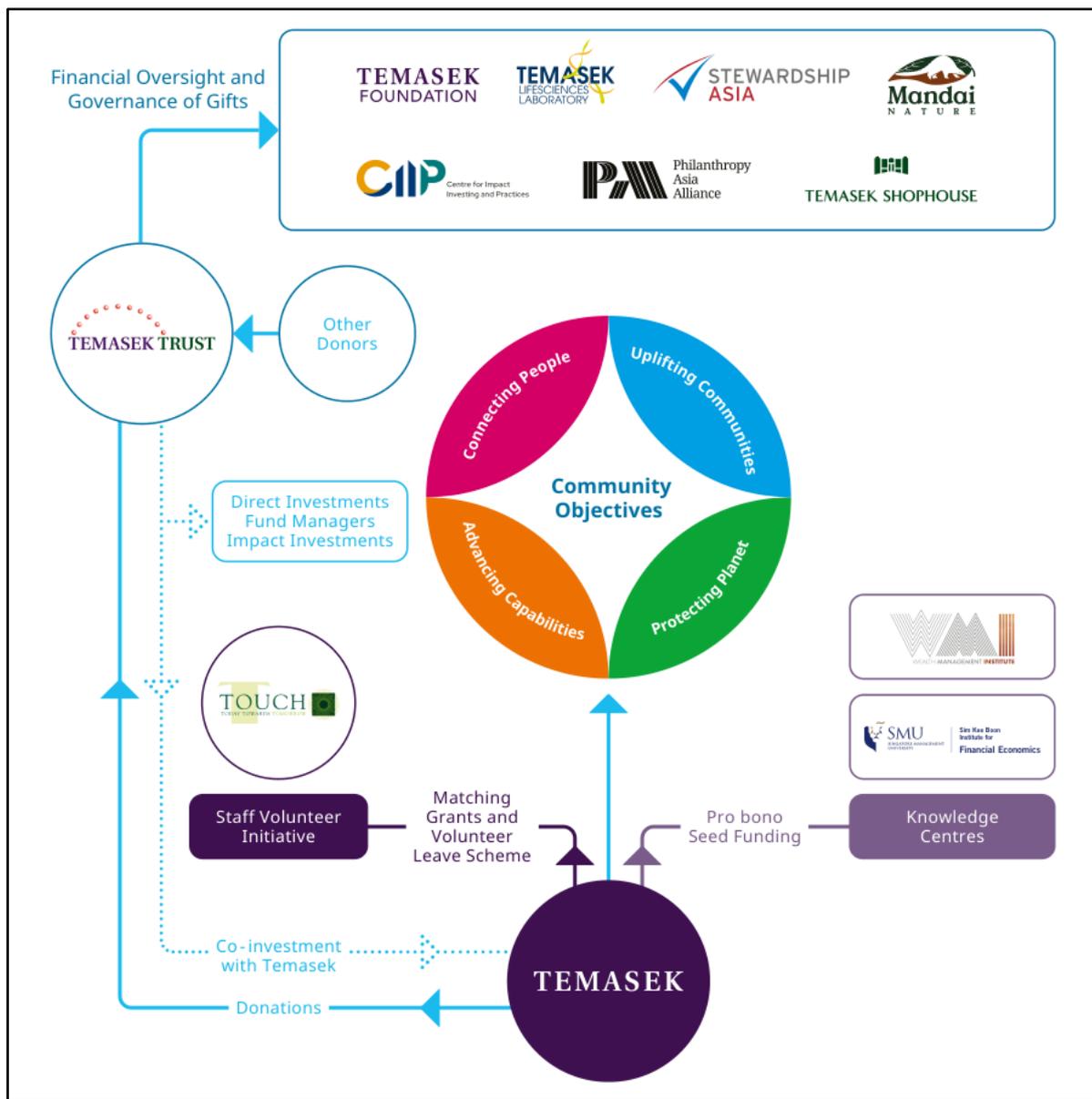
Source: Temasek, 2023

Governance Dimension

One consideration behind Temasek's investment choices is the prospective portfolio company's governance. Temasek seeks items such as the prospective company's oversight of ESG and climate policies, practices, human rights reports and environmental due diligence. Post-investment, there is periodic engagement with the companies on ESG matters, risk management and regulation compliance, among other matters. Temasek also assesses the portfolio companies' governance and organisational competencies on climate change, as well as external verification and disclosures (Temasek, 2024a).

Temasek Initiatives & Investment

Temasek's "Sustainable Living" framework guides portfolio allocation by targeting businesses that support net-zero, nature-positive and inclusive growth. It includes both sustainability-focused investments and climate transition investments in high-emission sectors shifting towards greener solutions.

Investments in sustainability

The 2024 sustainability report from Temasek showed that S$44 billion of its portfolio investments went towards sustainable living assets, accounting for 12% of its total portfolio. Of these sustainable living assets, sustainability-focused business investments totalled S$38 billion, while climate transition investments amounted to S$6 billion (Temasek, 2024a). The sustainability-focused segment of Temasek's portfolio has the highest allocation of its total holdings, partly due to how Temasek reclassifies which investments are sustainable. This classification framework which referenced global taxonomies was applied across its portfolio for the first time (Lim, 2024). The company plans to encourage decarbonisation across its portfolio and increase its sustainable industry investments.

The company implements several strategic initiatives to support the transition to a low-carbon economy, which are based on three main objectives: investing in clean technologies and sustainable infrastructure, supporting nature and carbon solutions, and creating market platforms for carbon trading.

Clean Technologies

An example of Temasek's investment in the clean energy and decarbonisation sector is the Caelux perovskite solar technology developer in the United States, U.S., and Form Energy, a developer of iron-air battery storage systems (Temasek, 2024a). The investments help solve renewable energy intermittency problems to allow reliable, renewable power integration into the grid.

The potential of green hydrogen to transform heavy industry and transportation sectors into low-carbon operations leads Temasek to pursue investments through an ecosystem-based model. The company has invested in the firms Topsoe for solid oxide electrolyser cells development and Electric Hydrogen for proton-exchange membrane electrolysers to better support the hydrogen value chain. Amogy receives funding from Temasek for developing ammonia-based power solutions used in shipping, while H2 Green Steel is building a Swedish steel production facility that will generate 95% less carbon emissions than conventional production (Temasek, 2024a). The investments will help to expedite the green hydrogen economy.

Nature and Carbon Solutions

Through investments in carbon capture, utilisation and storage (CCUS) technologies, Temasek actively supports carbon-negative solutions. Through GenZero, Temasek's investment platform, CarboCulture and other carbon removal firms receive funding to support their operations and scaling up (Temasek, 2024a). The technology-based solutions represent a fundamental element of Temasek's climate change mitigation approach, which extends beyond emission reduction.

To increase its impact, Temasek co-invests with other major players in dedicated climate funds. In partnership with BlackRock, it launched Decarbonisation Partners in 2021, a private equity platform investing in late-stage climate tech companies in clean energy, battery storage, electrification, and green transportation (Temasek, 2021). Through this platform, BlackRock uses its asset management capabilities with Temasek's patient capital investment to support the growth of essential technologies needed to reach a net-zero global economy by 2050.

Another partnership is with HSBC, leading to the set-up of Pentagreen Capital established debt financing for sustainable Asian infrastructure development. The investment strategy of Pentagreen focuses on "marginally bankable" projects which has the potential to generate significant environmental advantages. This supports emerging Asian markets in renewable energy and other areas (Temasek, 2024a).

Carbon markets

Temasek functions as a key entity for developing nature-based solutions and carbon market frameworks. The company established Climate Impact X (CIX), together with other entities, to create high-quality voluntary carbon credit trading platforms. Carbon credits in CIX are verified by Verra and Gold Standard (Temasek, 2024a). GenZero emerged as Temasek's fully owned investment platform in 2022 to focus on decarbonisation and nature solutions. Its investment portfolio includes reforestation projects in Ghana, sustainable aviation fuel technology development, carbon removal technology companies, as well as CIX equity ownership (Temasek, 2024a). The approach demonstrates Temasek's comprehensive decarbonisation approach, which unites natural carbon sinks with innovative technology and market mechanisms.

The company uses its knowledge partner position to develop new carbon credit systems. Through its Transition Credits Coalition (Traction) membership, Temasek supports transition credits in enabling the early retirement of coal-fired power plants across the Asia-Pacific region, thus demonstrating its leadership in managing hard-to-abate emissions (Temasek, 2024a).

Analysis of GHG emissions (Scope 2 and Scope 3)

Figure 7: Temasek Five-Year Environmental Footprint
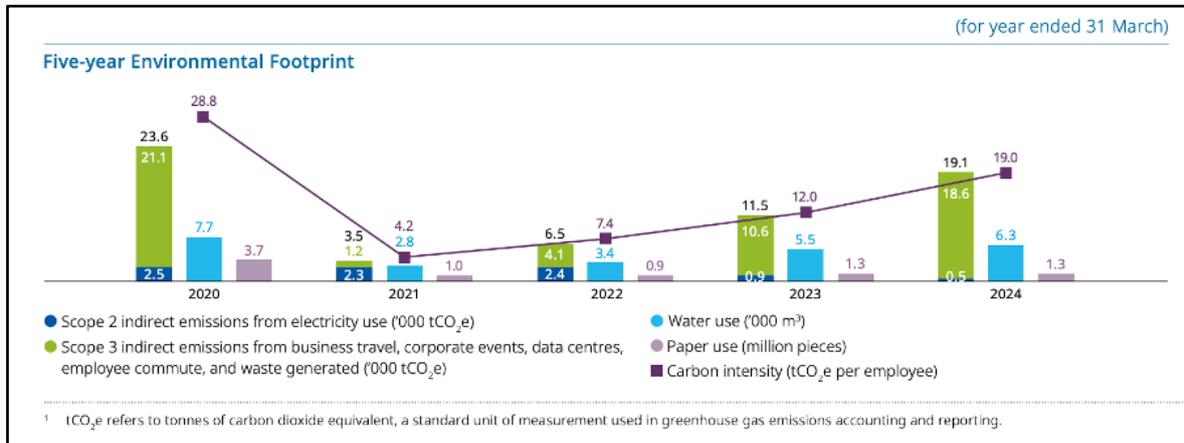
Source: Temasek, 2024a

During 2020 (for year ended 31 March), Temasek's carbon intensity per employee stood at 28.8 tCO_2e. The COVID-19 pandemic caused business travel to stop in 2020/2021, which resulted in a significant reduction of Scope 3 emissions from 21.1 $ktCO_2e$ in 2020 to 1.2 $ktCO_2e$ in 2021. The implementation of lockdowns combined with remote work arrangements resulted in reduced office power consumption and water usage, which led to decreased Scope 2 emissions as well as water usage in 2021. Following the pandemic recovery, Temasek's Scope 3 emissions rose to 10.6 $ktCO_2e$ in 2023 before reaching 18.6 $ktCO_2e$ in 2024, which brought emissions comparable to pre-pandemic levels (Temasek, 2024a).

