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Harmonized Framework for Corporate Sustainability Evaluation

SGFIN WHITEPAPER SERIES #8

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The Sustainable and Green Finance Institute:

The Sustainable and Green Finance Institute: The Sustainable and Green Finance Institute (SGFIN) is a research institute established by the National University of Singapore (NUS). SGFIN aims to develop deep research capabilities in sustainable and green finance with a focal point on Asia, and to provide thought leadership and shape sustainability outcomes in policymaking across the financial sector and the economy at large. Supported by exceptional domain experts across NUS, SGFIN will equip businesses with critical cross-disciplinary knowledge, training, and toolkits to integrate sustainability dynamics into their business strategies and investment decisions to better quantify the environmental and social impacts of their business developments, operations, products, and services. In essence, SGFIN aims to help companies embed sustainability as a key pillar in their business decisions.

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Foreword

Sustainability evaluation has transformed from a secondary concern to a critical pillar of corporate governance, strategy, and investment. Growing regulatory demands, shifting stakeholder expectations, and global environmental challenges call for structured, transparent, and standardized disclosures—especially in Southeast Asia, where ESG reporting is increasingly mandated.

At the Sustainable and Green Finance Institute (SGFIN), we recognize the need for a comprehensive evaluation framework that aligns with global reporting frameworks and standards while addressing regional challenges. This whitepaper examines existing sustainability reporting frameworks, evaluates their impact, and proposes an integrated evaluation approach to enhance consistency and reliability.

The ongoing and future adoptions of standardized reporting frameworks like IFRS S2 Climate-Related Disclosures mark significant progress, yet difficult challenges remain, including regulatory inconsistencies and high compliance costs. A robust evaluation framework is essential to bridge these gaps.

SGFIN's proposed Sustainability Evaluation Framework (SEF) streamlines disclosure expectations, promotes data credibility, and catalyses independent audits. By fostering regulatory alignment and strategic ESG integration, businesses can navigate this evolving landscape and drive meaningful sustainability outcomes.

We hope the development of this framework serves as a valuable resource for policymakers, businesses, investors, and academia, serving as a catalyst in the development of a more transparent, accountable, and sustainable corporate ecosystem.

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Executive Summary

Sustainability reporting has evolved significantly over the past decades, with international frameworks such as the GRI (Global Reporting Initiative), TCFD (Task Force on Climate-related Financial Disclosures), and ISSB (International Sustainability Standards Board) shaping corporate disclosures. The recent introductions of IFRS (International Financial Reporting Standards) S2 Climate-Related Disclosures and the European Union's CSRD (Corporate Sustainability Reporting Directive) marks a shift toward global standardization, increasing transparency and accountability.

Countries in Southeast Asia have implemented environmental, social, and governance (ESG) disclosure requirements, moving from voluntary to mandatory reporting. The Singapore Exchange (SGX) mandates climate-related disclosures aligned with TCFD, while Malaysia and Indonesia have introduced sustainable finance roadmaps. However, gaps remain in regulatory enforcement and reporting consistency across jurisdictions.

Substantial disparities persist in the quality and consistency of sustainability disclosures across various dimensions, including industries and jurisdictions. The lack of standardization among existing frameworks with different primary objectives leads to inconsistencies, with companies struggling with double materiality—assessing both financial and societal impacts of sustainability issues. This highlights a critical and crucial challenge in sustainability reporting: the cost of collecting and disclosing sustainability-related information.

In response to these challenges and evolving standards, SGFIN develops a Sustainability Evaluation Framework (SEF) that integrates corporate operations and value chain, strategic planning, and external validation through independent audits and adherence to global reporting standards.

Promoting harmonized ESG metrics would strengthen corporate sustainability evaluation, with the anticipated adoptions of IFRS S2 a significant step in that direction. To support robust evaluation, companies must enhance data collection, verification, and reporting using AI-driven solutions and third-party audits. Regulators can also promote adoptions by providing effective training programs and incentives, beyond mandating harmonized reporting.

A standardized and transparent sustainability evaluation framework is crucial for responsible investing and corporate accountability. SGFIN SEF underscores the need for data-driven, globally aligned reporting mechanisms to integrate ESG into business strategies and financial investments, ensuring long-term resilience and sustainable growth.

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1 Introduction

The Harmonized Framework for Corporate Sustainability Evaluation whitepaper begins by exploring the evolution of sustainability reporting and the need for an integrated, standardized approach that addresses both financial and impact materiality.

In Part 2, we introduce the SGFIN Sustainability Evaluation Framework (SEF), detailing its development references—including GRI, TCFD, and ISSB—the methodology behind its construction, the selection of key indicators, and the data collection process.

Part 3 focuses on analysing sustainability reporting across Southeast Asian countries using SGFIN SEF.

In the subsequent two parts, we review the harmonization between SGFIN SEF and IFRS S2, anticipating its strong influence on sustainability reporting in the region and globally. We highlight how SGFIN SEF promotes deeper coverage beyond IFRS S2 requirements.

Finally, we present four key implications arising from our findings and conclude with insights on the future of corporate sustainability evaluation.

1.1 Global Development of Sustainability Reporting

As shown in Figure 1, the sustainability movement gained momentum in the 1960s, driven by Rachel Carson's *Silent Spring*, which highlighted the environmental harm caused by pesticides and sparked broader concerns about industrial impact. These concerns laid the foundation for a growing recognition that businesses and policymakers must account for their environmental and social footprint. The 1987 Brundtland Report introduced the concept of sustainable development, emphasizing the need to balance present and future societal and environmental needs.

This increasing awareness translated into the need for transparency and accountability, leading to the emergence of sustainability reporting. In the 1990s, sustainability reporting advanced significantly. The GRI (Global Reporting Initiative) was founded in 1997, providing a framework to evaluate the sustainability practices of companies and organizations, while the 1998 launch of the Dow Jones Sustainability Index (DJSI) began benchmarking corporate sustainability performance.

The 2000s brought rapid growth in voluntary standards. The GRI Guidelines debuted in 2000, and the CDP (Carbon Disclosure Project) expanded in 2006 to include greenhouse gas emissions and climate risks. The International Finance Corporation (IFC) also influenced corporate practices in developing markets through its Environmental and Social Performance Standards.

The 2010s saw mandatory reporting requirements and global standard alignment. Key milestones included the European Union's (EU's) Non-Financial Reporting Directive (2012), the launch of the Sustainability Accounting Standards Board (2014), and the Task Force on Climate-related Financial Disclosures (2017). The United Nation Sustainable Development Goals (SDGs) (2015) further aligned corporate strategies with global objectives.

In the 2020s, focus shifted to standard convergence and regulatory growth. The ISSB was established in 2021 to harmonize global standards, while the EU's Corporate Sustainability Reporting Directive (CSRD) in 2023 expanded reporting obligations for companies in or trading with the EU.

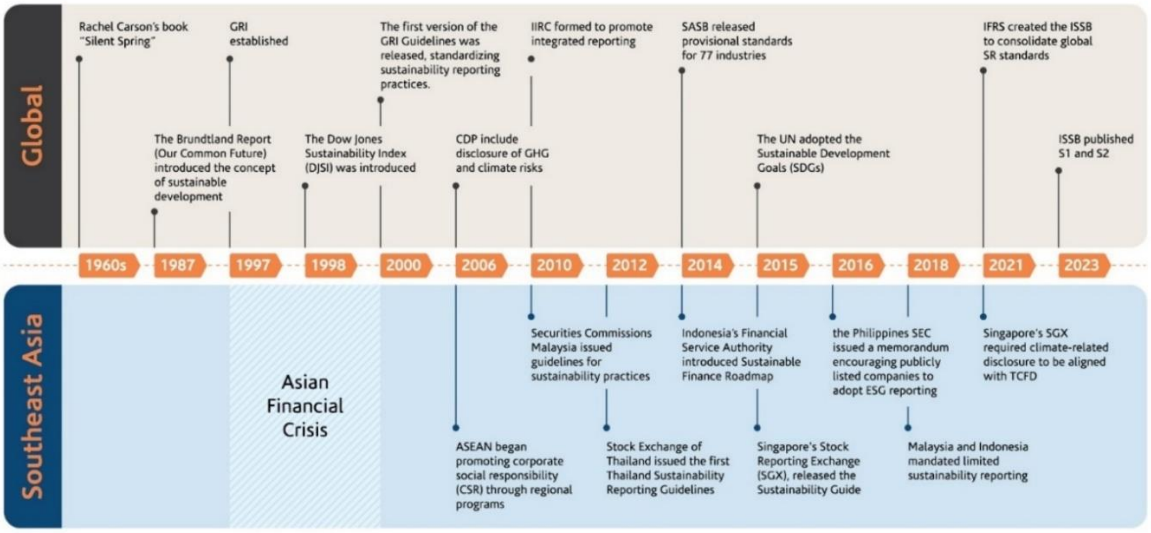


Figure 1: Sustainability Reporting Development

The period following the launch of the Paris Agreement and the SDGs witnessed exponential growth in sustainability reporting. Initially referred to as corporate social responsibility (CSR) reporting or environmental reporting before the 2000s, sustainability reporting has since evolved and accelerated significantly. While various motivations drive this reporting, stakeholder theory and legitimacy theory form the main fundamentals to explain sustainability reporting (Meutia et al., 2021). According to stakeholder theory, companies have responsibilities towards other groups with interests in the company apart from shareholders (Freeman, 1984). Legitimacy theory provides a foundation for understanding how and why managers might use externally focused reports to benefit an organization (Deegan, 2002). Mathews (1993) highlights that a social contract would exist between corporations and individual members of society or the community. This contract compels the company to adhere to social norms to ensure its sustainability and acceptance within society. Sustainability reporting provides legitimacy for corporate action by firmly influencing public perceptions and helping to avoid unexpected publication (Meutia et al., 2021). The Muslu et al. (2017) study found that firms build credibility over time through committing to CSR reporting practices.

While companies often find financial reporting relatively straightforward, sustainability reporting presents additional challenges due to the concept of double materiality. As shown in Figure 2, this principle emphasized that companies should assess and disclose their ESG impacts based on two key dimensions: financial materiality and impact materiality.

Financial materiality examines how sustainability issues influence the company's financial performance. It considers the risks and opportunities that ESG factors pose to operations, profitability, and long-term viability, essentially addressing how these

factors impact the company's bottom line. Impact materiality, on the other hand, assesses how a company's actions, decisions, and operations affect the broader environment and society. It focuses on the company's contributions to climate change, biodiversity, human rights, and other social issues, providing insight into how the company's business affects the world around it.

The double materiality concept recognizes that a company's sustainability performance is significant not only for its financial health but also for its wider social and environmental impact. Reporting on both dimensions offers a comprehensive perspective on a company's sustainability efforts, enabling stakeholders to understand both the financial implications of sustainability issues on the company and the company's influence on the world.

While inward-looking (financial) materiality directly affects the company's financial statements, outward-looking (impact) materiality requires companies to conduct additional assessments that may not yield immediate financial benefits. This presents a primary challenge in sustainability reporting: cost of collecting and divulging sustainability-related information.

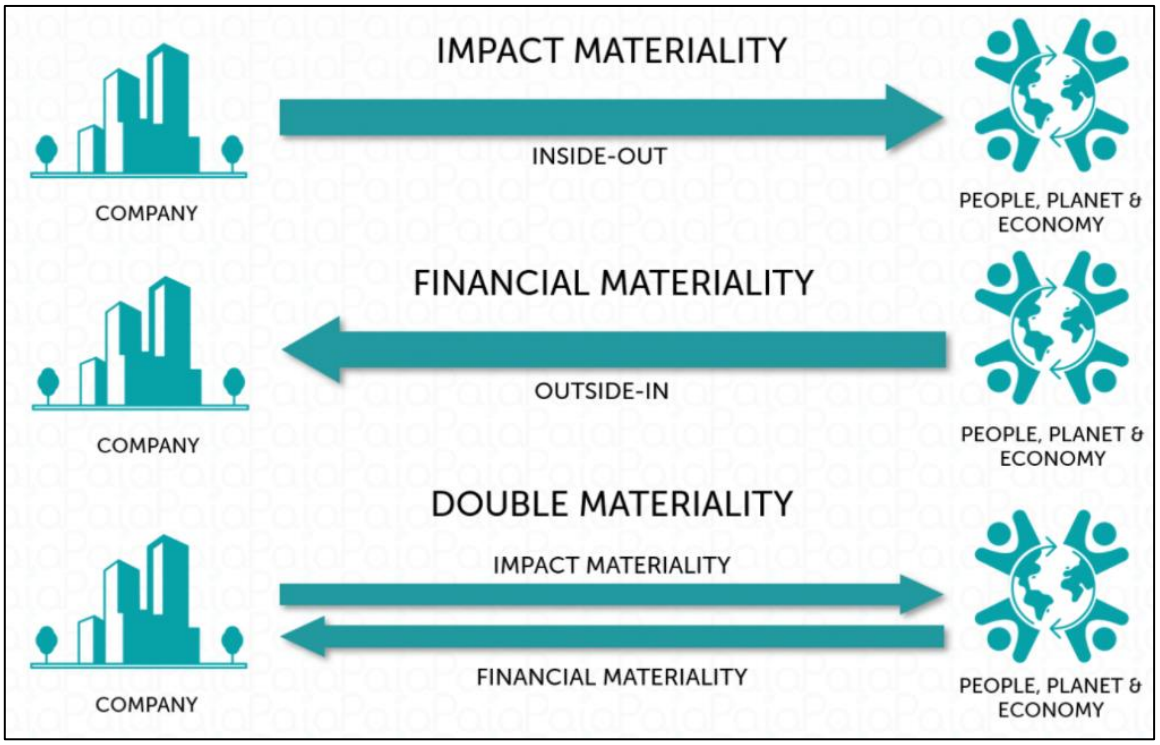


Figure 2: Double Materiality

Source: (Paia Consulting, 2023)

The extent to which companies report their ESG performance is determined by internal and external factors. Company size appear to be the main internal factor positively influencing sustainability reporting (Hahn & Kühnen, 2013), with larger companies having greater corporate visibility. In addition, Al-Shaer et al.(2022) discuss that the main factors that determine the content of sustainability reports are: (1) external governance-related factors, including the voluntary adoption of sustainability reporting assurance, the choice of assurance provider, stakeholder engagement and ownership concentration; as well as (2) internal governance

factors, including board quality and the existence of a sustainability committee. The contents of the reports are also related to the company's reporting infrastructure, including the publication of standardised GRI sustainability reports and more general financial reporting quality.

The framework for sustainability reporting is generally less mature and standardized than financial reporting, resulting in significant variability across countries and regions due to differing requirements and benchmark standards. In Southeast Asia, the GRI has emerged as a widely adopted standard. This adoption improves the comparability of sustainability reports in the region, enabling stakeholders to make more consistent evaluations of the ESG performance of companies in Southeast Asia. Nonetheless, the lack of a universal standard for sustainability reporting continues to pose challenges, as companies must navigate diverse regulatory landscapes and expectations. In an ideal world, Utama (2011)advocated for a standardized reporting: to increase the level and quality of corporate responsibility reporting, a single global Corporate Responsibility (CR) reporting standard needs to be accepted and mandated across different jurisdictions.

While the need for comparability can drive the standardization of sustainability reporting frameworks, caution is necessary. Abeysekera (2022) observed that while many frameworks have increasingly aligned with the UN SDGs, they tend to overemphasize performance metrics, potentially leading to non-productive inter-firm comparisons. He advocates for a principle-based sustainability reporting framework that prioritizes measuring, auditing, and reporting sustainability outcomes and impacts rather than focusing solely on performance indicators. This approach would minimize excessive comparisons between firms and allow organizations to achieve outcomes that are more relevant to their specific SDG commitments.

1.2 Feedback Loop Between Sustainability Reporting Frameworks and Sustainability Evaluation for Investment Decisions

Since sustainability reporting is still in its early stages compared to financial reporting, establishing a continuous feedback loop between sustainability reporting frameworks and industry practices in evaluating sustainability is crucial for developing effective and meaningful sustainable investments and initiatives. Several challenges persist in achieving effective adoption and utilization of sustainability reporting, including a lack of standardization and harmonization, data availability issues, and complexities in measurement and materiality assessments.

To address these challenges, SGFIN is proposing a corporate sustainability evaluation framework to bridge the gaps and enhance the relevance of corporate and investor actions in the evolving sustainability landscape. A well-balanced approach to sustainability evaluation is crucial. Requiring the collection and reporting of metrics that are irrelevant to a company's core activities can be counterproductive, creating unnecessary reporting burdens and diluting insights. Conversely, overlooking information that may seem overly specific or outside mainstream indicators could mean missing valuable opportunities to enhance investment decisions.