Temasek maintained operational emission levels below pre-COVID standards through specific reduction tactics. The company reached a 2024 target of reducing Scope 2 emissions through the selection of renewable electricity in UK and India offices, combined with purchasing Renewable Energy Certificates (RECS) for Singapore headquarters (Temasek, 2024a). The implementation of this strategy resulted in Scope 2 emissions decreasing from 915 tCO_2e in 2023 to 501 tCO_2e in 2024 (Temasek, 2024a).

The organisation reduced water consumption and paper usage in 2021 because of minimal office occupancy, but these metrics increased when offices reopened. Hence, Temasek launched a Five-Year Improvement Plan to enhance energy efficiency and water management and waste reduction at its Singapore headquarters (Temasek, 2024). The organisation carried out LED lighting retrofits, installed water-efficient systems, encouraged recycling and ceased single-use disposables as part of its five-year plan. The water consumption in the office in 2024 was less than that in 2020, and the 2024 paper usage was 1.3 million sheets compared to 3.7 million sheets in 2020. The BCA Green Mark (Healthier Workplaces) Platinum certification received by

Temasek's Singapore office in 2023 showed its commitment to workplace sustainability.

Portfolio Metrics & Targets

As an investor and owner, Temasek strives to build a portfolio of companies that contribute to the resilience and progress of the environment and society. Temasek makes efforts on both the institutional and investment levels to help create an inclusive, sustainable world.

Temasek has five key levers for change in the core strategy (Temasek, 2024a):

- Deploying capital to enable companies to transition into a more sustainable future, and increase their investments in the long term in companies that are aligned with sustainable living.

- By embedding ESG frameworks in the investment cycle to evaluate potential sustainability-related opportunities and risks.

- Temasek encourages the companies in their holdings to drive ESG Value creation and support their transition to a more sustainable future.

- By ingraining sustainability practices into the company's culture, Temasek practises and embraces sustainability.

- By partnering with like-minded people, Temasek contributes to the systemic changes required to solve sustainability challenges.

Figure 8: Temasek's sustainability approach
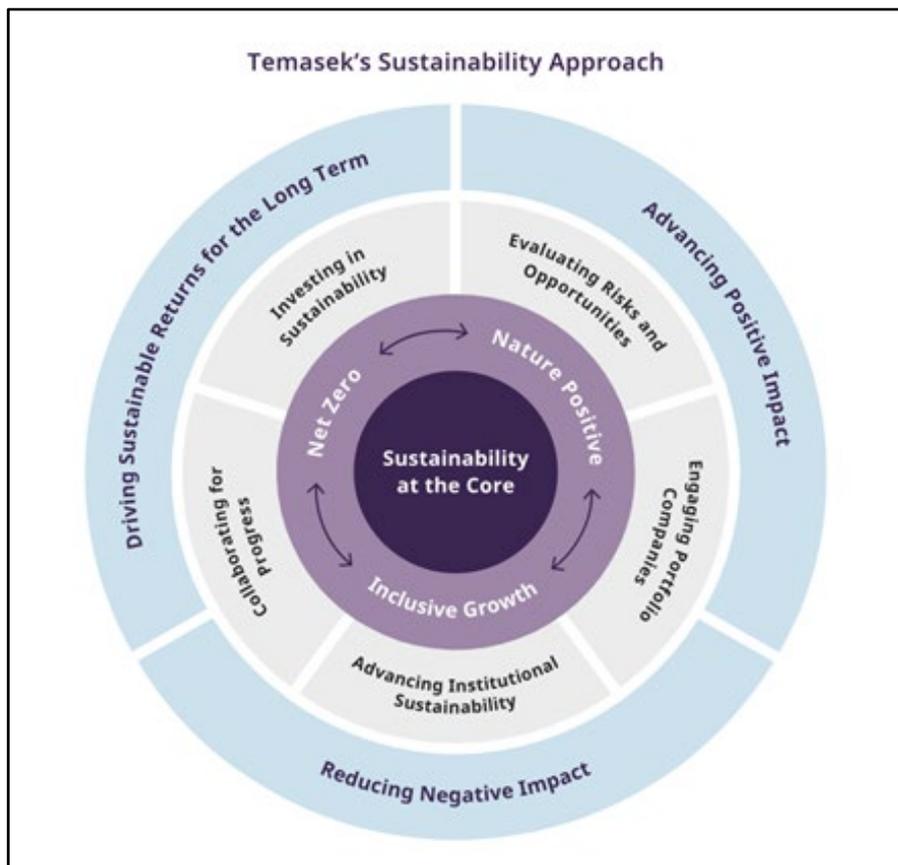
Source: Temasek, 2024a

As an investor, Temasek believes that "Sustainable Living" is one of the structural trends that guides the portfolio construction, and this is translated to actionable insights by the deployment of capital. As at 31 March 2024, 12% of its net portfolio value was aligned with the sustainable living trend (Temasek, 2024b). The portfolio included established businesses as well as companies with disruptive ideas, spanning across various sectors.

Emissions Associated with the Portfolio

Temasek tracks its progress toward its climate targets and reports the carbon emissions from its investment portfolio as part of its annual reporting.

For 77% of the portfolio, total portfolio emissions dropped from 27 million tonnes of CO_2 equivalent (tCO_2e) for the fiscal year ending March 31, 2023, to 21 million tCO_2e for the fiscal year ending March 31, 2024. Additionally, from 116 tCO_2e per million dollars of revenue ($tCO_2e/S\$M$) in FY 2023 to 92 $tCO_2e/S\$M$ in FY 2024, the Portfolio Weighted Average Carbon Intensity decreased (Temasek, 2024b).

As part of its yearly reporting, Temasek tracks its progress towards its climate commitments by measuring and disclosing the carbon emissions due to its investment portfolio. Some of its key indicators are: Total Portfolio Emissions (in tCO_2e); Portfolio Carbon Intensity (in tCO_2e/S\$M portfolio value); and Portfolio Weighted Average Carbon Intensity (in tCO_2e/S\$M revenue).

Temasek has focused on working with portfolio firms to lower emissions rather than using carbon credits to offset emissions thus far. Temasek's net-zero goal will only be reached if its portfolio companies continue to practise sustainability.

Portfolio Companies' Sustainability Efforts

Temasek has been working closely with its portfolio companies to develop decarbonisation strategies, setting clear sustainability targets, and providing funding for green innovations with the aim of achieving net-zero portfolio emissions by 2050. Combined, there are five portfolio companies which contributed to about 80% of Temasek's Total Portfolio Emissions as of 31 March 2024 (Temasek, 2024a). The following explores how two of these companies, Sembcorp Industries and Olam Group, are progressing in their energy transition.

Sembcorp Industries

In the effort to achieve net-zero emissions by 2050, Sembcorp Industries has implemented a sustainability strategy to expand its renewable energy usage. In February 2025, the company reported a gross renewable capacity of 17.0 gigawatts (GW). These included acquisitions pending completion and projects under construction, with a target to reach 25 GW by 2028 (Sembcorp, 2025b).

Sembcorp Industries focused on reducing its emissions intensity and achieved its 2025 GHG emissions intensity target earlier than scheduled (Tan, 2023). The company targets reducing this intensity to 0.15 tCO_2e/MWh by 2028 (Sembcorp, 2024). Sembcorp Industries is making its energy production much cleaner and more efficient, which supports Temasek's long-term sustainability objectives.

The company is working with the Singapore government to expand Battery Energy Storage Systems (BESS) on Jurong Island (Varadhan, 2024). This mission aims to enhance grid stability and facilitate greater integration of renewable energy sources. On the other hand, capabilities development in hydrogen production and utilisation aims to prepare for its future role in Singapore's energy mix (Sembcorp, 2025a).

Sembcorp has also launched GoNetZero, a corporate venture offering carbon management solutions. This initiative provides clients with access to renewable energy certificates and carbon credits, supporting their decarbonisation efforts and contributing to broader emission reduction goals (Singapore Economic Development

Board, 2022). By offering innovative solutions for businesses seeking to transition to cleaner energy, Sembcorp is enabling a wider shift towards sustainability.

Olam Group

Olam Group aims to reduce its GHG emissions across its operations and supply chains such that it reaches net zero by 2050 (Olam Agri, n.d.). For its processing facilities, it plans to include increasing the share of energy from renewables and reduce water use intensity.

In addition, Olam Food Ingredients (OFI) has implemented biomass boilers that utilise cocoa shells to generate power in its factories in the Netherlands and Germany (Olam Food Ingredients, 2023).

The Olam Group promotes climate-smart agriculture and regenerative landscape approaches. This is to achieve a net-positive carbon impact and minimise emissions from farming. These initiatives include monitoring and preventing the conversion or degradation of critical habitats while reducing emissions from farming, processing, and transport activities. Furthermore, Olam Group launched a smart carbon management platform Terrascope, which helps to enhance its reporting capabilities and analytics (Olam Group, n.d.).

Conclusion and Recommendations

Leading worldwide in sustainable investing, Temasek effectively combines ESG factors into its corporate culture, governance structure and investment value chain. From internal carbon pricing and incentives for emissions reduction to high-impact investments in renewables, green hydrogen and nature-based solutions, its end-to-end strategy demonstrates how a state investor may drive systematic change while attaining long-term financial success. A solid governance structure has allowed it to orient freely towards worldwide sustainability goals, including net zero by 2050. The company demonstrates its commitment to inclusive and responsible growth by integrating ESG criteria into portfolio firm evaluations and supporting community well-being through the Temasek Foundation.