Balancing relevance and comprehensiveness are crucial. Industry-specific insights can drive the evolution of sustainability standards, ensuring they remain aligned with

actual business impacts and emerging ESG priorities. This iterative process allows frameworks to adapt and evolve, ultimately supporting more accurate, comparable, and impactful sustainability disclosures across sectors.

1.3 Integration with Financial Reporting

The GRI standards have proven highly effective, as they are widely used by companies globally. Their popularity stems from their flexibility, making them adaptable to organizations of various sizes and industries, which adds to their versatility. However, GRI reports are typically separate from financial reports, making it challenging for companies to fully integrate sustainability performance into their financial statements.

As companies increasingly move toward integrated reporting—combining financial and non-financial information to present a comprehensive view of performance—GRI alone may not be sufficient to meet this critical need. Utama (2011) suggest that further research is required to integrate corporate responsibility or non-financial reports and financial reports and to develop a report type that summarizes a company's corporate responsibility activities and their effectiveness.

This development has led many companies to adopt Integrated Reporting (IR) frameworks issued by the International Integrated Reporting Council (IIRC), which facilitate the inclusion of ESG information alongside financial data. Sustainability Reporting practices and the GRI guidelines are intended for a wide audience of various categories of stakeholders. Integrated reporting on the other hand as discussed by the IIRC is based on the concept of value creation over time, particularly catering to the needs of investors (Wachira et al., 2020). Additionally, this shift toward integration has driven the implementation of standards like IFRS S2 for climate-related disclosure, aiming to harmonize sustainability and financial reporting practices.

The effectiveness of these integrated reporting efforts in addressing the current challenges remains to be seen, as 2024 marks the first year of IFRS S2 implementation. Over time, companies and stakeholders will evaluate whether these frameworks provide a more cohesive, transparent, and useful picture of both financial health and sustainability performance.

1.4 Reporting and Framework Consistencies

A lack of sustainability disclosures could be interpreted as a lack of commitment to transparency. However, it also reflects unique, company-specific factors that influence reporting and disclosures. Variability in reporting across businesses and industries significantly shapes the types of relevant sustainability information available. Unlike financial metrics, such as profit, which can be applied universally, sustainability metrics like waste generation, energy consumption, or water usage can vary widely between industries. To address these differences, some reporting frameworks have introduced industry-specific and customized reporting requirements that help ensure the information disclosed is both relevant and meaningful. These tailored guidelines aim to standardize disclosures within industry groups, enhancing comparability while allowing flexibility for the distinctive characteristics of each sector.

Another notable issue is the inconsistency in units of measurement. Standardizing these units is essential to address concerns around comparability and reduce the risk of conversion error. For example, kilowatt-hours (kWh) are typically used in electricity-specific contexts, while gigajoules (GJ) are preferred for broader energy reporting, such as total energy consumption. According to the GRI, energy consumption includes electricity, fuel usage, and steam, heating, or cooling consumption. Using a standardized unit, such as GJ, enables consistent aggregation of these various energy sources, ensuring that the total energy consumption reflects a reliable and comparable sum of its parts.

2 SGFIN Sustainability Evaluation Framework (SEF)

The SGFIN Sustainability Evaluation Framework (SEF) is developed based on globally recognized sustainability reporting frameworks and guidelines to ensure comprehensive and standardized ESG disclosures. It integrates references from key sustainability standards, including the GRI (Global Reporting Initiative), GHG (Greenhouse Gas) Protocol, CDSB (Climate Disclosure Standards Board), and TCFD (Task Force on Climate-related Financial Disclosures). The framework structures sustainability evaluation across three key areas: value chain integration, strategic planning, and external validation. Additionally, it aligns with leading sustainability information intermediaries such as Bloomberg, Refinitiv, and Trucost to enhance credibility and comparability. A thorough selection and refinement process resulted in 456 indicators, ensuring relevance to corporate sustainability performance. SGFIN SEF is designed to align with global best practices while addressing the specific needs of corporate sustainability disclosures.

Key Takeaways

- The SEF integrates internationally recognized sustainability reporting standards such as GRI, GHG Protocol, CDSB, and TCFD to ensure a structured and comprehensive ESG disclosure approach.
- SGFIN developed 456 sustainability indicators by analysing widely accepted frameworks and industry data providers, refining them to balance specificity, relevance, and practicality for corporate disclosures.
- The SEF promotes comparability with industry benchmarks by incorporating methodologies from Bloomberg, Refinitiv, and Trucost, reinforcing its credibility and market relevance.

2.1 References and Sources

In this section, we will discuss the widely used sustainability reporting frameworks and guidelines globally, as well as their influence on the development of the SGFIN Sustainability Evaluation Framework. In sustainability reporting, frameworks and guidelines play distinct yet complementary roles in shaping how companies disclose their ESG performance. Guidelines provide specific recommendations and methodologies for implementing sustainability reporting within a given framework, ensuring consistency and comparability in disclosures. In contrast, frameworks establish the overall structure and conceptual foundation for sustainability reporting, defining key principles and reporting boundaries.

2.1.1 Reporting Guidelines: GRI, GHG Protocol, CDSB

GRI (Global Reporting Initiative) Standards

GRI standards are the most widely used framework for sustainability reporting globally. Founded in 1997 to drive accountability for environmental practices, GRI has expanded to address social, economic, and governance issues. In 2000, it launched the first global sustainability reporting framework, which was further refined in 2016 into the comprehensive GRI Standards (PwC & Centre for Governance and Sustainability, 2023).

According to KPMG's 2022 Survey of Sustainability Reporting, 78% of the world's 250 largest companies (G250) and more than two-thirds of the top 100 companies in 58 countries (N100) utilize GRI standards in their disclosures. Currently, over 10,000 organizations worldwide, including more than 70% of G250 companies, adopt GRI standards to guide their reporting (Ásthildur, 2022). This is expected, given that its primary audience includes a diverse group of stakeholders such as investors and regulators. These standards address a wide range of topics, from biodiversity and emissions to tax, waste, diversity, and health and safety, providing a globally recognized framework for corporate transparency.

GRI emphasizes impact materiality, aiming to support organizations in effectively conveying their sustainability efforts, enhancing comparability across reports, and fostering transparency and engagement between companies and stakeholders. As a result, GRI has become a fundamental driver of sustainable business practices worldwide.

Greenhouse Gas (GHG) Protocol

The Greenhouse Gas (GHG) Protocol is a globally recognized framework that provides standardized methodologies for measuring and managing greenhouse gas emissions across private and public sector operations, value chains, and mitigation efforts. Developed in the late 1990s by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD) in response to the need for international corporate GHG accounting standards, the Protocol has become a cornerstone of climate action(World Resources Institute, n.d.).

The GHG Protocol emphasizes impact materiality, prioritizing the environmental consequences of a company's GHG emissions over their direct financial implications. However, it recognizes the link between the two by offering frameworks that allow

organizations to assess both the environmental and financial aspects of emissions within their operations and value chain.

Focusing on emissions measurement, the GHG Protocol provides standardized methodologies to quantify and report GHG emissions across a company's operations and value chain, with a primary focus on understanding and addressing their environmental impact.

The framework has diverse applications, including corporate sustainability reporting, product lifecycle assessment, supply chain management, policy development, and investment analysis, making it integral to advancing global climate goals(Greenhouse Gas Protocol, n.d.).

CDSB (Climate Disclosures Standards Board)

The CDSB (Climate Disclosure Standards Board), established at the 2007 World Economic Forum, is a global initiative aimed at enhancing the transparency and consistency of climate and environmental information in corporate financial reporting. Born from a collaboration between businesses and environmental organizations, CDSB's mission is to integrate environmental considerations into corporate strategies and empower investors with informed decision-making capabilities.

CDSB emphasizes financial materiality, aiming to integrate climate and environmental information into corporate financial reporting. Its framework ensures that disclosures are meaningful for investors and financial stakeholders. By providing a structured approach to incorporating material environmental information, CDSB helps companies assess and communicate their climate-related impacts. It focuses on three key areas—climate change, natural capital, and environmental risks and opportunities. CDSB aligns these disclosures with financial reporting principles to enhance transparency and informed decision-making.

Designed to harmonize with other major sustainability reporting standards and frameworks —such as CFD, the GRI, and the Sustainability Accounting Standards Board (SASB)—the CDSB framework minimizes duplication and enhances data comparability across disclosures.

The initiative's primary goals are to embed environmental data into mainstream reporting, foster accountability and transparency in environmental impacts, and provide consistent, reliable information for stakeholders. In 2022, CDSB was integrated into the ISSB under the IFRS Foundation, advancing global efforts to unify and streamline sustainability reporting standards.

2.1.2 Reporting Frameworks: TCFD and GHG Protocol

TCFD (Task Force on Climate-related Financial Disclosures)

TCFD Recommendations and Supporting Recommended Disclosures

Governance	Strategy	Risk Management	Metrics and Targets
Disclose the company's governance around climate-related risks and opportunities.	**Disclose the actual and potential impacts of climate-related risks and opportunities on the company's businesses, strategy, and financial planning where such information is material.**	**Disclose how the company identifies, assesses, and manages climate-related risks.**	**Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities where such information is material.**
a) Describe the board's oversight of climate-related risks and opportunities.	a) Describe the climate-related risks and opportunities the company has identified over the short, medium, and long term.	a) Describe the company's processes for identifying and assessing climate-related risks.	a) Disclose the metrics used by the company to assess climate-related risks and opportunities in line with its strategy and risk management process.
b) Describe management's role in assessing and managing climate-related risks and opportunities.	b) Describe the impact of climate-related risks and opportunities on the company's businesses, strategy, and financial planning.	b) Describe the company's processes for managing climate-related risks.	b) Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks.
	c) Describe the resilience of the company's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.	c) Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the company's overall risk management.	c) Describe the targets used by the company to manage climate-related risks and opportunities and performance against targets.

Figure 3: The 11 TCFD Recommendations for Sustainability Disclosures

Source: (Task Force on Climate-Related Financial Disclosures, 2017)

The TCFD provides a framework for organizations to disclose climate-related financial information, focusing on four core areas: governance, strategy, risk management, and metrics and targets. Figure 3 also highlights 11 recommendations disclosures within these areas. By improving transparency, the TCFD enables investors, lenders, and insurers to better assess and manage the financial risks and opportunities arising from climate change (Task Force on Climate-Related Financial Disclosures, 2017).

A key feature of the TCFD framework is its emphasis on financial materiality, ensuring that organizations disclose climate-related risks and opportunities that have a direct impact on their financial performance and long-term value creation. Materiality plays a crucial role in guiding companies to identify and prioritize environmental indicators most relevant to their financial stakeholders.

By integrating financial materiality into its recommendations, the TCFD ensures that climate-related disclosures provide decision-useful insights, empowering stakeholders to make informed financial and strategic decisions. This alignment of ESG factors with financial performance enhances the credibility and utility of sustainability reporting in addressing global climate challenges.

SASB (Sustainability Accounting Standards Board) / ISSB (The International Sustainability Accounting Standards Board)

The SASB was established to develop and maintain industry-specific sustainability accounting standards. It focused on identifying financially material sustainability issues. Referring to the SASB Materiality Map in Figure 4, it is evident that the various sub-components of the environmental dimension impact industries differently, with certain sub-components being more "material" to specific industries than others. This concept ensures that companies concentrate on the most significant environmental impacts and opportunities, rather than distributing their efforts across all possible indicators indiscriminately(Henriksson et al., 2019)

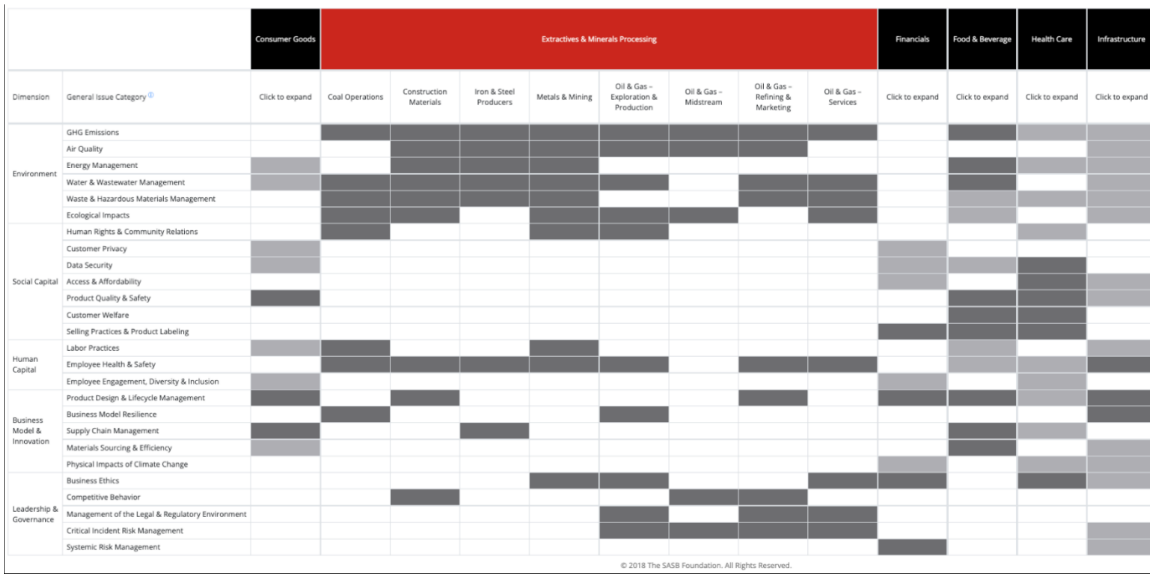


Figure 4: SASB Materiality Map

Source: (The Sustainability Accounting Standards Board, 2021)

In response to increasing market demands, GRI and the IFRS Foundation are intensifying their collaboration to enhance the interoperability between GRI and ISSB Standards. As GRI remain widely adopted, companies may need to develop strategies for interoperability and comprehensive reporting to accommodate potential future compliance with additional standards.

The SASB and the ISSB play pivotal roles in advancing sustainability reporting with a focus on financial materiality. SASB has developed sector-specific standards for 77 industries, emphasizing sustainability metrics that directly impact financial performance. These standards have been integrated into the ISSB framework, which builds on SASB's foundation.

The ISSB, established under the IFRS Foundation, provides globally comparable disclosure standards tailored to financial markets. Its first two standards, IFRS S1 (General Requirements for Sustainability Disclosure) and IFRS S2 (Climate-related Disclosures), incorporate SASB principles and align with recommendations from the TCFD. Together, they enable organizations to align ESG reporting with investor priorities, ensuring decision-useful information for financial stakeholders.

2.2 Sustainability Data on Information Intermediaries' Platforms

Bloomberg

Bloomberg's ESG scores aim to support informed decision-making for 15,000 companies, address gaps in data governance by relying solely on as-reported data (avoiding proxies) and provide transparency on the extent of company data disclosure. The scoring approach is bottom-up and model-driven, leveraging publicly available, self-reported information within a fully transparent, rules-based framework.

Bloomberg's extensive datasets include company-reported information across thousands of firms. The ESG Disclosure Score evaluates environmental, social, and governance (E, S, and G) performance on a scale from 0 to 100, with 100 indicating the highest performance. These proprietary scores are designed to offer transparent, consistent, and comparable ESG data to clients, with the underlying methodology and company data openly accessible to investors.

For E and S scores, Bloomberg exclusively uses voluntary disclosures from primary sources, such as sustainability reports, annual filings, proxy statements, corporate governance reports, supplemental releases, and company websites, ensuring accuracy and consistency. Additionally, Bloomberg provides detailed data and analytics on GHG emissions, including carbon emissions estimates for thousands of public and private companies globally.

Refinitiv

Refinitiv, with origins dating back to 2002, claims to offer one of the most comprehensive ESG datasets, covering over 80% of global market value and spanning more than 630 ESG metrics. Companies are assigned an ESG score ranging from 0 to 100, where higher scores indicate better performance. Additionally, Refinitiv provides a controversy score, reflecting the impact of global ESG-related news events associated with a specific company.

The ESG scoring process follows a bottom-up methodology, transparently and objectively evaluating a company's relative ESG performance, commitment, and effectiveness across 10 key themes. These scores are based on publicly available and verifiable data, ensuring accountability and comparability.

S&P Global

S&P Global assesses companies' ESG performance through a structured ESG Scores framework, providing company-level, dimension-level, and criteria-level scores. These scores are derived from the annual S&P Global Corporate Sustainability Assessment (CSA), which evaluates corporate sustainability practices based on publicly available information and company responses to the CSA questionnaire.

The S&P Global ESG Raw Data Package offers detailed sustainability-related data collected through the CSA, incorporating verified corporate disclosures, credible public sources, media reviews, stakeholder analysis, and direct company engagement to ensure data accuracy and reliability.

Since 2000, S&P Global Trucost has analyzed risks related to climate change, natural resource constraints, and broader ESG factors. Today, Trucost intelligence supports corporations, financial institutions, and governments in strengthening resilience and

managing the transition to a low-carbon, sustainable, and equitable future. It also serves as the data and analytics engine for various S&P Global ESG solutions.

2.3 Structure of SGFIN Sustainability Evaluation Framework (SEF)

The SGFIN SEF is designed to provide a structured and holistic approach to assessing corporate sustainability. A sustainability framework is essential to navigate the complexities of ESG performance, ensuring that businesses can effectively measure, report, and improve their sustainability practices. In the absence of a standardized framework, sustainability assessments risk being inconsistent, fragmented, and difficult to compare across industries and regions.

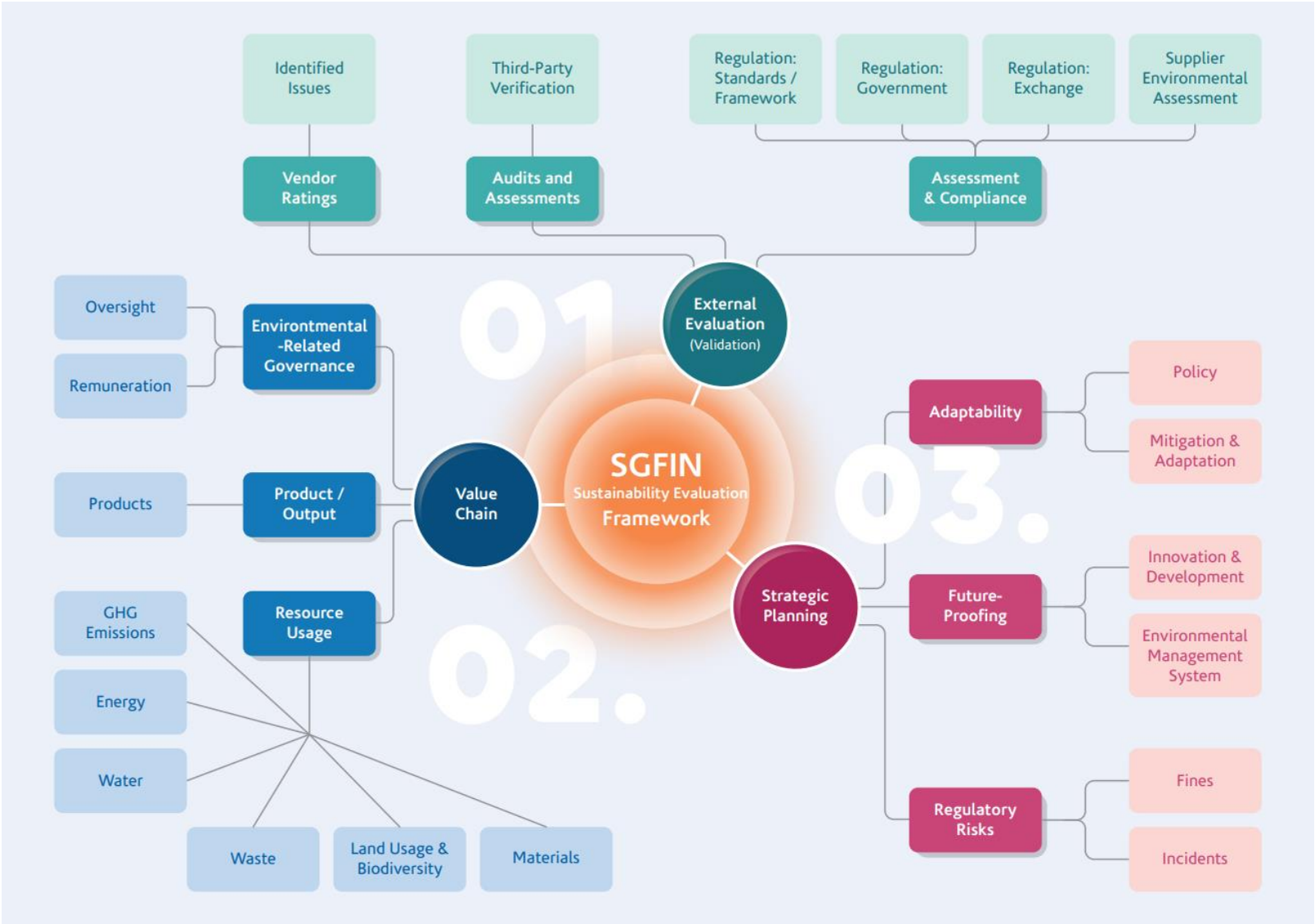


Figure 5: Over-arching Structure of SGFIN Sustainability Evaluation Framework (SEF)

By organizing into key thematic areas, SGFIN SEF addresses both operational and strategic aspects of sustainability. Figure 5 presents the structure of SGFIN's Sustainabitliy Evaluation Framework (SEF). The framework integrates environmental and social impacts within the value chain while aligning them with overarching strategic planning and external validation. This organization ensures a comprehensive evaluation of corporate sustainability performance, facilitating transparency and comparability across sectors and regions.

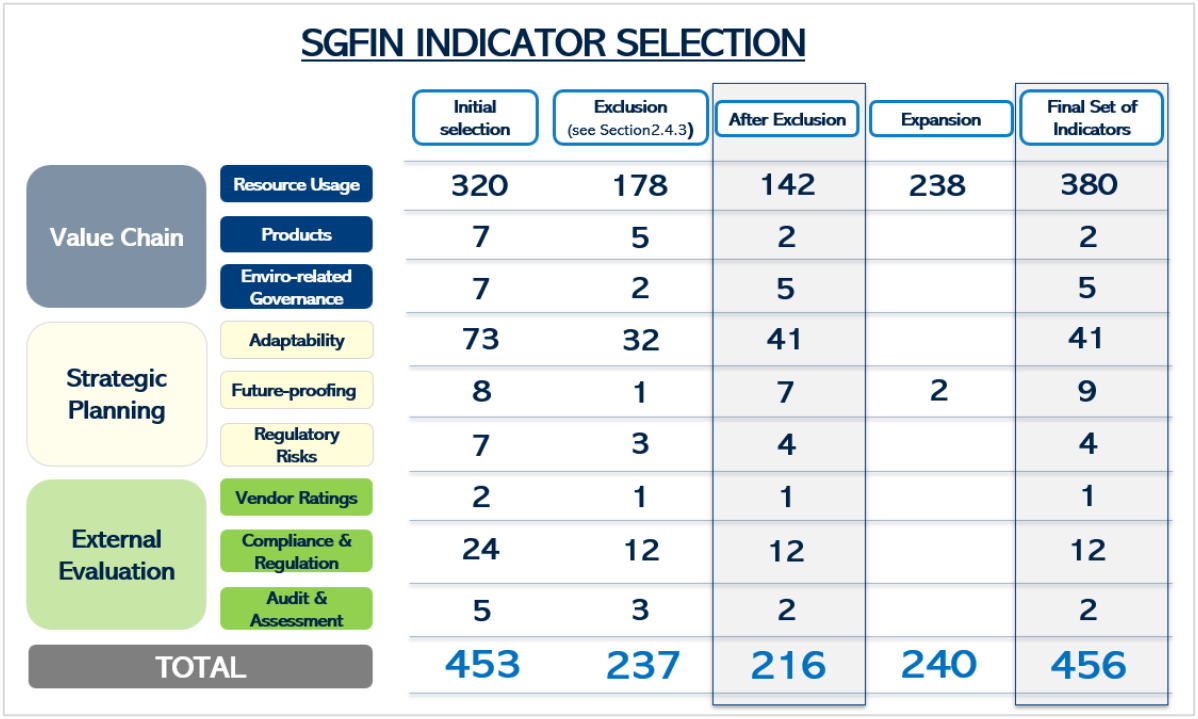
Based on this structure, we perform an indicator selection process consisting of three phases. First, we identified 453 indicators from various references and sources, as discussed in Section 2.1 of this paper. This initial set was then verified and assessed, leading to the exclusion of 237 indicators. We provide detailed explanations regarding the exclusion criteria in Section 2.4.3. With 216 indicators remaining, we refined and expanded them to enhance specificity, particularly regarding resource usage issues. In total, 240 indicators were added, resulting in a final set of 456 indicators. The category breakdown is shown in Figure 6, and the full list of indicators can be found in Appendix A.

2.3.1 Focus on the Environmental Aspect

Sustainability reports typically encompass economic, environmental, social, and governance data. While social and governance aspects are gaining relevance and wider adoption among companies, the environmental pillar remains the most prominent. Several factors contribute to this. First, climate change poses an existential threat with significant financial implications, impacting businesses, economies, and societies at large. Second, regulatory and policy pressures on environmental issues are intensifying, with stricter requirements and heightened scrutiny on corporate sustainability claims. This has pushed companies to ensure transparency and credibility in their reporting practices. Finally, consumer preferences are shifting toward eco-friendly products and services, compelling businesses to integrate sustainable practices into their operations (McKinsey & NielsenIQ, 2023). Additionally, the rise of greenwashing scandals (RepRisk, 2023) has further amplified public and regulatory demand for accountability and genuine environmental commitments (Laufer, 2003).

Given these factors, the environmental pillar is not only the most prominent but also the most scrutinized and financially consequential aspect of corporate sustainability. Organizations that fail to prioritize environmental sustainability risk falling behind in regulatory compliance, investor confidence, and consumer expectations, ultimately jeopardizing long-term competitiveness and resilience.

As illustrated in Figure 6, SGFIN SEF indicators primarily fall under the Resource Usage category, encompassing various environmental aspects, including GHG emissions, energy, water, and waste management.



SGFIN INDICATOR SELECTION

		Initial selection	Exclusion (see Section2.4.3)	After Exclusion	Expansion	Final Set of Indicators
Value Chain	Resource Usage	320	178	142	238	380
	Products	7	5	2		2
	Enviro-related Governance	7	2	5		5
Strategic Planning	Adaptability	73	32	41		41
	Future-proofing	8	1	7	2	9
	Regulatory Risks	7	3	4		4
External Evaluation	Vendor Ratings	2	1	1		1
	Compliance & Regulation	24	12	12		12
	Audit & Assessment	5	3	2		2
TOTAL		453	237	216	240	456

Figure 6: Indicators Selection Process for SEF

2.3.2 Value Chain

The environmental dimensions of a corporation's non-financial risks and opportunities are intricately linked to the natural resources and physical assets vital for its operations. These encompass factors like climate change, carbon management, resource depletion, energy consumption, water consumption, and waste management. Addressing these factors is crucial for sustainable development, with resource efficiency emerging as a pivotal strategy. By optimizing material use, minimizing waste, and implementing sustainable energy and water management practices, corporations not only reduce their environmental impact but also bolster operational resilience and cost-effectiveness, aligning with their long-term sustainability goals (International Finance Corporation, 2021).

This approach aligns with global reporting standards, such as GRI, which emphasizes the importance of identifying material topics that reflect significant economic, environmental, and social impacts, or those that substantially influence stakeholder decisions.

The value chain encompasses three key areas:

(a) **Resource usage**, tracking metrics such as GHG emissions, energy and water consumption, waste management, biodiversity impacts, and material usage. These elements collectively highlight critical areas of sustainability within the value chain.

(b) **Products/outputs**, focusing on low-carbon products and services with reduced lifecycle emissions, aligned with frameworks like the EU Taxonomy and Climate Bonds Taxonomy.

(c) **Environmental-related governance**, which includes climate-related oversight (e.g., assigning responsibilities to management or committees) and remuneration policies tied to sustainability targets, such as incentives for addressing climate issues.

2.3.3 Strategic Planning

These indicators offer insights into a corporation's ability to monitor and manage its material indicators, revealing their relevance to the corporation and the implied risks to the business. Additionally, the presence or absence of data in these indicators may provide insights into the legal environment regarding mandatory disclosures in different countries.

Strategic planning encompasses three overarching criteria, each of which is associated with specific indicators aimed at assessing corporate sustainability initiatives and challenges:

(a) Adaptability, assessing a company's capacity to address biodiversity preservation, GHG emissions reduction, and alignment with the United Nations SDGs. This includes policies like biodiversity and climate change, as well as targets such as active emissions reduction initiatives and carbon offsets. It also involves assessing whether companies acknowledge and mitigate physical climate risks.

(**b) Future-proofing**, focusing on investments in sustainable products, research, and development. Companies are evaluated on their spending in areas such as green technologies, environmental training, pollution prevention, and compliance initiatives. Indicators include patents for environmentally friendly innovations and adherence to ISO 14001 standards for environmental management systems.

(c) Regulatory risks, measuring a company's exposure to environmental penalties and incidents, such as fines paid during the reporting period and the number of hazardous material spills recorded.

Together, these criteria provide a comprehensive framework for understanding and evaluating the strategies companies employ to navigate sustainability challenges.

2.3.4 External Validation

External validation involves independent third party to assess and verify company's sustainability disclosures. This can enhance the credibility and reliability of sustainability report by ensuring that reported data are in alignment with reporting standards.

The assessment framework includes three main areas: Vendor Ratings; Audits and Assessments; and Compliance and Regulations, each with distinct indicators to evaluate environmental governance and practices.

(a) Vendor Ratings

This area examines companies' environmental controversies. Indicators assess whether organizations are embroiled in controversies related to their environmental impact and the number of such instances during the reporting year.

(b) Audits and Assessments

Third-party verification is a critical component, evaluating whether companies employ independent assessments of GHG emissions and other environmental policies. Verification standards used are also identified.

(c) Compliance and Regulations

1. Reporting: Examines adherence to frameworks such as GRI, SASB, ISSB, and TCFD.
2. Exchange Requirements: Assesses whether companies meet sustainability-related stock exchange listing requirements.
3. Government Regulations: Evaluates company engagement with climate-impacting policies at national, regional, or international levels, including carbon pricing mechanisms.
4. Supplier Environmental Evaluation: Focuses on evaluating suppliers for environmental impacts, including the number assessed and those identified with significant negative impacts.

2.4 Alignment with Existing Sustainability Data Frameworks

2.4.1 Intersections with Information Intermediaries' Data Frameworks

To minimize the risk of excluding important indicators in developing the SGFIN SEF, we conducted a thorough validation process to align our approach with industry practices. As part of this effort, we evaluated indicators commonly available on the data platforms of leading information intermediaries and ESG ratings providers. This approach allowed us to cross-reference our proposed indicators with those widely available within the ESG ecosystem, ensuring that the SGFIN SEF reflects both relevance and alignment with established industry practices. By leveraging these external benchmarks, we aimed to enhance the comprehensiveness and credibility of the evaluation framework while maintaining consistency with widely accepted practices in the industry.

Through this assessment, we found that 68 SGFIN SEF indicators align with CDP, 67 overlap with Refinitiv, and 127 correspond with Bloomberg, highlighting the framework's relevance and consistency with widely recognized sustainability reporting standards.

2.4.2 Indicator Selections and Exclusions

We summarized our indicator selection process in Figure 6. We reference various frameworks, standards, and industry data providers, four primary sources have contributed the most to the development of the SGFIN SEF, particularly in terms of the number of indicators adopted:

1. GRI (Global Reporting Initiative) – Serves as the primary reference for environmental indicators, ensuring comprehensive ESG disclosures.
2. CDSB (Climate Disclosure Standards Board) – Provides a balanced focus on both environmental and governance aspects, enhancing reporting consistency.

3. CDP (Carbon Disclosure Project) – Acts as the main reference for regulation, mitigation, adaptation, and reporting, supporting climate-related disclosures.
4. Bloomberg – Offers insights into policy, mitigation & adaptation strategies, innovation, and market developments, strengthening data-driven decision-making.

The SGFIN SEF is built upon a robust foundation of internationally recognized frameworks, standards, and industry data sources, ensuring its alignment with global best practices. As outlined, GRI, CDSB, CDP, and Bloomberg serve as key references, each contributing to different aspects of sustainability reporting. To further reinforce the framework's credibility and comprehensiveness, we conducted a validation process by cross-referencing our indicators with those used by leading ESG information intermediaries and ratings providers. The overarching structure of the SGFIN framework integrates these references into a cohesive model, ensuring that it captures material sustainability issues, enhances comparability, and supports meaningful disclosures across industries.

Based on this process, we identified an initial list of 453 indicators, aiming to be as granular and specific as possible while maintaining alignment with existing frameworks. We excluded 237 indicators for various reasons after further review. The primary rationale for exclusions was to reduce reporting complexity and deprioritize indicators considered less urgent or material. For example, we initially included total energy intensity, segmented by within or outside the organization, as recommended by GRI. However, this level of detail does not seem critical at this point, with its reporting quite sparse on the field, leading to its exclusion

3 Sustainability Reporting in Southeast Asia

Southeast Asian stock exchanges have strengthened sustainability reporting requirements, moving from voluntary guidelines to mandatory ESG disclosures. Exchanges such as SGX, Bursa Malaysia, the Stock Exchange of Thailand and The Indonesia Stock Exchange have implemented distinct reporting frameworks aligned with global standards like GRI, TCFD, and ISSB. While some exchanges emphasize financial materiality, others incorporate environmental and social dimensions, ensuring comprehensive sustainability disclosures. However, reporting rates remain low. Challenges include high data collection costs, inconsistent materiality assessments, and limited regulatory enforcement. The chapter also analyses reporting trends, showing gaps in corporate ESG disclosures across the region.