To maximise impact, Temasek should focus on investing in sustainable businesses and building partnerships that support innovation in challenging sectors. Key next steps include greater transparency in Scope 3 emissions, more stakeholder engagement in emerging markets, and promoting carbon accounting and ESG disclosures. Enhancing diversity and equity practices will further strengthen inclusive sustainability. Temasek's sustainability approach offers a model for institutional investors trying to balance profit and purpose amidst growing climate challenges.

Discussion Questions

1. What are the most significant advantages and disadvantages of including a carbon pricing component in investment decisions?

2. How might a systemic approach move the world towards a net-zero economy?

3. How else might Temasek lower Scope 3 emissions in its portfolio and raise climate responsibility among its invested companies?

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Unilever: Brand Elevation through Sustainability

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Company Overview

Unilever, one of the world's oldest fast-moving consumer goods (FMCG) companies, has become a leading and widely recognised name in the industry. Headquartered in London, Unilever operates in over 190 countries. Its products are used by around 3.4 billion people daily, showcasing a worldwide presence (Unilever, 2025f). The company's origins trace back to the early 1900s when Lever Brothers began soap production before innovating and expanding into home care and margarine markets. In September 1929, Lever Brothers merged with a margarine company named Margarine Unie to form "Unilever", officially establishing itself on 1 January 1930 (Unilever, 2025a).

Nearly a century later, in 2025, Unilever has a strong position due to its ability to adapt and innovate in dynamic markets. Its products span five categories: beauty and wellbeing, personal care, home care, foods, and ice cream. CIF, Dove, Knorr, Lifebuoy, Magnum, Sunsilk, Vaseline, and Wall's are notable brands. Unilever had a €60.8 billion turnover in 2024. According to its financial charts, the Asia Pacific Africa geographic area constantly contributed the most to its turnover from 2015 to 2024. Beauty and wellbeing, personal care, and food products brought in the highest turnover for product area, each occupying 22% of the overall turnover (Unilever, 2024h).

Unilever's ambition is to brighten everyday life for all by delivering best-in-class performance with superior brands. To achieve this goal, Unilever uses a strategic plan called "Growth Action Plan 2030" (Unilever, 2025c). One significant consideration in the plan is sustainability. This paper will analyse the economic, environmental, social and governance sustainability in Unilever. Technological and innovation aspects, business challenges analysis and future strategy recommendations will be further discussed.

Figure 1: Unilever's Growth Action Plan 2030

Source: Unilever, n.d.-c

Sustainability Strategy

Unilever strives to become the "leader in the next era of corporate sustainability" by delivering a consistent and competitive performance while transforming its business to meet sustainability goals (Unilever, 2025b). In this matter, "next era" refers to embedding sustainability progress into business performance. Through its governance, Unilever aims to be more focused on allocating resources to progress in sustainability-based priorities, aligning actions with a roadmap, and being systemic in its advocacy through deeper collaboration. In 2010, the firm launched the Unilever Sustainable Living Plan (USLP), the start of a sustainable business model blueprint (Unilever, n.d.-a). Unilever's Growth Action Plan 2030, set out in November 2024, continues the firm's sustainability endeavour.

The sustainability goals of Unilever relate to core areas in climate, nature, plastics and livelihoods. It reports the progress for these goals in line with numerous sustainability reporting standards. One is the World Economic Forum and International Business Council (WEF IBC), through which it discloses core metrics on Environmental, Social, and Governance (ESG). Another standard is the Global Reporting Initiative (GRI), which covers economic, environmental, and social aspects. Sustainability Accounting Standards Board (SASB)'s industry-specific guidelines are also used for reporting financially material topics and related sustainability metrics. On top of that, Unilever aligns with the United Nations Global Compact (UNGC), implementing its ten principles relating to the environment and human rights aspects (Unilever, n.d.-i).

Additionally, Unilever submits and publishes its Carbon Disclosure Project (CDP) reports in the areas of climate, forest, and water (Unilever, n.d.-h).

Figure 2: Unilever Sustainability Goals

Source: Unilever, n.d.-e

An extra mile in Unilever's sustainability efforts is its approach to Digital Sustainability. According to its Digital Sustainability Statement, the company operates over 80 corporate websites across its network, each leaving a digital carbon footprint. To reduce this footprint, Unilever has partnered with a green hosting provider powered by wind, solar, and/or hydropower, which are considered clean and renewable sources. Team members, including designers, developers and product managers, are trained to follow best practices for sustainable web design. To verify its commitment, these sites already comply with Web Content Accessibility Guidelines (WCAG) Version 2.1 Level AA, which aim to ensure accessibility for users with learning disabilities and cognitive limitations. The websites are also tested using an internationally recognised methodology to calculate digital carbon emissions and help achieve a more sustainable online presence. Unilever also encourages visitors to use its websites in dark mode, which can help reduce energy consumption on their own devices (Unilever, 2024d).

Unilever's sustainability achievements represent a significant commitment to its long-term goals. Key progress under the Growth Plan 2030 includes:

- A 72% reduction in Scope 1 and 2 greenhouse gas (GHG) emissions between 2015 and 2024

- Achieving a 97% deforestation-free order volumes of palm oil, paper and board, tea, soy and cocoa in 2024

- Increasing reusable, recyclable or compostable plastic packaging to 57%

- Supporting 2.58 million SMEs in growing their businesses through Unilever's digital platforms (Unilever, 2025i)

Building on this momentum, Unilever remains committed to:

- Achieving a 42% reduction in Scope 3 emissions by 2030,

- Reaching net zero emissions by 2039,

- Ensuring 100% of its plastic packaging is reusable, recyclable or compostable by 2030 (for rigids) and 2035 (for flexibles) (Unilever, n.d.-e).

Unilever demonstrates transparency by sharing its sustainability journey through the "Sustainability Hub" on its official website. This page allows stakeholders to follow detailed updates on Unilever's sustainability initiatives, progress and achievements.

Economic Sustainability Initiatives

Sustainable Living Brands as a Growth Engine

While all of Unilever's brands are on a journey towards sustainability, it has certain brands which embody a strong environmental or social purpose. These brands boost the company's impact and also grow faster. In 2019, at the Deutsche Bank Global Consumer Conference in Paris, Unilever CEO Alan Jope shared that in 2018, the firm's sustainable living brands grew 69% faster than the rest of its portfolio—a notable increase from the 46% growth in 2017. By then, Unilever had introduced 28 sustainable living brands, including new entrants such as Close Up (toothpaste), Wheel (laundry), Calvé, and Bango (dressings). Additionally, seven of its top ten brands, Dove, Knorr, Omo/Persil, Rexona/Sure, Lipton, Hellmann's, and Wall's ice cream, were classified as sustainable living brands, underscoring the strategic value of sustainability in driving business growth (Arora, 2020).

Financial Impact of Sustainable Strategy

The implementation of Unilever's sustainable strategy has had a multifaceted impact on the company's financial performance. Although the initiative required significant upfront investment, it has delivered long-term benefits across various financial dimensions.

Cost Management

Initially, the strategy demanded substantial investment in sustainable technologies and processes, which subsequently increased costs. However, over time, the efficiencies and innovations driven by the strategy contribute to cost savings. Notably, improvements in energy and water usage have reduced overall operational expenses and unlocked new revenue streams from consumers who prioritise sustainability.

Earnings Enhancement

The enhanced brand value and strengthened market positioning resulting from Unilever's sustainability strategy have had a positive effect on earnings. The company's leadership in sustainability contributed to improved long-term profitability. This positive trend is illustrated in the accompanying chart, which shows the evolution of Unilever's operating profit from 2007 to 2024.

Figure 3: Unilever's Operating Profit from 2007 to April 2024
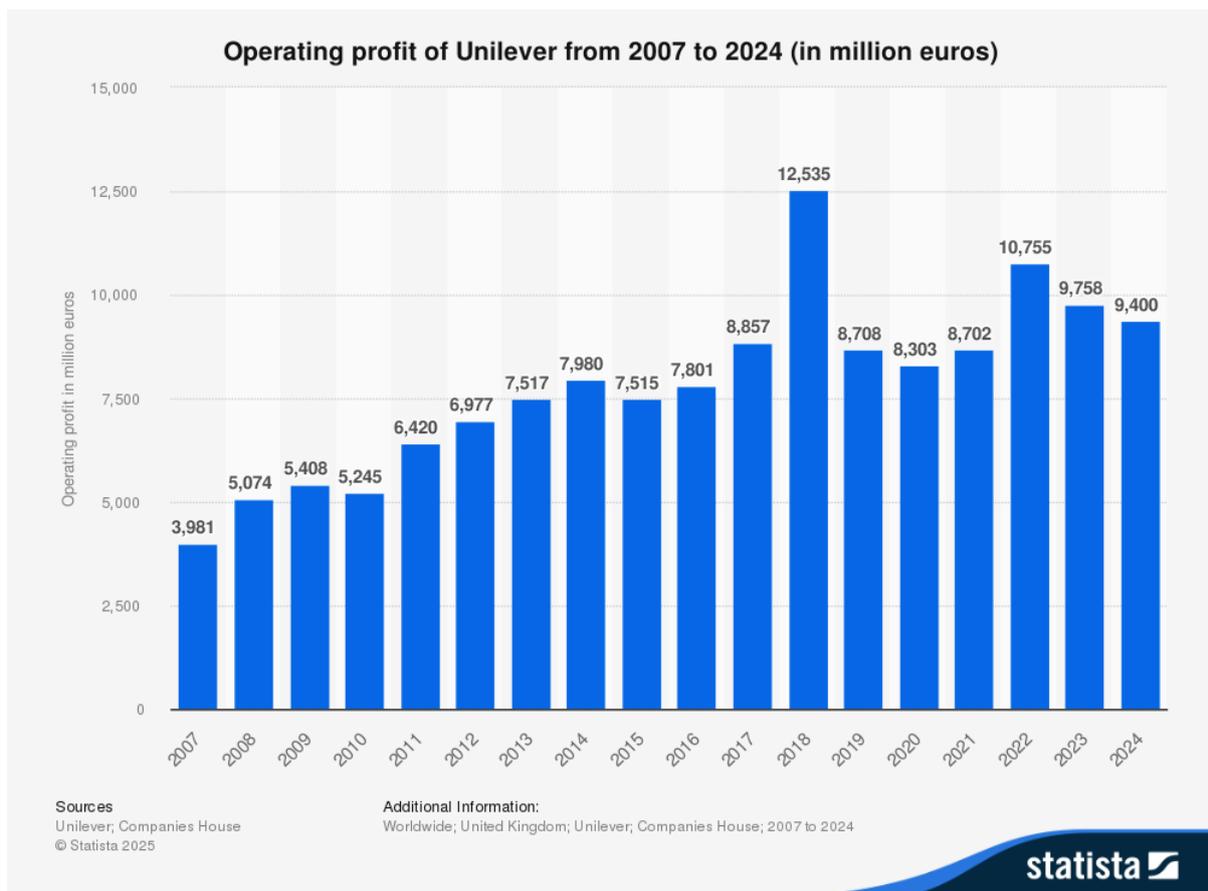
Source: Statista, 2025