Key Takeaways

- Stock exchanges across Southeast Asia have established ESG reporting frameworks with varying levels of alignment to global standards.
- Mandatory sustainability disclosures are increasing, but reporting rates remain low
- Differences in reporting approaches exist, with some exchanges prioritizing financial materiality while others focus on broader ESG factors.
- Companies face challenges in ESG reporting due to high data collection costs, inconsistent materiality assessments, and regulatory gaps.

The Asian Financial Crisis (1997-1998) highlighted the importance of corporate governance, ethics, and social responsibility in Southeast Asia, sparking discussions on transparency and trust. The introduction of the GRI framework in 2000 led countries like Malaysia and Singapore to voluntarily adopt sustainability reporting. In 2005, the Stock Exchange of Thailand (SET) launched the Thailand Sustainability Investment (THSI) program.

As depicted in Figure 1, the 2010s saw significant growth in mandatory sustainability reporting across Southeast Asia. Malaysia's Securities Commission issued ESG guidelines in 2010, followed by Thailand's first Sustainability Reporting Guidelines in 2012. Indonesia's Financial Services Authority (OJK) introduced the Sustainable Finance Roadmap in 2014, and Singapore's SGX required sustainability reporting on a "comply or explain" basis in 2015. By 2018, Indonesia and Malaysia mandated limited sustainability disclosures for listed companies, focusing on ESG and climate risks.

In the 2020s, countries in Southeast Asia strengthened sustainability regulations in response to rising transparency demands. Thailand integrated ESG into corporate governance in 2020, while Singapore's SGX mandated climate-related disclosures aligned with TCFD guidelines in 2021. Indonesia's OJK enhanced sustainability disclosures in 2022, emphasizing climate risks and green finance.

This evolution reflects the shift from voluntary frameworks to more stringent mandatory disclosures, aligning Southeast Asia with global sustainability standards.

3.1 Sustainability Reporting Requirements in Southeast Asia

In this section, we discuss the development of sustainability reporting requirements in six Southeast Asian countries. The discussion is ordered alphabetically by country name.

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3.1.1 Indonesia Stock Exchange

Indonesia's sustainability reporting is governed by OJK Regulation No. 51/POJK.03/2017, which mandates that financial institutions, issuers, and publicly listed companies integrate sustainable finance principles into their operations. These entities must disclose their economic, social, and environmental performance through annual Sustainability Reports, either as part of the annual report or as a separate document submitted to OJK and made publicly available. The Indonesia Stock Exchange (IDX) also requires companies to maintain transparency in their environmental performance, which is crucial for their listing status.

If prepared separately, Sustainability Reports must include key elements such as a sustainability strategy, governance structure, company profile, performance metrics, and an explanation from the Board of Directors. Optional elements include independent verification, reader feedback, and responses to prior reports. Indonesia's regulatory framework underscores the importance of sustainable finance, ensuring that companies remain accountable, transparent, and compliant to

maintain their position in the financial market. For more details, please refer to Appendix C.

3.1.2 Bursa Malaysia

Bursa Malaysia's sustainability reporting requirements focus on economic, environmental, and social (EES) factors, excluding governance, which is covered under separate corporate governance regulations.

The framework aligns with GRI guidelines, with:

- Environmental themes (e.g., emissions, water, energy, biodiversity) detailed into 43 sub-indicators across 10 themes.
- Social themes (e.g., diversity, human rights, safety, anti-corruption) also detailed into 43 sub-indicators across 10 themes.
- Economic themes covered by three sub-indicators.

This sector-focused approach ensures comprehensive and industry-specific sustainability disclosures (Bursa Malaysia, 2015).

3.1.3 Philippine Stock Exchange

The Philippines Securities and Exchange Commission (SEC) mandates sustainability reporting as part of the Annual Report (SEC Form 17-A) using a standardized template. Implemented in 2019, companies may submit existing reports aligned with global frameworks or provide a link to their disclosures (Securities and Exchange Commission Philippines, 2019).

A "comply or explain" approach was used in the first three years, allowing companies to justify missing data while improving reporting processes. Reports must be material, balanced, reliable, and comparable, covering economic, environmental, and social performance, including contributions to the UN SDGs.

Key disclosure areas include:

- Economic: Financial performance, procurement, anti-corruption.
- Environmental: Resource management, biodiversity, impact, compliance.
- Social: Labor, human rights, supply chain, community, customer engagement, data security.

This structured approach aligns local regulations with global best practices, promoting transparency, accountability, and investor confidence while integrating sustainability into corporate strategies. An example of Sustainability Reporting template can be found in Appendix D.

3.1.4 Singapore Exchange (SGX)

The Singapore Exchange (SGX) has introduced Core ESG Metrics to standardize ESG disclosures, ensuring consistent and comparable reporting aligned with global frameworks. Supported by institutional investors, SGX encourages adoption while allowing issuers to tailor disclosures via materiality assessments.

SGX's sustainability reporting requirements under Listing Rules 711A and 711B mandate annual sustainability reports covering: Material ESG Factors, Policies, Practices, and Performance, Targets, Sustainability Reporting Framework, Board Statement (Listing Rules 711 A, 2022) (Listing Rules 711B, 2025).

Practice Note 7.6 offers guidance to enhance transparency and comparability. These initiatives reinforce SGX's commitment to sustainable finance, promoting accountability and investor trust.

A detailed explanation and mapping can be found in the Appendix E.

3.1.5 Stock Exchange of Thailand

Thailand's Sustainability Reporting Guide integrates national priorities and global standards, aligning with frameworks like GRI, IR, TCFD, SASB, CDP, and SDG Compass (The Stock Exchange of Thailand, 2022).

It is based on four core principles:

1. Materiality – Focus on relevant, strategic topics.
2. Clarity – Concise, accurate, and easy to understand.
3. Timeliness – Provide up-to-date sustainability progress.
4. Reliability & Comparability – Ensure accuracy and enable benchmarking.

This guide helps companies produce credible, meaningful, and globally aligned sustainability reports for stakeholders. A detailed explanation can be found in the Appendix F.

3.1.6 Ho Chi Minh and Hanoi Stock Exchanges

Vietnam has progressively strengthened its sustainability reporting framework, transitioning from voluntary guidelines to mandatory ESG disclosures for publicly listed companies. Initially, Circular 155/2015/TT-BTC encouraged sustainability-related disclosures but did not require them. In 2016, the State Securities Commission (SSC) and IFC introduced an Environmental and Social Disclosure Guide, aligning reporting practices with international standards. This guide recommended disclosures on key environmental (e.g., energy use, waste management) and social (e.g., employment policies, community engagement) factors, helping companies improve transparency and accountability.

A significant shift came in 2021 with Circular 96/2020/TT-BTC, which mandated ESG reporting as part of listed companies' annual reports. Companies must now disclose their sustainability goals, development strategies, and expanded environmental data, including total GHG emissions and GHG reduction measures. These regulations align Vietnam's corporate governance standards with global best practices, enhancing investor confidence and supporting the country's long-term environmental and social development goals. Moving forward, companies are expected to strengthen ESG strategies, improve data collection, and integrate sustainability into business decision-making.

An example of Sustainability Reporting template based on Circular 155/2015/TT-BTC can be found in Appendix F.

3.2 Manual Data Collection by SGFIN

Data collection covers current-existing sustainability reports from six Southeast Asian countries over a four-year period (2019–2022). We chose to begin with 2019 to align with the progression of sustainability reporting in the region, as illustrated in Figure 1. Notably, in 2018, Malaysia and Indonesia introduced limited mandatory sustainability reporting, marking a pivotal shift in regional disclosure practices. This timeframe allows for analysing trends and changes in sustainability practices, regulatory developments, and corporate disclosures across different economic and policy environments

3.2.1 Reporting Rates by Indicators

The reporting rate for 456 SGFIN SEF indicators were examined on the firm-year level, where a firm-year represents a single company's sustainability disclosure for a specific year. Ideally, each company should report on every indicator each year, resulting in 100% data coverage across all firm-years. However, in practice, variations in reporting completeness may occur due to differences in disclosure practices and regulatory requirements.

In general, sustainability reporting is still patchy in Southeast Asia. Table 1 highlights the low reporting rates across six countries, showing that half (230) of the total indicators have a reporting rate above zero but below 5% of total firm-years. Additionally, approximately a quarter (119) of the total indicators are not reported at all. Table 2 documents indicators with non-zero reporting rates, but still very low reporting rates (<1%). One example is the reporting of GHG emissions by gas type. According to the GHG Protocol (World Resource Institute & World Business Council for Sustainable Development, 2004), there are seven recognized types of greenhouse gases: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF_6), and nitrogen trifluoride (NF_3). These gases are commonly measured in metric tons of carbon dioxide equivalent (tCO_2e) to standardize their climate impact.

Table 1: Reporting Rates for SEF Indicators in Southeast Asia

Reporting Rates by SEF Indicators		
Indicators NOT Reported in any firm-years	**119**	***26%***
(0.1 - 5) % of firm-year	**230**	***50%***
(5.1 - 10) %	49	*11%*
(10.1 - 20) %	31	*7%*
(20.1 - 50) %	16	*4%*
(50.1 - 100) %	11	*2%*
TOTAL Indicators	**456**	

However, the gases differ significantly in their nature and behaviour. For instance, methane is approximately 200 times less abundant in the atmosphere than CO_2 and has an average atmospheric lifetime of about a decade, compared to centuries for

CO_2. Despite its shorter lifespan, methane has a much higher global warming potential (GWP) over a 20-year timeframe, underscoring the importance of reporting emissions by gas type. Providing detailed information about each type of gas is crucial for enabling companies to develop effective strategies and risk management practices to reduce emissions.

Table 2: SEF Indicators with Low Reporting Rates in Southeast Asia

SEF Indicators	Southeast Asia Disclosure %
Emissions	
Carbon Dioxide (CO_2) Emissions, Total (tCO_2)	0.66%
Carbon Dioxide (CO_2) Scope 1 (tCO_2)	0.20%
Methane (CH_4) Emissions in CO_2e, Total (tCO_2e)	0.66%
Methane (CH_4) Scope 1 in CO_2e (tCO_2e)	0.51%
Nitrous Oxide (N_2O) Emissions in CO_2e, Total (tCO_2e)	0.66%
Nitrous Oxide (N_2O) Scope 1 in CO_2e (tCO_2e)	0.30%
Fluorinated GHGs in CO_2e, Total (tCO_2e)	0.23%
Fluorinated GHGs Scope 1 in CO_2e (tCO_2e)	0.00%
Scope 3 Other (Upstream) Significant Air Emissions (tCO_2e)	0.25%
Scope 3 Other (Downstream) Significant Air Emissions (tCO_2e)	0.28%
Carbon Offsets/Credits Purchase, Amount (tCO_2e)	0.69%
Carbon Offsets/Credits Purchase, Limit (Percentage)	0.00%
Absolute Emissions Reductions: Scope 1, Baseline (tCO_2e)	0.94%
Absolute Emissions Reductions: Scope 3, Baseline (tCO_2e)	0.53%
Emissions Intensity Reductions:Scope 3, Intensity Figure in Base Year	0.00%
Energy	
Fuel Use, Natural Gas (kg)	0.53%
Fuel Use, Crude Oil (m^3)	0.41%
Heating, Cooling, and Steam Use, Renewable (GJ)	0.25%
Heating, Cooling, and Steam Use, Non-Renewable (GJ)	0.15%
Heating, Cooling, and Steam Produced (GJ)	0.14%
Heating, Cooling, and Steam Sold (GJ)	0.83%
Heating, Cooling, and Steam Intensity, Total	0.31%
Renewable Energy Certificates Purchased (MWh)	0.97%
Energy Consumption Reductions, Baseline (Gigajoules (GJ))	0.78%
Energy Consumption Reductions, Base Year (Year)	0.94%
Land and Biodiversity	
Land Disturbed (Hectares)	0.73%

Water	
Water Discharge: Water Stress Area (m^3)	0.58%
Change in Water Storage (ML)	0.10%
Others	
Green Patent (Y/N)	0.47%
Spills in Volume, Amount (Thousands of barrels)	0.67%
Spills in Tonnes, Amount (Metric tons (tonnes))	0.36%
Recent Environmental Controversies (Y/N)	0.42%
ISSB Compliance (Y/N)	0.33%
Emissions Trading Scheme Involvement (Y/N)	0.28%
EU Emissions Trading Scheme Involvement (Y/N)	0.08%

3.2.2 Reporting Rates by SEF Categories

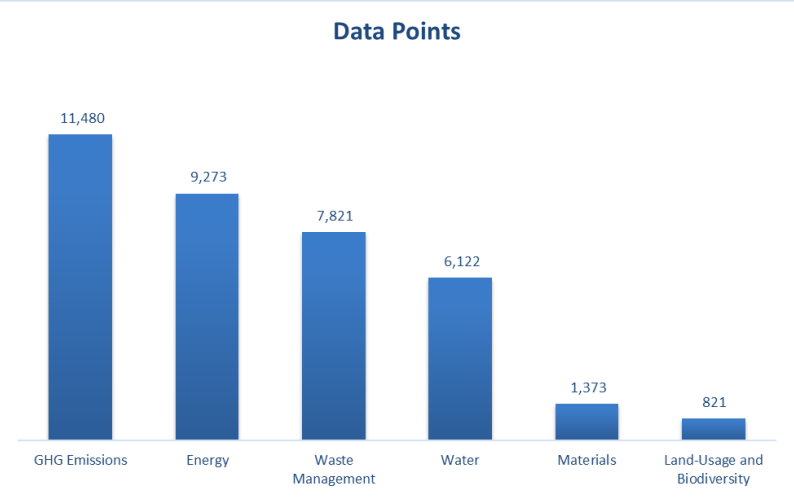

Figure 7: Available Data Points

As shown in Figure 7 above, GHG emissions contributed the highest number of data points (11,480), followed by Energy (9,273) and Waste Management (7,821). However, due to the large number of GHG-related indicators (156 in total), the non-missing data represents only 1.86% of the full disclosure scenario, where idealistically in each of the 3950 reports, all 156 GHG-related indicators are reported (Total N = 156 x 3,950 = 616,200). In contrast, Waste Management has the highest reporting rate among environmental categories at 5.35%, attributed to the smaller number of indicators. Table 3 below presents the reporting rates across six environmental categories.

Table 3: Reporting Rate by Environmental Categories

Categories	Count of Indicators	Total firm-reports	Total N	Data Points	Reporting Rate
GHG Emissions	156	3,950	616,200	11,480	**1.86%**
Energy	106	3,950	418,700	9,273	2.21%
Waste Management	37	3,950	146,150	7,821	**5.35%**
Water	37	3,950	146,150	6,122	4.19%
Materials	11	3,950	43,450	1,373	3.16%
Land-Usage and Biodiversity	10	3,950	39,500	821	2.08%

3.3 Why Are Reporting Rates So Low in Southeast Asia?

A critical reason for low sustainability reporting rates is the high cost of data collection and disclosure. Companies face a trade-off: allocate resources to ensure more reliable ESG data reporting at a significant cost or minimize spending, potentially compromising data reliability. Another potential consideration factor is the difference in materiality significance. Unlike financial materiality, sustainability reporting (SR) materiality is less strictly regulated, leading some companies to forgo disclosure if they deem ESG data immaterial.

This challenge is particularly critical for GHG emissions reporting, where companies often focus on broader categories rather than detailed breakdowns. Several factors contribute to the low reporting rates of GHG emissions by gas type:

1. Focus on Carbon Dioxide: Companies often prioritize Scope 1 and Scope 2 Carbon Dioxide reporting because it is the most abundant GHG and typically constitutes the largest share of emissions.
2. Measurement Challenges: Measuring non-CO_2 gases is more complex. For example, methane emissions can arise from diverse sources such as fugitive emissions from oil and gas operations, agriculture, and landfills, making accurate quantification difficult.
3. Limited Regulatory Requirements: Governments often mandate reporting primarily for CO_2, while requirements for methane and other gases are less common or less stringent. This results in lower incentives for companies to track and disclose these emissions.

4 New Reporting Standard: IFRS S2

IFRS S2 extends IFRS's global influence—adopted by over 140 jurisdictions—into climate-related disclosures, building on TCFD while introducing 76% new or expanded cross-industry requirements in areas such as scenario analysis, Scope 3 emissions, and transition planning. Effectively merging sustainability and financial reporting, it aims to standardize how companies identify and disclose climate risks and opportunities. IFRS S2 addresses concerns about compliance costs by incorporating proportionality mechanisms and focuses on adoption over expansion, encouraging firms to use readily available data and concentrate on concrete implementation before broader ESG coverage.

Key Takeaways

- IFRS S2 builds on TCFD but adds 76% new or expanded disclosures
- 30 jurisdictions covering 57% of global GDP plan to adopt ISSB standards
- Companies meet only 23% of the additional requirements in S2, with the gap lies wider in Metrics and Targets
- Proportionality mechanisms are introduced in S2 to help manage compliance burdens for resource-constrained firms
- At current stage S2 emphasizes adoption over expansion, encouraging immediate climate-focused reporting before broadening ESG indicator coverage

4.1 About IFRS (International Financial Reporting Standards)

In contrast to the mature financial reporting landscape, the sustainability reporting landscape is significantly more fragmented, with multiple frameworks and standards in use by different stakeholders. Examples include the GRI, GHG Protocol, CDP, and TCFD, as discussed in the previous chapter. This fragmentation, combined with the absence of globally standardized reporting requirements, has fuelled strong industry demand for consolidation.

The IFRS Foundation, a non-profit organization established in 2001, aims to develop high-quality, understandable, enforceable, and globally accepted accounting and sustainability disclosure standards. Among its notable achievements is the creation of the IFRS Accounting Standards through the International Accounting Standard Board (IASB). These standards are now adopted by over 140 jurisdictions, making them the most widely accepted accounting standards globally. This widespread recognition positions IFRS well to address the challenges of sustainability reporting.

In 2021, the IFRS Foundation established the International Sustainability Standards Board (ISSB) to work alongside the IASB. Building on the IASB's success in establishing the global accounting standard, the ISSB was tasked with developing standards to provide comparable and decision-useful information. A key objective of the ISSB is to unify the fragmented sustainability reporting landscape by leveraging the groundwork laid by various voluntary initiatives. These include the CDSB, the TCFD, the Value Reporting Foundation's Integrated Reporting Framework, the industry-specific SASB Standards, and the World Economic Forum's Stakeholder Capitalism Metrics.

The ISSB also collaborates with GRI, an organization offering sustainability standards for a broader range of stakeholders. This partnership seeks to harmonize ISSB's investor-focused sustainability disclosures, designed for capital market needs, with GRI's broader stakeholder-oriented framework. In 2022, the IFRS Foundation and GRI formalized their collaboration through a Memorandum of Understanding to enhance interoperability and streamline sustainability reporting efforts.

4.2 About S1 and S2

In June 2023, ISSB launched its inaugural standards, IFRS S1 General Requirements for Disclosure of Sustainability-related Financial Information (IFRS S1) and IFRS S2 Climate-related Disclosures (IFRS S2). Both IFRS S1 and IFRS S2 are effective for annual reporting periods beginning on or after 1 January 2024. It is expected to see disclosures in alignment with IFRS Standards starting from 2025.

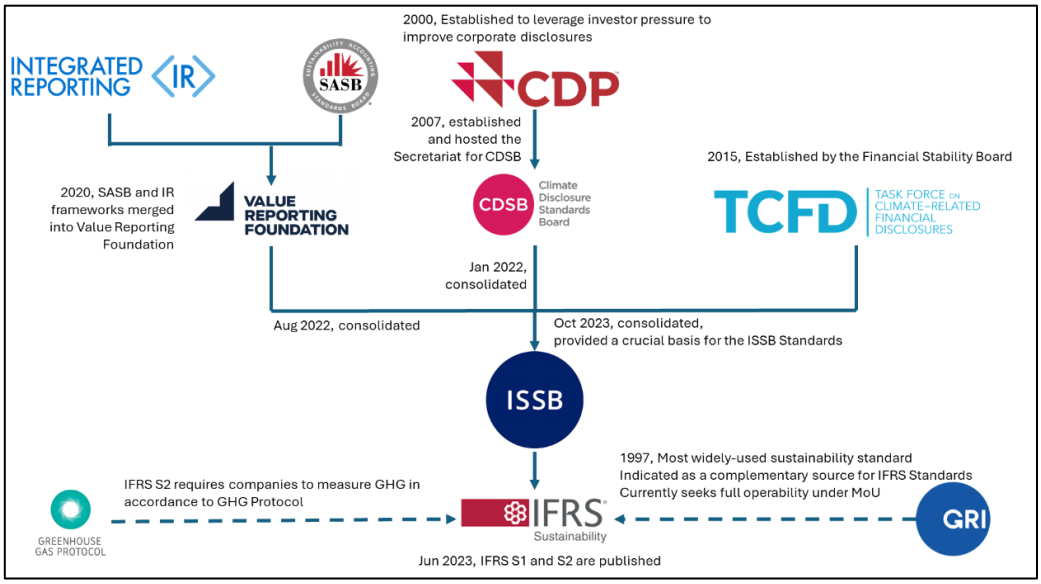

Figure 8: IFRS S1 & S2

(Recreated by Authors – Original sources:(BloombergNEF, 2023), (International Finance Corporation, 2024), (International Sustainability Standards Board, 2023b))

IFRS S1 establishes disclosure requirements for companies to inform investors about sustainability-related risks and opportunities. It is structured around the TCFD's four core elements: governance, strategy, risk management, and metrics and targets. It also mandates industry-specific information. Building upon IFRS S1, IFRS S2 focuses specifically on climate-related disclosures, fully integrating the TCFD recommendations to provide detailed guidance on reporting climate-related risks and opportunities. ISSB stipulates that a company is required to apply IFRS S1 and S2 together. The detailed comparison is listed in the table below.

Table 4: IFRS S1 and S2 Comparison

Aspect	IFRS S1	IFRS S2
Structure	Broad, principles-based disclosure standards for sustainability reporting.	Detailed, topic-specific guidance focused on climate-related disclosures.
Focus	Setting out overarching sustainability-related disclosure requirements, such as definitions of materiality, requirements on location and timing of reporting and guidance on reporting changes in estimates and errors.	Specific focus on Climate-related physical and transition risks and climate-related opportunities available to the entity.
Industry Specific Disclosures	Requires a company to consider the industry-based SASB Standards for topics beyond climate	Requires a company to disclose industry-specific climate-related information. Detailed illustrative guidance are provided, as covered in "Appendix B: Industry-based Guidance on Implementing IFRS S2"

Metrics	NA	Sets out metrics and targets requirements including: Cross-industry metrics categories; Industry-based metrics; Climate-related targets

Source: (International Sustainability Standards Board, 2023b),(International Sustainability Standards Board, 2023a))

IFRS S1 and S2 are designed to harmonize sustainability disclosures across various jurisdictions, providing a unified framework that enhances comparability for global investors and interoperability for multinational corporations. Mirroring the established IFRS Accounting Standards, these standards prioritize consistency, completeness, and comparability over different investment horizons, thereby meeting investor needs for comparability, reliability, and informed decision-making. They emphasize cost-efficient reporting by focusing on material aspects that impact financial performance and long-term value creation, ensuring that disclosures are decision-useful without imposing unnecessary burdens on companies. By consolidating pre-existing standards and frameworks widely used in the industry, IFRS S1 and S2 streamline the reporting process for companies already engaged in sustainability reporting, facilitating a smoother transition to the new standards.

4.3 Alignment of IFRS S2 with TCFD

IFRS S2 builds on the foundation laid by the TCFD (Task Force on Climate-related Financial Disclosures). Established in 2017, the TCFD has significantly shaped the global voluntary climate reporting landscape. By 2022, 58% of the large public companies surveyed by TCFD disclosed in alignment with at least five of the 11 recommended disclosures, a notable increase from 18% in 2020(Task Force on Climate-related Financial Disclosures, 2023). As of 2024, 78% of companies on the S&P 500, 82% on the STOXX 600 and 98% on FTSE 100 provide climate disclosures informed by TCFD framework (Mckeeman & Erica, 2024).

Despite these advancements, substantial challenges remain in climate-related reporting. A 2022 TCFD survey identified insufficient information from investee companies as the primary obstacle cited by asset managers and asset owners (Mckeeman & Erica, 2024). Research conducted by O'Dwyer and Unerman (2020) also identified insufficient incorporation of materiality into risk management process, difficulty in understanding and adopting climate-based scenario analysis, and inconsistency with other pre-existing frameworks as some of the key challenges of TCFD. These challenges highlight the necessity of evolving from a broad, voluntary framework to one that offers more granular, practical guidance and standardized disclosures. The framework must not only enhance granularity but also ensure interoperability, enabling global investors to efficiently integrate climate-related data into their decision-making processes while managing associated costs.

With the TCFD having fulfilled its mandate, it was disbanded in 2023, and its responsibilities were transferred to the IFRS Foundation. IFRS S2 fully integrates and aligns with the TCFD's four core recommendations (governance, strategy, risk management, and metrics and targets) and 11 supporting recommended

disclosures. However, IFRS S2 introduces enhancements and new requirements that differentiate it from the TCFD framework, particularly in cross-industry and industry-specific guidance. The key differences in IFRS S2 from TCFD are (IFRS Sustainability, 2024):

1)Inclusion of additional requirements and guidance that are in line with the TCFD recommendations but not captured in existing TCFD guidance

2)Requirement of more detailed disclosure that is in line with the 11 TCFD recommendations

TCFD recommendations, recommended disclosures and guidance	IFRS S2
Recommended disclosure c) Describe the resilience of the company's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.	IFRS S2 is broadly consistent with recommended disclosure c). **However, IFRS S2 does not specify particular scenarios for a company to use in its climate-related scenario analysis.**[a] IFRS S2 requires a company to provide **additional information** regarding its resilience on: • significant areas of uncertainty the company has considered in its assessment; • the company's capacity to adjust and adapt its strategy and business model over time; and • how and when the company has carried out its climate-related scenario analysis. IFRS S2 provides that a company carrying out climate-related scenario analysis **use an approach that is commensurate with the company's circumstances and consider all reasonable and supportable information that is available at the reporting date without undue cost or effort.**

Figure 9: Recommended disclosure c of TCFD

(Source: (IFRS Sustainability, 2024))

* Red bold text indicates case 1; black bold text indicates case 2

Although IFRS S2 have the same recommended disclosures under the same four pillars as TCFD, the IFRS S2 captures significant advancements in the guidance details. According to research done by ISS-Corporate, over 76% of the cross-industry disclosure requirements advances from TCFD, among which 50% additional requirements to TCFD (Mckeeman & Erica, 2024). Most of the new requirements come from metrics and targets.

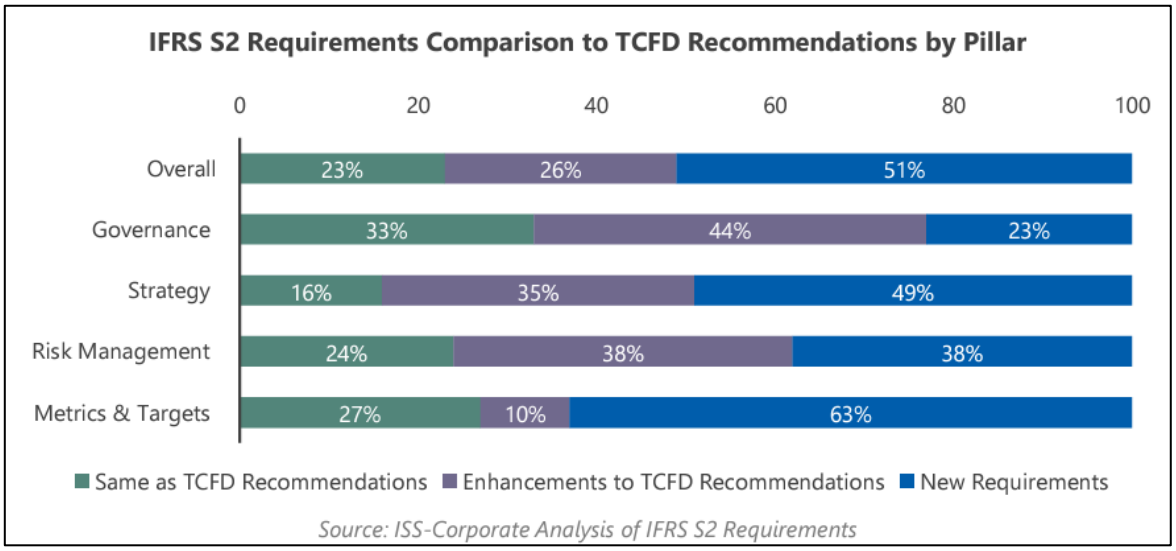

Figure 10: IFRS Requirements Comparison to TCFD

In reviewing the TCFD Recommendations and S2 requirements, we observe the following examples of new disclosure requirements in S2:

Governance:

- How climate is reflected in the mandates
- The Board's understanding of the trade-off between risk and opportunities

Strategy:

- Requirement for a company to consider and refer to its industry-based guidance
- Transition plan in response to scenario analysis in the short, medium and long term
- The effect of such transition plans
- The source of funding to manage climate-related risks

Risk Management:

- Whether and how scenario analysis is used
- How the nature, likelihood and magnitude of the effects of climate-related risks are assessed

Metrics and Targets:

- Additional details on GHG emission data, such as any change made to the measurement approach; and requirement to disaggregate emissions between the consolidated accounting group and associates, joint ventures and unconsolidated subsidiaries
- The amount and percentage of assets or business activities vulnerable to climate-related risks, or aligned with climate-related opportunities
- The planned use of carbon credit to achieve any emission target

IFRS S2 builds upon the pillars and recommendations of the TCFD by introducing enhanced requirements and more specific guidance, representing a significant step forward in facilitating efficient and effective climate-related financial disclosures. However, market adaptation to this new standard will require time and effort. To bridge this gap, it is essential for IFRS S2 to collaborate closely with diverse jurisdictions and industries, fostering alignment and ensuring the framework's successful implementation.

Looking at the existing adoption, early research by ACCA and the University of Glasgow on the IFRS S2 Exposure Draft (ED IFRS S2) provides valuable insights into companies' readiness to adopt the standard. The study analysed the disclosures of the 50 largest GHG-emitting companies in the global chemical and construction industries, benchmarking them against the ED IFRS S2 requirements.

The findings reveal that companies are moderately prepared for IFRS S2, primarily due to their existing alignment with TCFD recommendations. However, compliance with the additional requirements in ED IFRS S2 is significantly lower. On average, current disclosures cover only 23% of the new items introduced in ED IFRS S2, compared to 56% of TCFD-related items. Among the four pillars, companies demonstrate the highest level of adherence in Governance (Baboukardos et al., 2022). This aligns with ISS Corporation's findings, which indicate that Governance includes the fewest new

requirements beyond TCFD. Conversely, in Metrics and Targets—identified by ISS Corporation as having the largest proportion of new requirements—companies perform poorly (Mckeeman & Erica, 2024). The sample companies report on only 12% of items related to climate-related financial position, performance, and cash flows (Baboukardos et al., 2022).

4.4 Progress of S2 Implementation

According to the ISSB 2024-2026 work plan covered in Feedback Statement, Consultation on Agenda Priorities, "supporting the implementation of IFRS S1 and IFRS S2" is ISSB's top priority. Given the finite capacity, ISSB will assign high, but slightly lower focus on enhancing the scope of reporting. This will receive equal attention from both enhancing industry-based standards derived from SASB standards and researching for new areas such as biodiversity and human capital. The work plan suggests that ISSB focus on adoption by jurisdictions and exchanges rather than expansion of material indicators to report.

As the ISSB Standards were recently released, representing a significant advancement over the TCFD Standards, companies require more time to adapt, particularly as local legislation is still evolving to support adoption. According to IFRS's research, between October 2023 to March 2024, 1,151 companies worldwide have shown recognition of ISSB Standards (IFRS Foundation, 2024). However, further efforts are needed to enhance awareness and convert recognition into concrete implementation plans and actions.

We recognize on the corporate level, some sustainability leaders are already working towards the adoption. For example, UOB Bank declared that IFRS S2 Standards were referenced during the preparation for their 2023 Sustainability report. The board has also received training on the upcoming sustainability reporting expectations and requirements including the ISSB Standards (UOB, 2024). Keppel, a leading infrastructure and real estate company in Singapore, is also studying the new ISSB Standards and consider how they can be incorporated into sustainability reporting(Keppel, 2024).

At the legislative level, in Southeast Asia, Singapore and Malaysia have been among the earliest adopters of the new ISSB Standards. Malaysia and Singapore initiated public consultations on the adoption of ISSB Standards in February and March 2024, respectively, and both countries announced their adoption plans in September 2024. Further details are provided Table 5.