Stakeholder Impacts

For customers, Unilever's sustainability strategy has effectively enhanced brand loyalty among consumers who prioritise environmental and social responsibility. By aligning its product portfolio with strong sustainability principles, Unilever has differentiated itself in the marketplace, driving consumer preference towards its purpose-led brands. This differentiation has translated into measurable growth as consumers are willing to pay for sustainable products (NielsenIQ, 2023). Such robust performance reinforces the economic rationale behind integrating sustainability into the core business strategy.

Furthermore, the sustainability strategy has transformed both Unilever's supply chain and its competitive landscape. The adoption of rigorous sustainable sourcing practices has encouraged suppliers to embrace greener practices, leading to enhanced operational efficiencies and reduced costs, particularly in energy and water consumption. These improvements not only lower production expenses over time but also mitigate risks associated with supply chain disruptions. In addition, by setting ambitious sustainability targets, Unilever has established an industry benchmark that could spur competitors to elevate their practices.

From an investor's perspective, the economic benefits of Unilever's sustainability strategy are especially compelling. Despite initial scepticism regarding the financial viability of such initiatives, long-term results have validated the approach. For example, sustainable living brands have consistently outperformed the broader portfolio, growing 46% faster and contributing 70% of overall turnover growth (Amat, 2024). These impressive results have strengthened the company's earnings and enhanced its reputation in financial markets. The steady upward trend in Unilever's share price, from 2000 through to April 2025, clearly illustrates the sustained value creation driven by its commitment to sustainability, confirming that integrating purpose with profit is a key driver of long-term enterprise value.

Figure 4: Unilever's Share Price from 2000 to April 2025

ULVR | Share Price — From 01/31/2000 To 04/02/2025 — $60.22

ULVR | Volume — 3.99M

Source: S&P Capital IQ, 2025

Overcoming challenges to drive long-term growth

While Unilever's sustainability strategy has generated notable benefits, the company has also encountered challenges in its implementation. One notable challenge emerged in the plant-based meat sector. The Vegetarian Butcher brand had a distinct supply chain and less scalable sourcing model, prompting Unilever to consider divesting from this loss-making line (Unilever, 2025j). Despite these setbacks, early doubts about the economic viability of its sustainability strategy have been largely dispelled. Overall, Unilever has demonstrated that its sustainability initiatives can drive significant growth through enhanced brand differentiation and innovation.

First, Unilever's strategy enhances brand differentiation and bolsters consumer loyalty. As consumers increasingly value the environmental and social implications of their purchases, Unilever's commitment to sustainability could prompt customers to pay a premium for its products.

Second, the focus on sustainability drives both innovation and cost reduction. For instance, the development of Sunlight dishwashing liquid, which utilises a plant-based foaming ingredient, not only meets environmental objectives by reducing reliance on petrochemicals but also achieves notable cost savings (Global Council for the Promotion of International Trade, 2024). Overall, despite certain challenges, Unilever's sustainable approach remains closely aligned with its core objective of maximising long-term profitability.

Environmental Sustainability Initiatives

Global pressure to address environmental challenges is mounting, especially in the consumer goods industry. Climate change threatens supply chains, causing extreme weather and resource volatility. In this landscape, Unilever sees sustainability as strategic resilience.

Besides the Unilever Sustainable Living Plan which started in 2010, the firm also introduced the Unilever Compass strategy in 2020 (Unilever, 2020b), integrating sustainability into its corporate strategy for the new decade. The Compass focuses on three priority pillars: improving the health of the planet, improving people's health, confidence and wellbeing, and contributing to a fairer, more socially inclusive world (Unilever, n.d.-j).

Strategic Initiatives

Unilever's environmental sustainability strategy comprises several initiatives and commitments across key areas.

Climate Action and Emissions Reduction

Unilever has set a goal of achieving net-zero emissions across its value chain by 2039 (Unilever, 2024a). To get there, it aims for a 100% reduction in its operational GHG emissions by 2030, and heavy cuts in supply-chain (Scope 3) emissions through 2039. The company's Climate Transition Action Plan relies on science-based targets for emission reductions.

As of the end of 2024, Unilever had already delivered a 72% reduction in its Scope 1 and 2 GHG emissions from 2015, putting it well on track to cut operational emissions to zero by 2030. The true challenge is reducing Scope 3 emissions, which Unilever is addressing by working closely with suppliers and investing in low-carbon innovations. For instance, the Supplier Climate Programme helps suppliers to reduce their emissions (Unilever, 2025e).

In the Home Care division, the company is reformulating products and sourcing alternative inputs to reduce the carbon footprint of each product. An example is a Persil/Omo dilute-at-home laundry detergent with a 6x concentrated formula and sustainable packaging which has reduced distribution-related CO_2 emissions by 83% and uses 70% less plastic (Unilever, 2022b).

Unilever is also focusing on energy sources: it reached 100% renewable grid electricity for its sites (Unilever, 2019b). Its climate efforts are also backed by a dedicated €1 billion Climate & Nature Fund set up by Unilever to invest in climate-friendly technologies and nature-based solutions (Unilever, n.d.-k).

Plastic Use Reduction and Circular Packaging

Plastic pollution is a pivotal topic, and Unilever has made strong commitments to transform its packaging and reduce reliance on virgin plastic. Initially, the company pledged to halve its use of virgin plastic by 2025 (Unilever, 2019a), but since then, it adjusted its targets, now aiming for a 30% reduction in virgin plastic by 2026 and 40% by 2028 (Unilever, 2024c). Unilever is pursuing a circular economy approach to plastics with three focus areas: Reduce, Recycle, and Reuse/Refill. So far, Unilever has achieved an 18% reduction in virgin plastic use since 2019 (Unilever, 2024c). Recycled plastic now makes up 22% of its packaging material (Unilever, 2024c). To further boost these numbers, Unilever is investing in packaging innovation, for example, developing plastic-free packaging for certain products.

However, Unilever acknowledges that flexible packaging is the toughest challenge due to the lack of easy recycling solutions. To tackle this, it is exploring advanced recycling technologies and new product formats (Unilever, 2024c). Importantly, Unilever is working collaboratively to solve the plastics problem. It is a member of the *Business Coalition for a Global Plastics Treaty* (DiNapoli, 2024) advocating for a strong, legally binding UN agreement that can standardise rules and even cap virgin plastic production globally. Unilever's CEO, Hein Schumacher, stated in 2024 that he wants a plastics treaty "with teeth", with binding rules that create a level playing field and enable companies to invest confidently in non-plastic packaging innovations.

Deforestation Prevention and Sustainable Sourcing

Unilever's products depend on agricultural commodities like palm oil, paper, tea, soy, and cocoa, industries often linked to deforestation. To achieve a deforestation-free supply chain, Unilever invested in supply chain traceability. The results were beyond satisfying as Unilever had 97% of its key commodity volumes verified as deforestation-free by the end of 2024 (Unilever, n.d.-d). To get here, Unilever deployed cutting-edge monitoring technology, using satellite images to map and track its raw material origins. With these tools, Unilever can proactively intervene if there are any deforestation alerts.

Unilever is also investing in nature restoration and regenerative agriculture to have a positive impact on ecosystems. It aims to implement regenerative farming practices on 1 million hectares of land and to protect or restore 1 million hectares of natural ecosystems by 2030. As of 2024, Unilever had 23 active regenerative agriculture projects covering 130,000 hectares (Unilever, n.d.-k). In its agriculture supply chains, Unilever works closely with smallholder farmers across the world to promote sustainable practices. By 2030, Unilever aims to source 95% of its key crops from sustainable, verified sources (Unilever, 2024e).

Water Stewardship and Waste Management

Water is another critical environmental focus for Unilever. Many of its factories and ingredient sources are in water-stressed regions (including parts of Asia and Africa). Unilever's strategy to address water relies on two pillars: improving its water efficiency and acting as a steward of water resources in the communities where it operates. Internally, the company managed to reduce water use per tonne of production through recycling and process improvements. Externally, it set a goal to implement 100 water stewardship projects in water-stressed locations by 2030. By 2024, Unilever had 21 active water stewardship programmes in such areas (Unilever, n.d.). These projects include collaborations with local governments, non-profits and industries to protect watersheds, improve irrigation efficiency, and provide access to clean water. In this context, Unilever is a member of the Alliance for Water Stewardship, collaborating to encourage factories to reuse and recycle water. Unilever also recognises water as part of climate adaptation, advocating for water to be included in national climate plans.

On waste management beyond plastics, Unilever has made efforts to eliminate waste-to-landfill. It creates waste management initiatives like community biogas plants, promotes waste segregation at source and organic kitchen gardens. Unilever's broader waste strategy ties closely with its plastics and packaging initiatives, with the aim of a "waste-free world" where products and materials form a circular loop (Hindustan Unilever Limited, n.d.-a).

Asian Regional Focus

A large share of the company's sales occurs in Asia's emerging markets, including China, India, Indonesia, the Philippines, and Vietnam, which are expected to drive much of the company's future expansion. However, acute environmental challenges persist, such as urban air pollution, inadequate waste management infrastructure, water scarcity, deforestation and climate-sensitive rural ecosystems.