As of December 2024, Thailand has concluded its public consultation on ISSB Standards adoption. It has proposed that the earliest mandatory adoption starts from 2026, for the companies listed in the SET50 group. The Philippines and Indonesia have also expressed their commitment to adopting the standards, though neither has provided a clear timeline. At the time of this report, there have been no updates on adoption progress in Vietnam, Cambodia, Myanmar, or Laos.

On the global scale, thirty jurisdictions are working to integrate ISSB Standards into their legal or regulatory frameworks. Together, these jurisdictions account for 57% of global

GDP, 40% of global market capitalization, and over half of worldwide GHG emissions (IFRS Foundation, 2024).

Table 5: Adoption of IFRS Sustainability Disclosures Standards

Jurisdiction	Status of implementation	Comment period expiration date	Adoption approach	Earliest mandatory reporting effective date	Scope of entities	Assurance requirements	Reference
Indonesia	Commitment	31-Mar-25	Local standards based on ISSB Standards	1-Jan-27	Unknown	Voluntary	Link
Malaysia	Finalised	21-Mar-24	Adoption of ISSB standards	1-Jan-25	Main Market listed issuers; ACE Market listed issuers; large non-listed companies with revenue of RM2bn and above	At least limited assurance	Link
Philippines	Comment Paper Review	30-Apr-24	Unknown	Unknown	Unknown	N/A	Link
Singapore	Finalised	5-Apr-24	Local standards based on ISSB Standards	1-Jan-25	Listed companies and potentially large non-listed companies	Limited assurance	Link
Thailand	Comment Paper Review	19-Dec-24	Adoption of ISSB standards	1-Jan-26	SET, MAI, REIT, IFF and Infra Trust and Property Fund registrants	Limited assurance on GHG emissions	Link

Updated by authors, original source: (Deloitte, 2024)

4.5 Feedback and Actions of Stakeholders in Southeast Asia

As reports issued under IFRS S2 will only become available in 2025, feedback on their implementation can only be collected later. However, insights from the exposure draft phase provide valuable indications of anticipated responses.

Based on more than 1,400 comments letters that IFRS gathered from stakeholders such as companies, investors, policy makers and the academia, there seems to be a strong support from the industry on the introduction of ISSB Standards as a global baseline for

sustainability-related financial disclosure. There also seems to be a general agreement on IFRS S2 requirements.

Nonetheless, one key concern raised was that resource-constrained companies might face challenges conducting extensive searches for information without incurring substantial costs or effort. As highlighted earlier in Section 3.3, IFRS S2 represents a significant advancement from TCFD. This issue was particularly relevant for disclosures on climate-related risks and opportunities (IFRS S2 part 11), financial position, performance, and cash flows (IFRS S2 part 18), climate-related metrics (IFRS S2 part 30), scenario analysis (IFRS S2 part B1), and Scope 3 emissions (IFRS S2 part B36). Most of these items fall under the "Strategy" and "Risk Management" pillars, which, as we discussed earlier, saw the highest percentage of changes during the development of S2.

To address these challenges and facilitate adoption, IFRS S2 introduced proportionality mechanisms that balance practicality for companies with the broader impact of reporting. These mechanisms require companies to use "all reasonable and supportable information that is available at the reporting date without undue cost or effort" when making disclosures. Similar proportionality measures were also integrated into ISSB Accounting Standards, which is the most widely adopted accounting standard worldwide. A key interpretation of this requirement suggests that companies are encouraged to rely on readily available information at the time of reporting, rather than undertaking exhaustive efforts to gather additional data(IFRS Foundation, 2023).

While some stakeholders expressed concerns about the complexity of reporting certain items in S2, they also acknowledged the potential need to expand its scope to cover broader sustainability-related issues. The latter point is made more salient in the public responses and consultations in jurisdictions with more advanced sustainability reporting.

For example, in March 2024, Singapore's SGX conducted public consultations on the adoption of IFRS S2. The feedback led SGX to "encourage the use of the Sustainability Disclosure Standards beyond climate-related disclosures" while not "mandate it at this stage" (SGX RegCo, 2024b). SGX proposes the future inclusion of topics beyond the current climate-related focus, such as biodiversity and human capital (SGX RegCo, 2024a). These topics reflect a double materiality perspective, which is absent from S2's single materiality approach.

Additionally, Singapore Exchange Regulation (SGX RegCo) and the Accounting and Corporate Regulatory Authority (ACRA) jointly recommended in a comment letter to ISSB that ISSB should provide more detailed guidance on areas like energy and water measurement, in alignment with ISO Standards such as ISO14046 Water Footprint and ISO50001 Energy Management (SGX RegCo & ACRA, 2022), where specific indicators such as "water use", "water withdrawal" are provided (ISO, 2014). Notably, while S2 includes specific metrics and guidance for measuring GHG emissions, other environmental impacts are broadly categorized under climate-related risks and opportunities. For example, water related reporting was only mentioned under climate-related "physical risk" definition, as "reduced water availability". There was no guidance provided on how "reduced water availability" should be measured under the S2 Standard.

For the case of Malaysia, Bursa Malaysia expands its reporting requirements beyond the S2 requirements. Malaysian-listed companies are required to report on an additional list of metrics to complement S2, under Annex PN9-A "Common Sustainability Matters". Sustainability matters under PN9-A are deemed as material and the disclosure "is required in the Sustainability Statement even though the ISSB Standards may not necessitate the disclosure" (part 12.4, (Bursa Malaysia, 2024). This is to ensure "comparability of key information across listed issuers through the common sustainability matters" (part 9.4). As illustrated in Table 6, S2's coverage on the PN9-A items is limited, with only a few required under the industry guidance for several industries.

In summary, while IFRS S2 represents a significant step forward in establishing a global baseline for sustainability-related financial disclosures, its implementation presents challenges, particularly for companies that are relatively new to sustainability reporting. Stakeholders broadly support its introduction, but concerns remain about the complexity and costs of certain reporting requirements, such as Scope 3 emissions measurement and climate-related scenario analysis to assess climate resilience. Proportionality mechanisms have been introduced to address these issues, balancing practicality with reporting rigor. However, feedback from jurisdictions like Singapore and Malaysia highlight potential gaps in guidance for broader environmental and social topics, suggesting opportunities for ISSB to expand S2's scope and integrate double materiality perspectives in the future.

As illustrated in Table 6, items covered under IFRS S2 (red) and S2 Industry Guidance (green) were highlighted by authors. Other items in regular font are not covered in IFRS S2.

Table 6: Climate-related Disclosure Items under Annex PN9-A

Common Sustainability Matters	Indicators included in Annex PN9-A "Common Sustainability Matters" (Bursa Malaysia)	Inclusion in SGFIN SEF (Y/N)
Energy management	Total energy consumption	Y
Water	Total volume of water used	Y
Waste management	Total waste generated, and a breakdown of the following:	Y
	a) total waste diverted from disposal	Y
	b) total waste directed to disposal	Y
Emissions management	Scope 1 emissions in tonnes of CO2e	Y
	Scope 2 emissions in tonnes of CO2e	Y
	Scope 3 emissions in tonnes of CO2e (at least for the categories of business travel and employee commuting)	Y

5 Harmonization of SGFIN SEF and IFRS S2

IFRS S2, which draws on the TCFD framework, mandates 35 climate-related disclosures spanning Governance, Strategy, Risk Management, and Metrics & Targets. SGFIN SEF aligns well with the quantitative aspects of IFRS S2—covering 67% of its metrics and targets section. GHG emissions reporting emerges as a central emphasis of both frameworks. Country-level sustainability reporting practices vary widely across Southeast Asia, influenced by differences in regulatory requirements, oversight mechanisms, and the extent of mandatory versus voluntary disclosures. By addressing the need for both general information and granular industry-specific data, the SGFIN SEF is aligned with both IFRS S2 Standard and Industry Guidance, ensuring a balanced and comprehensive approach to sustainability reporting.

Key Takeaways:

- IFRS S2, based on the TCFD framework, mandates 35 climate-related disclosures across Governance, Strategy, Risk Management, and Metrics & Targets.
- SGFIN SEF aligns well with the quantitative aspects of IFRS S2, covering 67% of its Metrics & Targets section, with a strong emphasis on GHG emissions reporting.
- SGFIN SEF is aligned with both IFRS S2 Standard and Industry Guidance for a comprehensive approach to sustainability reporting.

5.1 IFRS S2 Coverage

IFRS S2 Standard Coverage (or General Coverage), which aligns with the TCFD framework, outlines 35 disclosures across four sections. Among these, the Strategy section holds a pivotal role, requiring 14 disclosures. These range from climate-related risks and opportunities to climate resilience. The Metrics and Targets section is also significant, with 11 disclosures. In addition to Standard Coverage, IFRS S2 provides industry-specific guidance, offering 318 indicators across 11 sectors and 68 industries.

Figure 11 presents the alignment between SGFIN SEF indicators, S2 Standard, and S2 Industry-Specific Indicators.

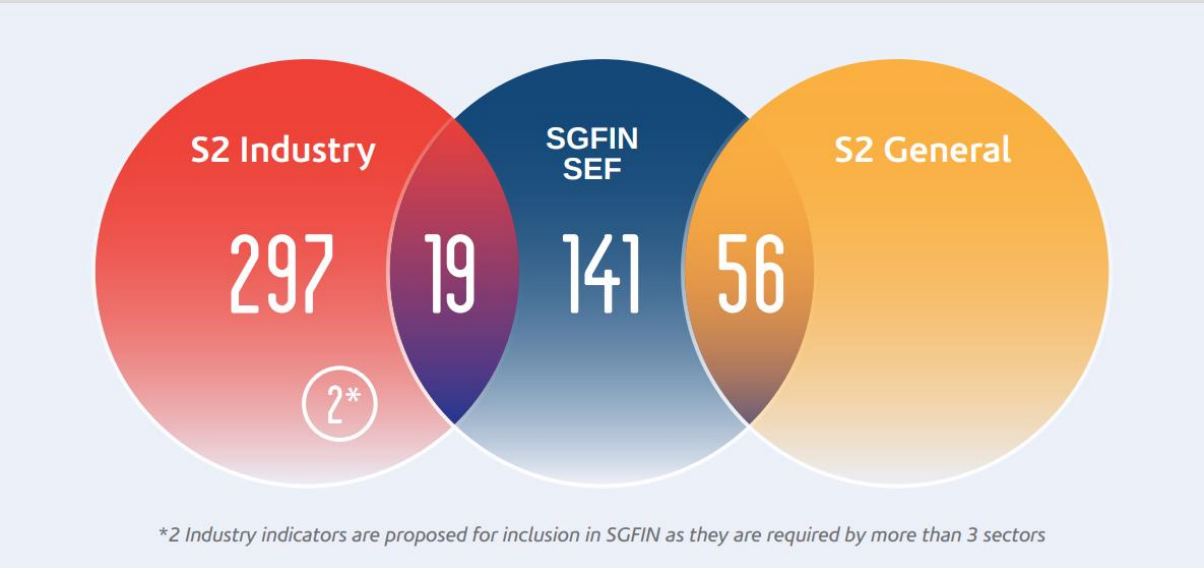

Figure 11: SGFIN SEF- S2 Composition

As depicted in Figure 12, the SGFIN SEF covers 67% of the Metrics & Targets section of IFRS S2, consistent with our primary focus on quantitative data collection from corporate Sustainability Reports. In contrast, the coverages of the other three pillars of S2 are much weaker, with Governance coverage of 30%, Strategy coverage of 11%, and practically no coverage of Risk Management pillar.

Although Strategy and Risk Management disclosures are central to the TCFD framework, several challenges exist. These disclosures are inherently forward-looking, requiring thoughtful articulation of long-term planning, risk assessments, and strategic responses. Due to their reliance on judgment and subjectivity, they are difficult to benchmark against peers, reducing comparability.

Additionally, unlike static data such as metrics and targets, risk exposure and strategic planning are dynamic, constantly evolving in response to market conditions, regulatory changes, and emerging risks. This fluid nature makes it harder to define and standardize forward-looking disclosures.

For these reasons, we have chosen to place greater emphasis on metrics and targets, which are more quantifiable, objective, and comparable, ensuring clearer and more actionable sustainability assessments.

We identified 56 indicators that overlap between IFRS S2 Standard Coverage and SGFIN SEF Coverage, with the majority (50) falling under the Metrics and Targets

category. Of the remaining 6 indicators, three indicators pertain to Governance and three fall under the Strategy pillar. Governance-related indicators are Biodiversity Oversight (Y/N), Sustainability Oversight (Y/N), and Sustainability Oversight, Competence, whereas Strategy-related indicators are Physical Risk (Y/N), Physical Risk (Detail), Environmental Fines (Amount).

Figure 12: SGFIN SEF Coverage of S2 Standard indicators

It is important to highlight the substantial emphasis that IFRS S2 Standard Coverage places on GHG emissions reporting within its Metrics and Targets section. This focus aligns with existing reporting trends in Southeast Asia as shown in Table 7, where GHG emissions have the most comprehensive data coverage among environmental resource usage categories. The detailed attention to GHG emissions is not only reflective of the region's efforts to meet climate targets but also speaks to the increasing regulatory and investor demand for transparency in carbon-related risks.

The alignment between IFRS S2 and existing corporate reporting in Southeast Asia may ease the immediate reporting and disclosure transition for these companies, as they likely already have established processes for tracking and reporting GHG emissions. However, IFRS S2 also introduces more stringent and standardized requirements, compelling companies to enhance the accuracy and comparability of their emissions data. This supports the broader goal of integrated reporting by ensuring that critical climate-related risks are given due weight in financial disclosures.

Furthermore, by setting clear expectations for GHG reporting, IFRS S2 not only promotes accountability but also tries to incentivize companies to develop more proactive carbon reduction strategies, positioning them better to meet future regulatory changes and shifting stakeholder expectations.

5.2 Existing IFRS S2-Aligned Reporting in Southeast Asia

We collected data from 1,045 publicly listed companies across six major Southeast Asian countries over a four-year period (FY 2019 to FY 2022) to evaluate the existing alignment of sustainability reporting in Southeast Asia with IFRS S2. Our dataset includes more than 100 companies per country, except for Vietnam, where only 60 companies were covered.

While most SGFIN SEF indicators consist of quantitative environmental data, fifteen (15) qualitative inputs are also included. Generally, these qualitative indicators fall into two distinct categories. The first category is Yes/No (Y/N) queries, typically used to assess policy, strategy, risk management, and governance. The second category incorporates open-ended questions to capture a broader range of relevant inputs.

Table 7: Existing Reporting Rates on IFRS S2 Standard Indicators

Indicators	Type	Indonesia	%	Malaysia	%	Philippine	%	Singapore	%	Thailand	%	Vietnam	%	TOTAL	%
GHG-related Indicators															
GHG, Total	Quantitative	339	62%	358	67%	497	43%	570	**73%**	365	66%	39	10%	**2,168**	**55%**
GHG Scope 2 Location-Based	Quantitative	279	51%	361	68%	550	48%	508	65%	369	67%	29	7%	**2,096**	**53%**
GHG Scope 1	Quantitative	297	55%	350	66%	542	47%	463	60%	353	64%	22	6%	**2,027**	**51%**
GHG Scope 3	Quantitative	75	14%	178	33%	96	**8%**	186	24%	238	43%	7	2%	**780**	**20%**
Emissions Target, Active (Y/N)	Y/N	72	13%	186	35%	46	4%	181	16%	247	44%	2	1%	**734**	**18%**
Net Zero Target, Active (Y/N)	Y/N	41	8%	119	22%	66	6%	67	6%	76	14%	2	1%	**371**	**9%**
Carbon Offsets/Credits Origination (Y/N)	Y/N	2	0%	17	3%	26	2%	3	0%	38	7%	0	0%	**86**	**2%**
Carbon Offsets/Credits Purchase (Y/N)	Y/N	2	0%	8	2%	10	1%	15	1%	11	2%	0	0%	**46**	**1%**
Other Indicators															
Sustainable Investment/Expenditures	Quantitative	317	58%	308	58%	704	61%	37	3%	200	36%	30	13%	**1,596**	**38%**
Sustainability Oversight (Y/N)	Y/N	167	31%	304	57%	230	20%	411	36%	312	56%	4	2%	**1,428**	**34%**
Physical Risk (Y/N)	Y/N	131	24%	190	36%	455	40%	175	15%	160	29%	32	13%	**1,143**	**27%**
Third-Party Verification (Y/N)	Y/N	83	15%	110	21%	54	5%	78	7%	160	29%	4	2%	**489**	**12%**
Internal Carbon Pricing (Y/N)	Y/N	1	0%	7	1%					4	1%			**12**	**0%**

To identify Y/N responses, specific critical keywords are used. Below are examples of keywords associated with respective indicators:

- Sustainability Oversight: Sustainability Committee, Sustainability Officer, Sustainability Team, Steering Committee, Sustainability Task Force, ESG Team, Environmental Committee, Sustainability Council, Sustainability Structure.
- Physical Risk: Physical Risk, Flood, Fires, Extreme Weather, Drought, Sea Level Rise, Extreme Temperature, Storm, Cyclone, Hurricane.
- Third-Party Verification: External Assurance, Externally Assured, External Verification, Third-Party Assurance, Third-Party Audit.

For other indicators, the keywords are more straightforward as the indicator names themselves directly describe the intended information, such as *Net-Zero Target, Carbon Offsets/Credits, Sustainable Development Goals,* and *ISO 14001 Certification*.

Singapore leads the region in reporting total GHG emissions, with 73% of firm-years disclosing this indicator. Malaysia and Thailand demonstrate the highest disclosure rates for reporting Scope 1 and Scope 2 emissions, while Thailand is ahead of other countries in Scope 3 reporting.

From Table 7, companies in Thailand exhibit the strongest commitment to disclosing the four main GHG-related indicators across Southeast Asia, followed by Malaysia, Singapore, and Indonesia. In contrast, less than half of the companies in the Philippines report total GHG emissions, Scope 1, and Scope 2. Scope 3 reporting is particularly sparse, with only 8% of total firm-years disclosing this indicator.

5.2.1 Sparse Sustainability Reporting in Vietnam

Vietnamese companies exhibit low disclosure rates due to several possible interrelated factors. Firstly, disclosures are made on a voluntary basis, so companies lack a mandatory requirement to provide comprehensive ESG or non-financial data, resulting in inconsistent or minimal reporting. Secondly, high governmental ownership in firms – estimated at 57% - further discourages transparency, as many state-linked corporations prioritise financial information and are less inclined to invest in robust sustainability disclosures(Pham et al., 2020). Besides that, the absence of clear regulatory guidelines on sustainability reporting means that although international frameworks like the GRI and SASB exist for voluntary adoption, there is no unified local standard to ensure accountability and encourage consistent practices. Finally, another possible factor is the lack of stronger commitment from management and boards, evidenced by our findings that 3% of Vietnamese companies have a board-level committee or designated director for sustainable development. With limited executive or board-level oversight, sustainability often remains an afterthought rather than a strategic priority (Nguyen Huong, 2024).

5.2.2 Focus on Sustainability Oversight in Malaysia and Thailand

Oversight of sustainability within Malaysia is guided by Bursa Malaysia's Listing Requirements, in addition to its Sustainability Reporting Framework of 2015, which encourages disclosures relating to the role and responsibilities of a company's main governing body in identifying and assessing, controlling, and mitigating environmental, economic, and social (EES) risks and opportunities. Central to this framework is a call for the establishment of a sustainability committee, thereby enabling structured governance at the board level (Bursa Malaysia, 2015). In addition, the updated Malaysian Code on Corporate Governance reinforces Bursa's SRF through underlining the undisputed accountability of the board regarding ESG concerns, risk management, and sustainability oversight. Through these stipulations, Malaysia emphasizes the importance of established oversight mechanisms by encouraging companies to create formal committees or designate specific committees or officers that provide direct reports to the board concerning sustainability issues.

Thailand also follows a similar prescriptive approach. Thailand adopts a "apply or explain" basis to which encourages the board to comprehensively apply the CG Code to the company's business. The Stock Exchange of Thailand, along with the Securities and Exchange Commission of Thailand, issues explicit guidelines that call for ESG disclosures and emphasize the integration of sustainability risks and opportunities into the corporate strategy and board-level decisions (Corporate Governance Code 2017).This structured practice, together with enhanced scrutiny of carbon-intensive and manufacturing sectors, is forcing many companies to establish dedicated committees or assign specific board members to oversee sustainability performance. As a result, Thailand's companies often establish formal oversight mechanisms at the highest governance levels, aligning with national policy directives that emphasizes on responsible, future-oriented corporate behaviour.

Despite Singapore's impressive international reputation and sound governance structure, sustainability oversight is not necessarily conducted through the use of

formal committees reporting to the board. It should be noted that data limitations can create apparent disparities. Many Singapore listed companies have established in-house ESG task forces or cross-discipline sustainability committees. Because these committees do not necessarily report to the board, they are frequently not counted in formal counts of "sustainability committees" even though they may play substantial governance roles in the companies.

Additionally, Singapore's "comply or explain" approach allows companies greater leeway, so that some larger internationally exposed organizations may go beyond the minimum requirements, while smaller ones may revert to very basic forms of reporting. This flexibility means some companies can remain minimalistic in their disclosures, hence focusing on cost management or operational efficiency over full ESG integration and could partially explain why Singapore's overall sustainability oversight disclosure rate compares less favourably with the mandatory-oriented frameworks of Malaysia and Thailand.

In Indonesia and the Philippines, the lack of distinct regulatory guidelines mandating the establishment of a sustainability task force or committee is a possible reason why only a small percentage of companies have dedicated sustainability governance. As a result, existing boards of directors often absorb responsibilities for strategic sustainability planning and risk management, removing the need to form a standalone sustainability board or committee.

5.2.3 Sparse Sustainability Investment Reporting in Singapore

Singapore presents a paradox in the ASEAN context where it boasts some of the region's highest sustainability disclosure rates, yet its companies do not typically report their sustainability-related investments. It is plausible that the service-oriented nature of Singapore's market (Deutsche Bank, 2024) —dominated by finance, technology, and logistics —plays a key role in keeping large-scale sustainability-related expenditures relatively low. With these sectors relying heavily on intangible value creation, substantial capital outlays for issues like pollution abatement or natural resource management are less common. Countries like Indonesia, Malaysia, or Thailand, house extensive manufacturing and resource-extractive industries necessitating significant environmental mitigation or social investment. In contrast, Singapore's largely service-based economy often requires fewer capital-intensive sustainability measures. Even when Singaporean firms implement ESG initiatives—such as carbon monitoring or energy-efficient technologies—the absolute spending figures can appear comparatively modest against the backdrop of resource-heavy peers that fund large-scale water treatment or renewable energy projects.

Although transparent reporting is critical for accountability, Singapore's experience highlights that rigorous disclosures alone do not necessarily translate into proportionately high ESG budgets, pointing to the need for more nuanced metrics that account for industry structures and sector-specific impacts.

5.2.4 High Propensity of Emission Targets in Thailand and Malaysia

Thailand and Malaysian firms lead the region in establishing definitive emissions targets, primarily due to their highly industrialised businesses, which include petrochemicals, heavy manufacturing, and (in Malaysia) palm oil. These sectors not

only have substantial carbon footprints but also attract greater scrutiny from global investors and environmental watchdogs. As a result, many companies in these resource-intensive industries choose to adopt specific, measurable emissions goals to mitigate reputational and regulatory risks. Evidence from industries such as oil and gas and palm oil production suggest that operating in a carbon-intensive setting drives more explicit climate commitments, particularly when companies seek to maintain competitiveness in international markets and to adhere to domestic regulatory compliances on emissions environmental performance and emissions.

Indonesia, on the other hand, faces several challenges that hinder its ability to define clear emissions targets. Key factors include lack of knowledge and awareness at corporate managerial level about sustainability reporting (Dissanayake et al., 2020)and less stringent climate policies and regulatory enforcement (Mutiha, 2023)compared to Thailand and Malaysia. Although the government has announced emissions reduction commitments, the inconsistent implementation and monitoring of these policies make it difficult to drive companies toward setting explicit targets.

5.3 SGFIN SEF and IFRS S2 Industry Guidance Coverage

In addition to the general requirements of IFRS S2, 318 industry-specific guidance indicators are provided, covering 11 sectors and 68 industries. However, 289 of these indicators are required in only one industry, demonstrating that most indicators are sector-specific and likely irrelevant to the majority of sectors.

To address this, we categorized the indicators into two groups based on their level of applicability: *Priority Indicators* (required in more than or equal to three sectors) and *Limited Indicators* (required in one to two sectors). Within the SGFIN SEF, we identified seven priority indicators and twelve limited indicators.

Table 8: Reporting Rates on S2 Industry Guidance Indicators

Indicators	Type	Indonesia	%	Malaysia	%	Philippine	%	Singapore	%	Thailand	%	Vietnam	%	TOTAL	%
Emissions															
Nitrogen Oxides (NOx) (tonnes)	Limited	45	8%	46	9%	161	14%	46	4%	50	9%	0	0%	**348**	**8%**
Sulfur Oxides (SOx) (tonnes)	Limited	45	8%	43	8%	149	13%	43	4%	49	9%	0	0%	**329**	**8%**
Particulate Matter 10 (PM10), Total	Limited	24	4%	23	4%	143	12%	39	5%	28	5%			**257**	**7%**
Volatile Organic Compounds (VOC), Total (tonnes)	Limited	6	1%	16	3%	106	9%	0	0%	39	7%		0%	**167**	**4%**
Energy															
Total energy used	Priority	387	**71%**	416	**78%**	391	34%	623	**80%**	344	62%	21	5%	**2,182**	**55%**
Fuel Use, Total (GJ)	Limited	269	49%	95	18%	265	23%	240	31%	112	20%	41	10%	**1,022**	**26%**
Renewable Energy Use, Total	Priority	119	22%	65	12%	142	12%	104	13%	151	27%	2	1%	**583**	**15%**
Electricity Purchased, Total	Priority	21	4%	50	9%	14	1%	19	2%	250	45%	0	0%	**354**	**9%**
Energy Produced, Total	Limited	28	5%	37	7%	43	4%	11	1%	178	32%	2	1%	**299**	**7%**
Fuel Use, Total, Renewable	Limited	80	15%	23	4%	7	1%	84	11%	33	6%	0	0%	**227**	**6%**
Water															
Water use	Priority	350	64%	354	67%	653	57%	451	58%	358	65%	89	22%	**2,255**	**57%**
Water Withdrawal	Priority	189	35%	131	25%	341	30%	160	21%	240	43%	6	2%	**1,067**	**27%**
Water Withdrawal: Water Stress Area	Limited	9	2%	1	0%	8	1%	1	0%	43	8%	0	0%	**62**	**2%**
Water Use: Water Stress Area	Limited	1	0%	0	0%	3	0%	5	1%	25	5%	0	0%	**34**	**1%**
Waste Management															
Total Waste	Priority	247	45%	302	57%	488	43%	372	48%	328	59%	37	9%	**1,774**	**45%**
Hazardous Waste	Priority	233	43%	261	49%	438	38%	169	22%	249	45%	44	11%	**1,394**	**35%**
Waste Diverted From Disposal by Recycling	Limited	48	9%	2	0%	3	0%	69	9%	128	23%	9	2%	**259**	**7%**
E-Waste	Limited	5	1%	61	11%	42	4%	49	4%	19	3%	0	0%	**176**	**4%**
Other															
Climate-Impacting Policy/Law/Regulation	Limited	2	0%	49	9%	3	0%	26	2%	13	2%		0%	**93**	**2%**

5.3.1 Reporting Rates for S2 Industry Guidance Indicators

Certain indicators in specific countries have higher reporting rates than GHG emissions. For instance, as shown in Table 8, total energy usage is reported in 80% of

firm-year reports in Singapore, 78% in Malaysia, and 71% in Indonesia—7 to 11% higher than the reporting rates for GHG emissions. Similarly, electricity and water consumption are widely disclosed, likely because these figures can be easily obtained from company utility bills.

However, beyond these commonly reported indicators, others are less frequently disclosed, with less than 50% of firm-year reports covering them. Several factors contribute to this:

1. Sector-Specific Relevance. Certain indicators, such as waste management, are less relevant for industries like IT and telecommunications. Similarly, land restoration reporting is primarily applicable to sectors like mining and agriculture.
2. Measurement Challenges. Unlike electricity and water consumption, indicators such as waste generated or recycled require additional effort and resources to measure and report.
3. Economic Feasibility. Some practices, like waste handling, incur additional costs, whereas companies may opt for less costly alternatives, such as disposal into the surrounding environment. Reporting on indicators like species conservation lists may require hiring external consultants, making it less economically viable.
4. Lack of Commitment. Many companies focus only on complying with mandatory legal requirements and may not prioritize environmental concerns beyond regulatory obligations.
5. Country-Specific Reporting Practices. Country-specific cultural and regulatory factors can significantly influence how companies report sustainability data. Our findings suggest that Vietnam is still in the early stages of sustainability reporting. Strict government policies focused on financial reporting appear to divert corporate attention away from sustainability disclosures, leading to limited reporting in this area.

This variability in reporting highlights the challenges and barriers that companies face in expanding their sustainability disclosures across different indicators.

5.4 Extending Beyond S2: Resource Usage Indicators

The SGFIN SEF is founded on the principle that all categories of resource usage are equally salient, with a particular focus on five key areas of resources usage: energy, GHG emissions, water, waste management, and land use and biodiversity. For GHG reporting, which is a core requirement of S2, SGFIN SEF offers broader coverage by including intensity metrics.

Another example is waste-related indicators. SGFIN SEF primarily aligns with GRI standards for waste management, focusing on two key measurement variables: waste type and handling activities. Waste is categorized into two main types: hazardous and non-hazardous. Handling activities are further classified into two broad categories: disposal and diversion from disposal. These categories are then broken down into more specific activities, such as landfill, incineration, recycling, reuse, and other methods. This detailed approach ensures a comprehensive understanding of waste management practices.

Table 9 presents indicators with a reporting rate exceeding 10% of total firm-years. In addition to the quantitative indicators discussed earlier, SGFIN SEF also includes several qualitative indicators that address adaptability, assessment and compliance, and futureproofing. Given the relatively widespread disclosure of these indicators, SGFIN's balanced approach may be advantageous in highlighting the overall sustainability strategies adopted by companies.

Table 9: Reporting Rates beyond S2 from Sampled Indicators

Indicators	Type	Indonesia	%	Malaysia	%	Philippine	%	Singapore	%	Thailand	%	Vietnam	%	TOTAL	%
Waste Management															
Waste Diverted from Disposal by Recycling	Quantitative	48	9%	50	9%	371	32%	69	9%	128	23%	9	2%	**675**	**17%**
Non-Hazardous Waste - Landfilled	Quantitative	55	10%	50	9%	299	26%	48	4%	167	30%		0%	**619**	**15%**
Waste Directed to Disposal by Landfilling	Quantitative	55	10%	51	10%	297	26%	41	5%	140	25%	0		**584**	**15%**
Emissions															
GHG Intensity	Quantitative	127	23%	154	29%	27	2%	111	10%	60	11%	3	1%	**482**	**12%**
Energy															
Renewable Energy Produced	Quantitative	40	7%	103	19%	41	4%	42	4%	176	32%	2	1%	**404**	**10%**
Policy															
Sustainable Development Goals (Y/N)	Y/N	348	64%	398	75%	736	64%	437	38%	384	69%	31	13%	**2,334**	**56%**
Water Policy (Y/N)	Y/N	297	55%	390	73%	474	41%	511	45%	398	72%	117	49%	**2,187**	**53%**
Sustainable Development Goals: Quantitative Target (Y/N)	Y/N	50	9%	171	32%	42	4%	79	7%	151	27%	0	0%	**493**	**12%**
Mitigation and Adaptation															
Other Climate-Related Target, Active (Y/N)	Y/N	129	24%	251	47%	117	10%	320	28%	313	56%	5	2%	**1,135**	**27%**
Environmental Management System															
ISO 14001 Certification (Y/N)	Y/N	175	32%	251	47%	183	16%	287	25%	259	47%	59	25%	**1,214**	**29%**
Innovation and Development															
Green Building Certification (Y/N)	Y/N	56	10%	125	23%	92	8%	194	17%	31	6%	8	3%	**506**	**13%**
Supplier Environmental Assessment															
Suppliers assessed for environmental impacts (Y/N)	Y/N	136	25%	234	44%	415	36%	243	21%	284	51%	19	8%	**1,331**	**32%**

Overall, SGFIN SEF incorporates 141 indicators (65%) beyond those required by IFRS S2. Many of these indicators are drawn from established frameworks such as the GRI Standards, CDSB, CDP, and sustainability frameworks from data vendors like Bloomberg, Refinitiv, and Trucost.

6 Implications and Recommendations

6.1 Uniform Reporting Beyond S2 to Enhance Sustainability Evaluation

One of the key challenges in sustainability evaluation is the heterogeneity of reporting standards. This complexity arises from multiple factors, including the choice of reporting frameworks, selection of indicators, units of measurement, and varying regulatory requirements across jurisdictions.

While customization allows organizations to tailor reports to their specific needs, the growing demand for a standardized reporting system to streamline evaluation processes cannot be ignored. A unified reporting framework ensures consistency, comparability, and transparency in sustainability disclosures and evaluation.