Enabling the agricultural commodity ecosystem

Asia is a vital sourcing region for key agricultural commodities used in Unilever products, such as palm oil, tea and paper pulp. This sourcing dependency makes it crucial for Unilever to ensure that agricultural practices in the region are sustainable. To that end, Unilever uses satellite imaging, artificial intelligence, and supply chain mapping to track the origin of raw materials and identify areas at risk of deforestation. In places like Indonesia and Malaysia, Unilever has worked with plantation owners and smallholder farmers to ensure that its palm oil is sourced from land not recently cleared of forest (Unilever, n.d.-d).

Additionally, Unilever supports farmers through training in sustainable agriculture, such as soil conservation and biodiversity protection. In India, for example, tea farmers are trained in responsible cultivation practices (Hindustan Unilever Limited, n.d.-b).

Addressing Sachet-based Plastics

Plastic pollution is especially visible in many parts of Asia due to high population densities and weak recycling systems. Unilever usually sells products in small, single-use sachets and pouches to serve low-income consumers, an approach that helped expand its market reach but contributed to plastic waste (Brock & Geddie, 2022). These multi-layered plastic sachets are difficult to recycle and often end up in rivers or oceans.

As pressure mounted from regulators and environmental activists, Unilever was pushed to reduce its reliance on single-use plastics in the region. Countries such as India and the Philippines have introduced bans, but they only apply to sachets of small packaging sizes. Larger sachets continue to be sold. A Reuters investigation in 2022 revealed that Unilever had lobbied against sachet bans in several countries, such as Sri Lanka, raising questions about the alignment between its public statements and private actions (Brock & Geddie, 2022).

The Reuters report is one of many questions asked about Unilever's sachet use. Even before the report was published, Unilever had posted a blog article about sachet use. It explained that plastic sachets allow low-income consumers to buy small amounts of products, and that different countries require different approaches. To reduce their dependence on sachets, it is turning to refillable solutions, recyclable sachets, alternative materials, and supporting collection and recyclable infrastructure (Unilever, 2022c).

Unilever was one of the founding investors for the Circulate Capital Ocean Fund, which invests in waste collection and recycling infrastructure in South and Southeast Asia (Circulate Capital, 2019). Additionally, Unilever is piloting refillable stations markets such as Bangladesh, Indonesia and Sri Lanka that allow customers to buy products like soap and shampoo at varying amounts and lower prices (Unilever, 2025g).

Challenges and Risks

Unilever faces a range of challenges and risks in implementing its environmental sustainability strategy. These challenges are both operational and strategic. Although Unilever is reducing Scope 3 emissions, an independent analysis by Planet Tracker (Planet Tracker, 2023) cautioned that its current trajectory might only align with a +2°C warming scenario by 2030, rather than the 1.5°C goal of the Paris Agreement. The focus is on Unilever's upstream supply chain emissions, as it could end up with nearly double the level recommended for a 1.5°C path. This represents a strategic risk: failing

to align with 1.5°C could make Unilever susceptible to future carbon regulations, like carbon taxes on supply chain emissions or investor actions through Climate Action 100+.

Another risk in the climate arena is the availability of affordable renewable energy and new technology: achieving net zero may depend on innovations not yet at scale. If these do not materialise fast enough, Unilever could struggle to hit its interim targets by 2030. The company's strategy of advocating for enabling climate policy is one way to mitigate this risk, pushing governments to enact rules that will help Unilever meet its goals in time.

Social Responsibility and Community Impact

Unilever has established itself as a leader in corporate social responsibility (CSR) by integrating Environmental, Social, and Governance (ESG) principles into its business model. The company prioritises employee well-being, ethical sourcing, community engagement, and sustainable consumer products. This section explores Unilever's key initiatives, partnerships, and strategies in social responsibility, along with associated risks and opportunities.

Unilever's commitment to sustainability did not emerge overnight. The company has a long history of social responsibility initiatives dating back to the early 20th century. However, it was in 2010 that they took a transformative step by launching the Unilever Sustainable Living Plan, a comprehensive framework outlining ambitious sustainability goals across three key areas (Unilever, 2021):

- Improving the health and well-being of 1 billion people by 2020.

- Halving the environmental impact of their products by 2030.

- Enhancing the livelihoods of millions in their value chain by 2020.

These ambitious goals were woven into many areas of the company's operations, from product development and sourcing to marketing and distribution.

Employee Well-being and Diversity Initiatives

Unilever is committed to fostering a safe, inclusive and supportive workplace through robust policies and benefits. The company promotes mental and physical health through wellness programmes, health screenings and access to counselling services (Unilever, n.d.-b). Diversity and inclusion (D&I) are central to Unilever's culture. The company has set bold targets for gender parity, with women holding 55% of managerial

roles globally as of March 2024. Unilever also champions LGBTQ+ inclusion through partnerships with organisations such as Stonewall. Its Unstereotype initiative in 2016 challenges biases in advertising and internal culture, and in 2024, 90% of its tested ads were free from gender stereotypes (Unilever, 2024b).

To ensure racial and ethnic diversity, Unilever invests in leadership programmes for underrepresented groups and partners with diverse talent pipelines. Employee Resource Groups (ERGs) provide support networks for women, people of colour, and persons with disabilities (Unilever, 2024b). Additionally, Unilever's "Respect, Dignity, and Fair Treatment" policy advocates zero tolerance for discrimination (Unilever, n.d.-g). Through continuous learning and development, Unilever empowers employees to grow while maintaining an equitable workplace. By embedding well-being and D&I into its core operations, Unilever cultivates a workforce that is engaged, innovative and reflective of the communities it serves.

Workplace Safety and Health

Unilever ensures a safe and healthy work environment through stringent safety protocols, continuous training, and proactive risk management. The company adheres to global standards for occupational health and safety management. In addition, it has rolled out programmes and activities related to road safety, machine safety and contractor safety. Through its "Zero Harm" ambition, Unilever strives for zero accidents, injuries, and work-related illnesses, fostering a culture where employee well-being is paramount (Unilever, 2025d). These measures reinforce Unilever's commitment to a productive, secure, and caring workplace.

Responsible Sourcing

Unilever enforces strict ethical sourcing policies to ensure fair labour practices and environmental sustainability.

As Unilever CEO Alan Jope said, "Climate change, nature degradation, biodiversity decline, water scarcity – all these issues are interconnected, and we must address them all simultaneously. In doing so, we must recognise that the climate crisis is not only an environmental emergency; it also has a terrible impact on lives and livelihoods. We, therefore, have a responsibility to help tackle the crisis: as a business, and through direct action by our brands (Unilever, 2020a)."

Central to this effort is Unilever's Sustainable Agriculture Code (SAC), which was later updated to be the Unilever Sustainable Agriculture Principles (Unilever, 2024e). The principles cover nature protection, climate action, human rights and animal welfare. The company works directly with farmers, particularly smallholders, to promote regenerative farming techniques, helping them increase yields while reducing chemical use and carbon emissions.

Ethical sourcing is another priority, with Unilever enforcing a Responsible Sourcing Policy. In 2020, 83% of its procurement spend was through suppliers meeting the policy's mandatory requirements of the RSP (Unilever, 2021).

Fair Labour and Living Wages

Unilever upholds fair labour practices and living wages as fundamental pillars of its responsible business strategy. The company is committed to ensuring that all workers, whether direct employees or those in its extended supply chain, receive fair compensation, safe working conditions, and dignified treatment. Its policy also prohibits forced labour, child labour, offensive behaviour and discrimination (Unilever, n.d.-g).

A key focus is closing the living wage gap. Unilever was accredited by the Fair Wage Network in 2022 to be a global living wage employer. This was after years of catching up when its employees in 37 countries were found to receive less than a living wage in 2015. In 2020, the firm pledged to extend the living wage commitment to suppliers by 2030 (Fair Wage Network, n.d.).

In conclusion, Unilever's strong ESG integration sets it apart as a responsible corporate leader. While its initiatives in employee welfare, ethical sourcing, and sustainability are commendable, challenges like cost management and regulatory compliance remain. Continued innovation and stakeholder collaboration will be key to maintaining its competitive edge.

Innovation and Technology in Sustainability

Innovation and technology are a core component of Unilever's sustainability approach. At the forefront of its business model are product innovations, intelligent infrastructure, and waste reduction.

Green Product Innovation for Circular Economy

Unilever invests continuously in R&D for green processes and products. Based on assessments of the environmental footprint of raw materials and packaging, the company has tried to increase its use of lower-GHG-emission ingredients, plant-based formulas and recyclable packaging (Unilever, 2024a). This approach not only contributes to the circular economy but also meets the growing consumer demand for green products.

One such innovation is Persil/OMO, a dilute-at-home laundry detergent. The packaging uses 70% less plastic and is already rolled out in certain markets, also contributing to reduced distribution CO_2 emissions (Unilever, 2022b).

AI, IoT, and Blockchain for Resource Optimisation

Unilever's operations increasingly leverage technologies, namely artificial intelligence (AI), the Internet of Things (IoT), and blockchain (Unilever, 2022a). AI analytics and IoT-enabled equipment have enhanced Unilever's resource consumption strategies, improving efficiency in water, energy, and raw material usage. Blockchain presents a new era opportunity for Unilever by introducing transparency and accountability across the supply chain. With blockchain, Unilever can track and verify the origin and sustainability certifications of major commodities such as palm oil, tea, and cocoa. Blockchain ensures the credibility of sustainable sourcing claims, thereby building consumer trust and reinforcing Unilever's commitment to environmentally responsible and ethical practices.

Urban Sustainability and Green Logistics

Even though Unilever is not directly responsible for the construction of urban infrastructure, its active intervention and strategic collaborations play a critical role in the development of green infrastructure and urbanisation. Keeping the increasing urbanisation and the resulting environmental strain in mind, Unilever is involved in reducing the environmental footprint of urban growth through green mobility strategies and sustainable supply chains.

One such initiative is the introduction of electric vehicle (EV) fleets into Unilever's logistics and distribution channels. It intends to scale up the use of these electric and alternate fuel vehicles in the coming years in markets such as the United States, Europe, China and Brazil. While it is dependent on the availability of EVs and recharging infrastructure, which are limited in many parts of the world, Unilever continues to engage local authorities and associations to accelerate change (Unilever 2024a).

Strategic Collaboration and Sustainable Agriculture

Unilever strengthens its leadership on sustainability even further by forming strategic technological collaborations and alliances. In cooperation with universities, research bodies, and innovative start-ups, Unilever can harness cutting-edge technologies for its sustainability programmes (Unilever, n.d.-f).

It also collaborates with agri-tech firms to enhance yield and promote land fertility, biodiversity, and water stewardship across agricultural supply chains, helping Unilever realise the long-term goal of sustainable sourcing.

Challenges and Risks in Sustainability Implementation

Regulatory and Policy Challenges

Unilever, as a company that runs its business in more than 190 countries, must deal with different regulations, especially in the environmental aspect, as most countries face challenges in this area. One risk is uneven regulation across markets. For example, if the EU imposes strict requirements on recycled content or deforestation due diligence, Unilever must comply, but competitors in less-regulated markets might gain a cost advantage. Conversely, a sudden country ban on certain materials might lead to business interruption for Unilever. Unilever's push for a global plastics treaty is partly to mitigate these risks by harmonising rules and creating clarity.

Greenwashing and Reputational Risks

In 2024, Greenpeace UK published a report on alleged gaps between Unilever's commitments and actions on plastic packaging. While the company has advertised initiatives to tackle plastic pollution, Greenpeace claimed that Unilever still produces significant amounts of non-recyclable, single-use plastic, especially in developing countries with inadequate waste infrastructure (Greenpeace UK, 2024).

Such incidents can erode public trust and brand credibility. Environmentally conscious consumers may choose to boycott the brand, while ESG-focused investors might reconsider their portfolios.

Material Sustainability Risks

Unilever faces certain issues that could impact its long-term operations and reputation. For example, certain plastics are hard to recycle. Rigid plastics make up 69% of Unilever's plastic packaging portfolio, typically found on bottled shampoo and detergent products. At the moment, 76% of Unilever's rigid plastic packaging can be recycled, reused or composted. Meanwhile, the same rate for flexible plastic packaging and tubes is much lower at 13%, requiring distinct solutions to mitigate their environmental impact (Unilever, n.d.-l).

Unilever reports that 97% of its commodities, such as palm oil, paper and board, tea, soy and cocoa, are sourced without links to deforestation. Among these commodities, however, there are different compliance rates, highlighting the difficulties in achieving uniform deforestation-free targets across commodities and regions.

Implementation and Cultural Challenges

Implementing a sustainability agenda across an organisation operating in 190 countries is a massive change management exercise. Unilever has generally been successful in creating a sustainability culture, but maintaining momentum through leadership changes is crucial. There are also the challenges of technological and behavioural change: not all new eco-friendly innovations succeed in the market. Additionally, some sustainable sourcing goals might face supply constraints.

In facing these challenges, Unilever has a few mitigating strategies, such as emphasising partnerships and collective action. It works with industry peers, non-profit organisations and governments to find scalable solutions. Continued sustainability progress will allow it to gain more trust from stakeholders.

Future Strategy and Recommendations

Expanding Sustainable Practices

Unilever's goal is to reduce greenhouse gas emissions in Scope 1 and 2 by 70% by 2025. Moreover, by 2030, Unilever has set a target to achieve a full 100% reduction, using 2015 as the baseline (Unilever, 2024a). As these emissions fall within Unilever's direct operational control, the company is well-positioned to meet these goals through internal decisions and investments. On the other hand, Unilever's Scope 3 emissions related to the supply chain have a high number of external stakeholders involved, and could become a significant challenge. Unilever should engage all suppliers to comply with its sustainability standards, beyond those that it is already engaging. This will help reduce emissions from the entire supply chain.

Figure 5: Unilever Scope 3 GHG Reduction Targets
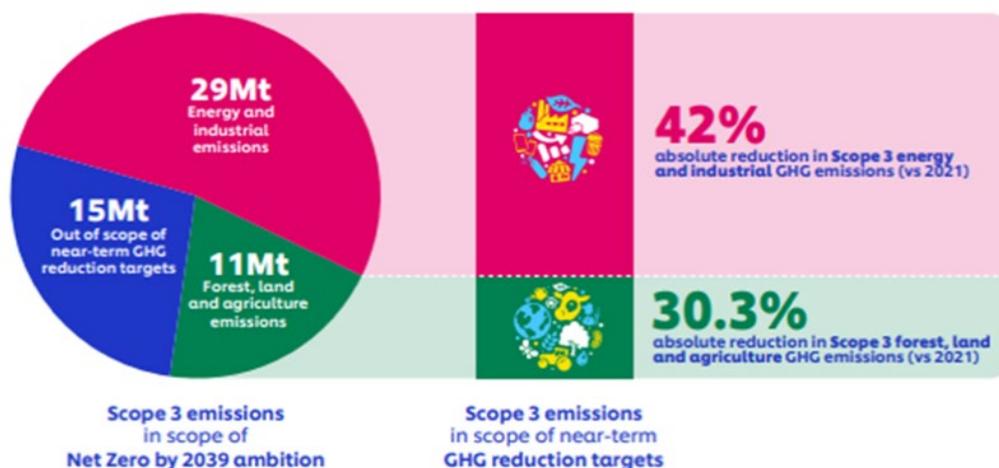
Source: Unilever, 2024a

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Unilever has set two near-term targets: a 42% reduction in Scope 3 energy and industrial emissions and a 30.3% reduction in forest, land, and agriculture (FLAG) emissions by 2030, compared to 2021 levels. As shown in Figure 5, energy and industrial emissions account for 29 Mt, while FLAG emissions make up 11 Mt, highlighting the scale of the task. To reach these targets, Unilever requires deeper collaboration across suppliers, logistics partners, and even consumers, making Scope 3 reduction the most complex component of Unilever's climate strategy. The difficulty is highlighted especially when juxtaposed with the target of Unilever's net-zero goal by 2039.

Building Partnerships and Collaborations

Active engagement with groups related to Unilever's business, such as the Roundtable on Sustainable Palm Oil (RSPO) and the Carbon Pricing Leadership Coalition, can help Unilever become more credible and effective in sustainability (Unilever, 2024a). These partnerships could improve recycling systems and support a circular economy. Unilever also collaborates with organisations such as Oxfam in addressing social and environmental challenges in its supply chains (Wilshaw, 2021). By strengthening ties with stakeholders on a global and local scale, Unilever can expand its impact and drive systemic change across industries and communities.

Continued Investments in Technologies and Innovations

Unilever has adopted satellite and blockchain technology in the traceability of its supply chain. It has also invested in green product innovation. For future development, Unilever could maximise the use of AI-powered analytics to help predict raw material needs more accurately, reduce overproduction, and even suggest greener logistics routes, supporting both cost efficiency and environmental goals (RTS Labs, 2024).

Discussion Questions

1. What are the opportunities and challenges of building a purpose-led organisation?

2. Should Unilever adapt its sustainability goals to fit local realities in different markets, or maintain a uniform global standard?

3. How can Unilever continue to lead in sustainability without falling behind on financial performance?

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Wilmar: Social Impact and Sustainability

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Introduction

Founded in 1991, Wilmar International Limited is a leading agribusiness group in Asia. Headquartered in Singapore, its core businesses in palm oil cultivation and palm oil refinery enable it to have one of the largest market capitalisations among companies listed on the Singapore Exchange (Wilmar, n.d.-b).

While it has made sustainability commitments and efforts related to anti-deforestation and helping rural communities, it has also faced criticism and allegations in these areas (Republika, 2015).

Wilmar would need to hold itself and its suppliers accountable for responsible business practices, avoiding illegal logging and forest burning, as well as labour abuse.

Company Overview

Led by Kuok Khoon Hong, Wilmar employs more than 100,000 people, operates over 1,000 manufacturing plants, and has an extensive agricultural commodity distribution network that covers more than 50 countries and regions. Its core net profit for FY2024 was US$1.16 billion, making it one of Fortune Global 500 companies (Wilmar, n.d.-b)

As one of the largest palm oil plantation owners in the world, Wilmar's plantations stretch more than 230,000 hectares as of end 2024. Most of the plantations are in Indonesia (66%), East Malaysia (25%) and Africa (9%) (Wilmar, n.d.-d).

"Wilmar is committed to a deforestation-free supply chain and emissions reduction business trajectory. This builds upon ongoing efforts and existing industry-level commitments by the palm oil sector. It is our ambition to contribute to climate leadership through these emissions' reduction initiatives and commitments," said Kuok Khoon Hong, CEO of Wilmar, in a press release. The firm was one of 14 agri-commodity firms to develop a sectoral roadmap, involving the cattle, soy and palm oil sectors, to reduce emissions consistent with a 1.5°C pathway. Announced in 2022, the effort was facilitated by the Tropical Forest Alliance, hosted by the World Economic Forum, with support from the World Business Council for Sustainable Development (World Economic Forum, 2022).

Sustainable Development Goals

Wilmar has committed to supporting the 17 United Nations Sustainable Development Goals (UN SDGs). Of these, six SDGs are identified as priorities for its business: Quality Education (SDG 4), Decent Work and Economic Growth (SDG 8), Responsible Consumption and Production (SDG 12), Climate Action (SDG 13), Life on Land (SDG 15), and Partnerships for the Goals (SDG 17).

Wilmar's focus on education, ethical employment, responsible buying, climate resilience, biodiversity conservation, and global partnerships illustrates how the company pursues sustained growth while reducing environmental and social risks (Wilmar, 2023).

SDG 4: Quality Education

As of 2023, Wilmar has built schools and crèches at all its plantations to allow employees and surrounding communities access to education. More than 4,000 young children are enrolled in these crèches, and more than 12,000 children are supported in their education. Besides funding the construction of schools in China, Wilmar also awarded over 980 secondary and higher education scholarships globally in 2023 (Wilmar, 2023).

In addition to conventional education, Wilmar also provides training to smallholder farmers regarding sustainable agriculture (Wilmar, n.d.-f). Through various levels of education, Wilmar helps build a more qualified and competent workforce.

SDG 8: Decent Work and Economic Growth

An employer of over 100,000 people globally, Wilmar provides them with income and training. In 2023, it invested over US$5.5 million in developing employees. The company's Human Rights Framework details implementation guidelines as well as remediation of any adverse impact. The company also has a Child Protection Policy and a Women's Charter to ensure children's and women's welfare (Wilmar, 2023).

Its training and market access for smallholder farmers not only boost their income but also foster socially responsible and environmentally friendly agriculture.

SDG 12: Responsible Consumption and Production

Wilmar's responsible production efforts are backed by its "No Deforestation, No Peat and No Exploitation (NDPE)" Policy pertaining to its supply chain. This is supported by its 98.8% traceability to palm oil mills across its global supply chain (Wilmar, 2024b). As a member of the Roundtable on Sustainable Palm Oil (RSPO) since 2004, Wilmar has a time-bound plan to certify all its plantations and mills against RSPO's criteria. As of 2024, 100% of its refineries and 82.1% of its oil palm plantations are RSPO-certified, though only 10.9% of all palm oil products transacted by Wilmar have the same certification (Wilmar, n.d.-a).

In terms of responsible consumption, Wilmar has achieved a 4.8% annual decrease in energy intensity (MWh per MT product excluding shipping) in 2023, with 52.2% of global energy consumption from renewable sources. It also attempts to convert agricultural waste products, such as biomass waste, to produce fuel and fertilisers (Wilmar, 2023).

SDG 13: Climate Action

Wilmar has set emissions reduction targets validated by the Science Based Targets initiative (SBTi). With 2022 as a base year, it plans to reduce absolute Scope 1 and 2 GHG emissions by 50.4% and absolute Scope 3 emissions by 30% by 2032. It also aims to achieve a 90% absolute reduction in all three scopes by 2050 (Wilmar, 2025).

Wilmar has constructed 25 methane capture facilities at its palm oil mills in Indonesia and Malaysia. These facilities capture methane, a potent greenhouse gas (GHG), from palm oil mill effluent (POME), and utilise the recovered biogas for power generation. An operational methane capture facility can potentially reduce a palm oil mill's GHG emissions by up to 90%. In 2024, these facilities collectively avoided approximately 0.5 million tCO2e of GHG emissions (Wilmar, n.d.-e).

Monitoring for illegal logging, mining and poaching activities is in place for areas of high conservation value. Where there has been historical degradation of land, Wilmar will undertake restoration activities (Wilmar, n.d.-c).

SDG 15: Life on Land

Wilmar adopts an active stance towards the protection of more than 32,000 hectares of conservation areas on its plantations. It reported that in 2023, there was zero deforestation in forests of high carbon stock and areas of high conservation value. Further, Wilmar restored and rehabilitated 531 hectares of riparian zones (areas of land along water bodies) with over 228,000 trees from 52 species in Indonesia, Malaysia and West Africa as of December 2023 (Wilmar, 2024a).

It has also raised awareness of biodiversity conservation through its Wildlife Awareness Outreach Programme, educational programmes for students and a forest conservation guide for non-experts working in agriculture in Indonesia and Malaysia (Wilmar, 2023).

SDG 17: Partnership for the Goals

Wilmar sustains engagement with local governments, civil society organisations and academic institutions for developing strategies in sustainable agriculture. Its partners include the Round Table on Responsible Soy, Roundtable on Sustainable Palm Oil and the Tropical Forest Alliance (Wilmar, 2024a).

Lastly, it is imperative to note the importance of other players in the agribusiness landscape. Continuous partnership engagement with these players will allow Wilmar to create change on a larger scale.

Sustainability Plan and Progress

Wilmar's 2023 sustainability report outlines its sustainability plans and progress, in accordance with international standards such as the Global Reporting Initiative (GRI), Sustainability Accounting Standards Board (SASB), Task Force on Climate-related Financial Disclosures (TCFD) and the UN Guiding Principles Reporting Framework. The report complies with the Singapore Exchange's listing rules (Wilmar, 2024a) and includes external assurance. Key efforts are discussed below.

Community Investment and Employee Development

Wilmar places emphasis on diversity, employee training, and community development. It adopted an updated Board Diversity Policy in 2023, with gender diversity targets to promote more female representation on its Board of Directors.

Figure 1: Classroom of a school in Indonesia developed by Wilmar

Source: Wilmar, 2024a

Wilmar has assessed all its employees and contractors to ensure that they are paid a living wage. It also has grievance procedures in place for stakeholders to raise any sustainability-related disputes, with a 100% response rate. For employee development, Wilmar has invested over US$5.5 million in training schemes to enhance long-term productivity and workforce capabilities.

For the communities, it has supported the education of 85.9% of children who are of school-going age in its plantations, as well as provided scholarships to underprivileged students in countries such as China, Nigeria and Singapore. In 2023 alone, Wilmar invested over US$23.4 million in community investment and philanthropic initiatives, topping the Global Benchmark 2023 Leaderboard of the Global Child Forum, and achieving a perfect score in the Food, Beverage & Personal Care sector category (Wilmar, 2024a).

Supply Chain Transformation and Sustainability

A key focus of Wilmar's sustainability efforts is its supply chain transformation, particularly in the palm oil sector. Against a target of 100% traceability to palm oil mills by 2024, Wilmar has achieved 98.8% traceability in 2023. It also aimed for 90% traceability to plantations by 2023 and 100% traceability by 2025. As of December 2023, its traceability to plantations was 90.6%.

Expanding on its No Deforestation and No People Exploitation (NDPE) commitments, Wilmar's No People Exploitation Sugar Policy has received formal recognition from the Sustainable Agriculture Initiative (SAI) Platform, aligning with the Gold Level equivalent, or achieving the highest sustainability standards for its sourcing goals, in the Farm Sustainability Assessment 3.0. It is a globally recognised framework for sustainable farming practices.

Figure 2: Wilmar's Supply Chain Overview
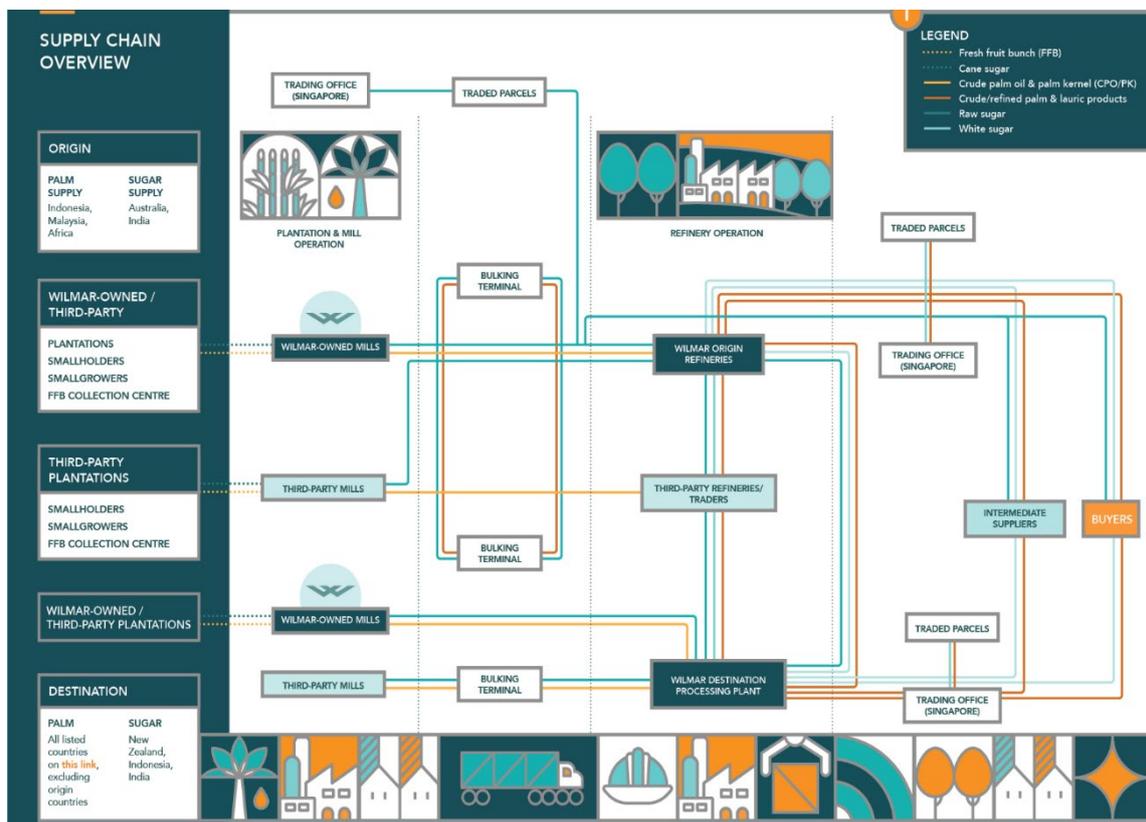
Source: Wilmar, n.d.-g

In 2023, Wilmar introduced a Coconut Responsible Sourcing Policy to ensure ethical, transparent and responsible sourcing for coconuts, with a specific supply chain traceability and risk mitigation. This, in turn, upholds its NDPE ambitions while improving the livelihoods of rural communities reliant on coconut sourcing (Wilmar, 2024a).

Corporate Climate Action & Emissions Reduction

Wilmar has reported a 4.1% decrease in overall GHG emissions intensity from 2022 to 2023, as well as a 4.8% reduction in energy intensity from 2022 to 2023. This reduction is attributed to enhanced energy efficiency across key business units, including sugar, oleochemicals, soy protein and tropical oil refining (Wilmar, 2024a).

Performance Assessment

In terms of disclosures, Wilmar has aligned with various sustainability reporting systems and received recognition from several ESG rating agencies. It publishes annual sustainability reports, which follow global standards such as GRI, SASB and TCFD. The report is also reviewed by independent auditors. Wilmar also runs an online sustainability dashboard and provides NDPE Implementation Reports, which show the progress on its NDPE policy. Because of these efforts, Wilmar has been included in the Dow Jones Sustainability Index for four years in a row. It also scored 69 out of 100 in the 2024 S&P Global Corporate Sustainability Assessment (Wilmar, 2024c).

In addition, Wilmar's performance in the Zoological Society of London's Sustainability Policy Transparency Toolkit (SPOTT) index shows its progress in sustainability. The SPOTT score is an indicator of the transparency and content of company disclosures regarding the organisation, its policies and practices. In 2019, it ranked fifth with a total score of 81% and ranked third in 2020 with 88.9%. In 2021, it took the top position with a score above 91% (Wilmar, 2021). It retained the top spot in 2022 with a score of over 93.2% (Wilmar, 2022). In the most recent SPOTT reviews for 2023 and 2024, its score was around 92%, keeping it ranked among the top palm oil producers. For both years, it received 100% for the category of "HCV, HCS and impact assessments" and the category of "Governance and grievances" (SPOTT, 2023; SPOTT, 2024).

Wilmar's high scores for SPOTT can be partly attributed to its anti-deforestation policies, biodiversity conservation. A key part of Wilmar's environmental work is its NDPE policy, which started in 2013. (Wilmar, 2023). It also has a biodiversity policy that applies to all suppliers and includes the wider landscapes beyond conservation areas (SPOTT, 2024).

Controversies and Challenges

Environmental Controversies and Challenges

Wilmar's challenge lies in managing the environmental impact of its activities and complex supply chain. The company has faced criticism several times for alleged roles in deforestation and illegal burning.

In 2007, Friends of the Earth Netherlands pointed to Wilmar as the firm behind the illegal logging and burning of rainforests in Indonesia. The organisation filed complaints to RSPO (which Wilmar is a member of) and the World Bank's International Finance Corporation which had provided funding to Wilmar (Friends of the Earth, Europe, 2007). In 2013, a report published by WWF-Indonesia documented that Wilmar and another company Asian Agri were purchasing palm oil fruits, which were grown illegally in Indonesia's Tesso Nilo National Park. Both companies had since responded by saying that they were no longer purchasing from suppliers inside the national park (Parker, 2013).

The same year, Wilmar became the first palm oil trader to publish an NDPE commitment in December 2013. However, five years after this commitment, Greenpeace published a report indicating large-scale deforestation by a palm oil business Gama, which was run by Wilmar executives and their family. Moreover, the Greenpeace investigation revealed Wilmar's history of selling companies embroiled in environmental or social conflicts to Gama, including PT Jatim Jaya Perkasa in 2004, PT Asiatic Persada in 2013, and PT Citra Riau Sirana in 2014 (Greenpeace Southeast Asia, 2018b). This led to the resignation of Wilmar-linked executives from Gama, and a greater push by Greenpeace for Wilmar's transparency in its supply chain (Greenpeace Southeast Asia, 2018a). Subsequently, after certain suppliers could show their progress of NDPE policy commitments, Wilmar re-integrated them into its supply chain (Wilmar, 2020).

As it is hard to mitigate the emissions from such sites without reducing productivity, this poses a tension between environmental goals and operational realities for Wilmar. Apart from that, Wilmar's global expansion also brings new issues, such as entering markets with weak or unclear regulations. It will be hard to ensure that its local partners will run operations in line with Wilmar's policies. For example, Wilmar's operations in Nigeria were accused of acquiring land without getting proper community consent, destroying forests and leaving local people destitute (Friends of the Earth, 2015). To address this challenge, Wilmar should try to improve its stakeholders' engagement and monitoring of suppliers.

Social Controversies and Challenges

The social challenges Wilmar faces pertain to human and labour rights. Ensuring company and supplier adherence to ESG targets is an issue. In 2016, Wilmar was accused of engaging in exploitative labour practices by Amnesty International, including the use of child labour and forced labour in plantations. Workers, especially women, were often employed under casual work arrangements, making them vulnerable to abuse. Wages could be deducted for failing to meet the harvesting targets, even if the worker has worked for longer hours. Moreover, children between eight to 14 years of age were found working on the plantations, carrying heavy loads

and getting exposed to chemicals such as pesticides. Some had dropped out of school to work with their parents (Amnesty International, 2016).

Despite the adoption of measures like grievance mechanisms and expanding supplier training, monitoring labour conditions in remote operations could be difficult.

Governance Controversies and Challenges

In 2023, the Indonesian government's business competition watchdog fined the subsidiaries of Wilmar and six other companies for hoarding cooking oil after the retail price was capped in response to a price surge (Jong, 2023a). The government had also charged executives from Permata Hijau Group, Wilmar Nabati Indonesia and Musim Mas, and the companies themselves, with corruption. The case involved the executives conspiring with a top trade ministry official to secure export permits for the firms. These permits would allow the companies to remove their domestic quota obligations and sell the cooking oil for higher prices abroad (Jong, 2023b).

On the other hand, Wilmar's exit from the High Carbon Stock Approach (HCSA) had been viewed by some environmental groups as a step backwards in the company's commitment to ending deforestation in its supply chain. The HCSA is a mechanism designed to help companies in the palm oil and pulp and paper sectors identify areas with high conservation value and areas that can be developed. Wilmar was HCSA's Co-Chair in 2017, but quit the alliance in 2020, citing concerns about HCSA's governance and financial management. Despite resigning, Wilmar stated that it remains committed to the adoption and implementation of the HCSA toolkit (Jong, 2020).

Finally, Wilmar needs to address greenwashing risks. Even though Wilmar has committed to NDPE and made its supply chain data more transparent, the variation among its suppliers' ESG performance has caused scepticism. To address this, Wilmar should focus on communicating supplier performance more effectively by highlighting specific issues rather than providing only general data.

Recommendations

Wilmar has made notable strides in addressing sustainability risks across its supply chain, but several areas remain for deeper, sustained action.

First, while traceability has reached 98.8% to mills and 90.6% to plantations, as cited in the 2023 Sustainability Report, this still leaves nearly 10% of the plantation supply base unverified. Given Wilmar's ambition to achieve full traceability by 2025, strengthening supplier-level data accuracy and coverage is essential. The Supplier Group Compliance Programme (SGCP) already monitors over 23.1 million hectares and 7,921 plantation units as of 2024 (Wilmar, n.d.-g), but integration with more ground

verification could help distinguish forest from plantation landscapes, especially in regions where satellite imagery alone is insufficient to confirm land-use change (Wilmar, 2019).

Second, the removal of suppliers who do not comply with Wilmar's NDPE policy has limits. Once removed, the suppliers will not have incentives to change their practices. The 2018 Joint Statement introduced more robust engagement tools for supplier transformation, particularly at the group level. Suppliers found to be involved in deforestation will face immediate suspension, but there is ongoing engagement to help bring their operations into compliance (Wilmar, 2018). Continued investments such as targeted support, training and time-bound improvement plans could help address persistent issues like smallholder deforestation and informal labour, which remain difficult to resolve through exclusion alone.

Third, the expansion into frontier markets, such as parts of West Africa, might bring higher exposure to governance and land tenure risks. There are difficulties in ensuring NDPE compliance where national regulation is weak, and land titles are often contested. While initiatives such as the jurisdictional certification in Sabah are promising, the company's influence outside its immediate operating boundaries remains limited. Therefore, continued collaboration with governments and industry platforms, combined with support for legal land mapping, could help mitigate these risks.

Lastly, although Wilmar has improved its transparency, much of the current reporting focuses on inputs and policies. Stakeholders increasingly expect outcome-based disclosures, such as hectares of forest protected, reductions in verified child labour incidents, or Scope 3 emissions avoided. Tracking year-on-year progress through impact metrics will be critical in building long-term trust and demonstrating accountability.

Conclusion

Wilmar has made commendable progress in embedding sustainability across its operations, particularly through its NDPE policy, traceability systems, and environmental initiatives such as biogas power plants. These efforts underscore a growing alignment between the company's operational goals and broader climate commitments.

Socially, Wilmar's investment in worker welfare, community infrastructure, and smallholder farmer inclusion reflects an understanding of the human dimensions of sustainability. Programmes aimed at education, healthcare and gender equity go beyond compliance and contribute to rural development and supply chain resilience.

Economically, integrating smallholder farmers has strengthened Wilmar's sourcing model and supported local livelihoods, advancing both business continuity and social value creation. However, systemic challenges remain. Historical governance and labour issues, the difficulty of monitoring remote suppliers, and varying legal contexts continue to test the company's ability in ensuring consistent standards across its global supply chain.

Looking ahead, sustaining progress will depend on Wilmar's ability to translate policy into measurable outcomes. This includes strengthening supplier engagement and monitoring systems, investing in field verification alongside satellite tools, and deepening outcome-based reporting. By maintaining transparency and aligning with regulatory and industry efforts, Wilmar is well-positioned to lead responsibly within the palm oil sector and set a benchmark for sustainable agribusiness.

Discussion Questions

1. How effective are Wilmar's sustainability strategies (e.g., NDPE policy, biogas plants, traceability systems) in reconciling palm oil production with environmental conservation goals?

2. What role do partnerships with non-profits, governments and certification bodies play in strengthening Wilmar's social and environmental accountability?

3. Can Wilmar's transparency mechanisms (e.g., SPOTT scores, sustainability reports) adequately mitigate concerns about greenwashing, or do lingering controversies suggest that deeper structural reforms are needed?

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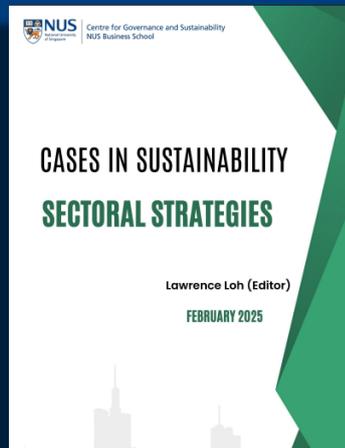
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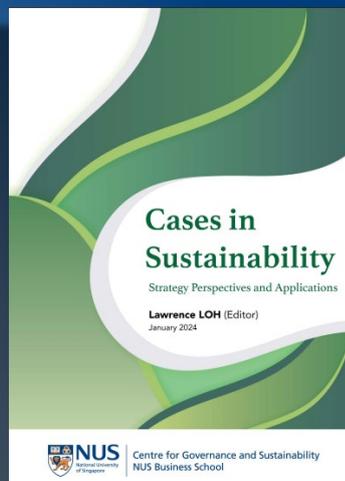
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