The SGFIN SEF offers a strong comprehensive recommendation for reliable reporting frameworks. First, the integration of widely recognized sustainability reporting standards, making them applicable across multiple jurisdictions and industries. This broad compatibility helps organizations streamline their reporting efforts while meeting diverse regulatory expectations.

Second, the composition of indicators in SGFIN SEF strikes a balance between general and industry-specific metrics. Some indicators are universally relevant and commonly reported across sectors, ensuring broad applicability. Meanwhile, other indicators are tailored to specific industries, addressing sector-specific sustainability challenges in a meaningful way. This balanced approach enhances the relevance and usability of sustainability reporting, making it both comprehensive and practical. While IFRS S2 also incorporates industry-specific indicators, SGFIN SEF offers a different level of granularity, providing deeper insights and greater flexibility for organizations to capture sector-specific sustainability performance

Lastly, SGFIN SEF promotes clarity in units of measurement, addressing a common challenge in sustainability reporting. Inconsistent measurement units often lead to discrepancies in data interpretation, making it difficult to compare sustainability performance across organizations and industries. To mitigate this issue, SGFIN primarily adopts units from well-established frameworks such as GRI and GHG Protocol. Additionally, when it comes to intensity-based metrics, SGFIN SEF allows flexibility by enabling companies to determine the most relevant denominator for their reporting. Intensity metrics measure environmental impact relative to a specific business metric, such as emissions per unit of production, revenue, or employee count. This flexibility ensures that companies can align sustainability reporting with their operational context while maintaining consistency with industry best practices.

6.2 SGFIN SEF at the Global Scale

The SGFIN SEF is well positioned for global adoptions. Built on a strong foundation rooted in internationally recognized frameworks such as CDP, GRI, and CDSB, it also incorporates well-referenced indicators from Bloomberg, Refinitiv, and Trucost. The framework provides a practical and comprehensive set of environmental metrics for reporting, covering key areas such as energy consumption, GHG emissions, waste

management, water usage, and biodiversity. Additionally, it aligns with the latest IFRS S2 and S2 Industry Guidance, integrating key indicators to establish a standardized approach to climate-related reporting. Its flexibility allows for adoption across industries and jurisdictions while maintaining consistency in sustainability assessments.

Despite these strengths, certain caveats must be addressed to enhance the framework's global applicability. First, while SGFIN SEF's broad scope is a key advantage, its effectiveness remains constrained by current reporting practices, as evidenced by low reporting rates in Southeast Asia.

Second, SGFIN SEF places heavy emphasis in environmental issues and relatively less emphasis on social and governance indicators. This may limit its comprehensiveness in addressing the multi-dimensional nature of sustainability. This could be an area of concern in developed markets where social and governance reporting may be more critical. While the SGFIN SEF acknowledges the importance of social and governance aspects, their exclusion in the current iteration was driven by two main considerations. First, SGFIN SEF was designed as a practical framework, intended for immediate adoption, and social and governance reporting rates remain low in the ASEAN region. Second, unlike financial materiality, which is relatively well-defined, social and governance materiality remains complex and difficult to standardize across industries and regions.

To enhance its global applicability, SGFIN plans to incorporate a broader range of social and governance indicators in the SEF to complement the strong environmental focus. Expanding the framework to include more measurable social metrics, such as employee well-being, supply chain ethics, and corporate diversity, would strengthen its comprehensiveness. Furthermore, ensuring greater interoperability with emerging sustainability standards, including IFRS S2, will help the evaluation framework maintain its relevance as regulatory landscapes evolve. Currently, ISSB is reviewing the potential inclusion of biodiversity and human capital into its sustainability reporting standard. SGFIN will closely monitor on the progress.

Evaluations of corporate sustainability would also benefit from clearer standardization in social and governance related data collection and reporting, particularly in defining measurement units and verification processes. Standardized methodologies for key ESG indicators would improve comparability across businesses and regions, making sustainability reporting more transparent and actionable for investors and stakeholders.

The proposed evaluation framework has the potential to serve as a globally recognized benchmark for sustainability reporting frameworks. Its structured and flexible approach makes it highly adaptable, but further enhancements are necessary to ensure its effectiveness in diverse regulatory contexts. By incorporating social and governance dimensions, aligning with global regulatory developments, and improving data standardization, SGFIN will improve the SEF's applicability and relevance in the evolving sustainability reporting landscape.

6.3 The Role of Assurance in Sustainability Reporting

Only 12% of companies' sustainability reports in Southeast Asia are verified by a third party as shown in Table 7. This aligns with the general sparsity of data reporting,

highlighting a significant gap in reliable disclosures. The absence of stringent regulatory requirements has contributed to the limited adoption of third-party assurance. However, the use of external assurance or audits is likely to increase, thereby improving overall reporting rates, with stricter mandates for verified and reliable sustainability reporting.

Sustainability assurance plays a role like financial assurance—it ensures that companies provide accurate, complete, and reasonable information in their reports. Without proper assurance mechanisms, there is a higher risk of misrepresentation, misleading claims, or inconsistencies in sustainability disclosures. Strengthening reporting practices through independent verification not only enhances credibility but also acts as a safeguard against greenwashing and potential legal ramifications. By implementing robust assurance frameworks, companies can demonstrate genuine commitment to sustainability while fostering trust among investors, regulators, and the public.

Increasing pressure from shareholders and stakeholders has accelerated the adoption of sustainability audits. However, the pace of this transition needs to be significantly amplified to meet the rising expectations for transparency and accountability.

6.4 Asset Management Implications of Sustainability Disclosures

A key challenge in asset management is the collection and analysis of corporate sustainability data. Investors needs more granular data from companies to enhance their investment allocation models. However, data availability and quality remain significant obstacles. Despite these challenges, these non-financial risk factors may have a material impact on asset prices, influencing investment decisions and long-term valuation.

SGFIN has developed a corporate emissions pricing model that integrates carbon emissions into equity market valuation, reflecting the financial impact of corporate sustainability features. SGFIN is actively working on expanding this model to incorporate water, waste, and energy metrics, aligning with the evolving landscape of sustainability disclosures. This approach is consistent with the IFRS-S2 standard, which recognizes that environmental factors (water, waste, energy) are industry-specific and require tailored reporting frameworks.

7 Concluding Remarks

Sustainability reporting is at a turning point. The shift toward mandatory disclosures, independent assurance, and international alignment creates an opportunity for enhanced accountability. To move beyond compliance-driven reporting, businesses must embed sustainability into core strategies, ensuring ESG integration is both meaningful and actionable. As ESG factors become key to investment and risk management, transparent and verifiable sustainability reporting will be essential in shaping a responsible and resilient global economy.

As sustainability becomes central to corporate governance and financial decision-making, the need for standardized, transparent, and reliable reporting is greater than ever. This whitepaper has examined the challenges and developments in sustainability reporting, particularly the adoption of IFRS S2, data collection improvements, and independent assurance.

Sustainability Reporting Framework (SEF) provides a path forward in advancing sustainability reporting by providing a structured, data-driven approach to ESG disclosures. Designed to align with global standards like GRI, CDP, CDSB, and IFRS S2, the SGFIN SEF promotes data integration, comparability, and strategic planning. With quantifiable and standardized environmental indicators, this framework facilitates enhanced risk assessment and investment decision-making for regulators, businesses, and investors.

Despite progress, gaps remain, especially in Southeast Asia, where disclosure rates vary across jurisdictions. Strengthening regulatory enforcement and aligning corporate strategies with clear, comparable, and verifiable ESG disclosures is essential. The shift toward mandatory reporting and global standardization presents a pivotal opportunity, but further efforts are needed to improve data consistency and verification.

Key Takeaways and Future Directions

1. Enhancing Regulatory Enforcement & Standardization – The adoption of IFRS S2 in Singapore, Malaysia, and Thailand is a step forward, but further harmonization is needed to improve comparability and consistency in ESG disclosures.
2. Strengthening Independent Assurance – Low third-party verification rates hinder credibility. Expanding assurance requirements, similar to financial audits, will reduce greenwashing and improve trust.
3. Advancing a Unified Global Framework – IFRS S2 should extend beyond climate to include biodiversity, human capital, and social impact indicators, ensuring comprehensive sustainability disclosures.
4. Encouraging Corporate ESG Leadership – Companies that proactively adopt robust ESG reporting will attract investors, build trust, and gain a competitive advantage.

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Appendix

Appendix A: List of SGFIN SEF Indicators

Initial Indicators	Expanded & Added indicator
Emissions	
GHG, Total (tCO_2e)	
GHG Scope 1 (tCO_2e)	GHG Scope 1, Stationary Combustion Emissions (tCO_2e)
	GHG Scope 1, Process (tCO_2e)
	GHG Scope 1, Fugitive Emissions (tCO_2e)
	GHG Scope 1, Mobile Combustion (tCO_2e)
GHG Scope 2 Location-Based (tCO_2e)	
GHG Scope 2 Market-Based (tCO_2e)	
GHG Scope 1 & 2 Location-Based (tCO_2e)	
GHG Scope 1 & 2 Market-Based (tCO_2e)	
GHG Scope 3 (tCO_2e)	
GHG Intensity, Total	GHG Intensity, Total (Units)
	GHG Intensity, Total (tCO_2e/MT of product)
	GHG Intensity, Total (tCO_2e/unit of production)
	GHG Intensity, Total (tCO_2e/vehicle produced)
	GHG Intensity, Total (tCO_2e/unit of service)
	GHG Intensity, Total (tCO_2e/unit hour worked)
	GHG Intensity, Total (tCO_2e/m^2)
	GHG Intensity, Total (tCO_2e/TEU twenty-foot equivalent unit)
	GHG Intensity, Total (tCO_2e/TB terabyte)
	GHG Intensity, Total (tCO_2e/BOE barrel of oil equivalent)
	GHG Intensity, Total (tCO_2e/kilometer)
	GHG Intensity, Total (tCO_2e/PKM passenger-kilometer)
	GHG Intensity, Total (tCO_2e/number of passengers)
	GHG Intensity, Total (tCO_2e/LTK load tonne-kilometre)
	GHG Intensity, Total (tCO_2e/room-night)
	GHG Intensity, Total (tCO_2e/room)
GHG Scope 1 & 2 Location-Based, Intensity	GHG Scope 1 & 2 Location-Based, Intensity (Units)
	GHG Scope 1 & 2 Location-Based, Intensity (tCO_2e/MT of product)
	GHG Scope 1 & 2 Location-Based, Intensity (tCO_2e/unit of production)
	GHG Scope 1 & 2 Location-Based, Intensity (tCO_2e/vehicle produced)
	GHG Scope 1 & 2 Location-Based, Intensity (tCO_2e/unit of service)
	GHG Scope 1 & 2 Location-Based, Intensity (tCO_2e/unit hour worked)
	GHG Scope 1 & 2 Location-Based, Intensity (tCO_2e/m^2)
	GHG Scope 1 & 2 Location-Based, Intensity (tCO_2e/TEU twenty-foot equivalent unit)
	GHG Scope 1 & 2 Location-Based, Intensity (tCO_2e/TB terabyte)
	GHG Scope 1 & 2 Location-Based, Intensity (tCO_2e/BOE barrel of oil equivalent)
	GHG Scope 1 & 2 Location-Based, Intensity (tCO_2e/kilometer)
	GHG Scope 1 & 2 Location-Based, Intensity (tCO_2e/PKM passenger-kilometer)
	GHG Scope 1 & 2 Location-Based, Intensity (tCO_2e/number of passengers)

	GHG Scope 1 & 2 Location-Based, Intensity (tCO_2e/LTK load tonne-kilometre)
	GHG Scope 1 & 2 Location-Based, Intensity (tCO_2e/room-night)
GHG Scope 1 & 2 Market-Based, Intensity	GHG Scope 1 & 2 Market-Based, Intensity (Units)
	GHG Scope 1 & 2 Market-Based, Intensity (tCO_2e/MT of product)
	GHG Scope 1 & 2 Market-Based, Intensity (tCO_2e/unit of production)
	GHG Scope 1 & 2 Market-Based, Intensity (tCO_2e/vehicle produced)
	GHG Scope 1 & 2 Market-Based, Intensity (tCO_2e/unit of service)
	GHG Scope 1 & 2 Market-Based, Intensity (tCO_2e/unit hour worked)
	GHG Scope 1 & 2 Market-Based, Intensity (tCO_2e/m^2)
	GHG Scope 1 & 2 Market-Based, Intensity (tCO_2e/TEU twenty-foot equivalent unit)
	GHG Scope 1 & 2 Market-Based, Intensity (tCO_2e/TB terabyte)
	GHG Scope 1 & 2 Market-Based, Intensity (tCO_2e/BOE barrel of oil equivalent)
	GHG Scope 1 & 2 Market-Based, Intensity (tCO_2e/kilometer)
	GHG Scope 1 & 2 Market-Based, Intensity (tCO_2e/PKM passenger-kilometer)
	GHG Scope 1 & 2 Market-Based, Intensity (tCO_2e/number of passengers)
	GHG Scope 1 & 2 Market-Based, Intensity (tCO_2e/LTK load tonne-kilometre)
	GHG Scope 1 & 2 Market-Based, Intensity (tCO_2e/room-night)
GHG Scope 1 Emissions Intensity	GHG Scope 1 Emissions Intensity (Units)
	GHG Scope 1 Emissions Intensity (tCO_2e/MT of product)
	GHG Scope 1 Emissions Intensity (tCO_2e/unit of production)
	GHG Scope 1 Emissions Intensity (tCO_2e/vehicle produced)
	GHG Scope 1 Emissions Intensity (tCO_2e/unit of service)
	GHG Scope 1 Emissions Intensity (tCO_2e/unit hour worked)
	GHG Scope 1 Emissions Intensity (tCO_2e/m^2)
	GHG Scope 1 Emissions Intensity (tCO_2e/TEU twenty-foot equivalent unit)
	GHG Scope 1 Emissions Intensity (tCO_2e/TB terabyte)
	GHG Scope 1 Emissions Intensity (tCO_2e/BOE barrel of oil equivalent)
	GHG Scope 1 Emissions Intensity (tCO_2e/kilometer)
	GHG Scope 1 Emissions Intensity (tCO_2e/PKM passenger-kilometer)
	GHG Scope 1 Emissions Intensity (tCO_2e/number of passengers)
	GHG Scope 1 Emissions Intensity (tCO_2e/LTK load tonne-kilometre)
	GHG Scope 1 Emissions Intensity (tCO_2e/room-night)
GHG Scope 2 Emissions, Intensity	GHG Scope 2 Emissions Intensity (Units)
	GHG Scope 2 Emissions, Intensity (tCO_2e/MT of product)
	GHG Scope 2 Emissions, Intensity (tCO_2e/unit of production)
	GHG Scope 2 Emissions, Intensity (tCO_2e/vehicle produced)
	GHG Scope 2 Emissions, Intensity (tCO_2e/unit of service)
	GHG Scope 2 Emissions, Intensity (tCO_2e/unit hour worked)
	GHG Scope 2 Emissions, Intensity (tCO_2e/m^2)
	GHG Scope 2 Emissions, Intensity (tCO_2e/TEU twenty-foot equivalent unit)
	GHG Scope 2 Emissions, Intensity (tCO_2e/TB terabyte)
	GHG Scope 2 Emissions, Intensity (tCO_2e/BOE barrel of oil equivalent)
	GHG Scope 2 Emissions, Intensity (tCO_2e/kilometer)

	GHG Scope 2 Emissions, Intensity (tCO_2e/PKM passenger-kilometer)
	GHG Scope 2 Emissions, Intensity (tCO_2e/number of passengers)
	GHG Scope 2 Emissions, Intensity (tCO_2e/LTK load tonne-kilometre)
	GHG Scope 2 Emissions, Intensity (tCO_2e/room-night)
GHG Scope 3 Emissions, Intensity	GHG Scope 3 Emissions Intensity (Units)
	GHG Scope 3 Emissions, Intensity (tCO_2e/MT of product)
	GHG Scope 3 Emissions, Intensity (tCO_2e/unit of production)
	GHG Scope 3 Emissions, Intensity (tCO_2e/vehicle produced)
	GHG Scope 3 Emissions, Intensity (tCO_2e/unit of service)
	GHG Scope 3 Emissions, Intensity (tCO_2e/unit hour worked)
	GHG Scope 3 Emissions, Intensity (tCO_2e/m^2)
	GHG Scope 3 Emissions, Intensity (tCO_2e/TEU twenty-foot equivalent unit)
	GHG Scope 3 Emissions, Intensity (tCO_2e/TB terabyte)
	GHG Scope 3 Emissions, Intensity (tCO_2e/BOE barrel of oil equivalent)
	GHG Scope 3 Emissions, Intensity (tCO_2e/kilometer)
	GHG Scope 3 Emissions, Intensity (tCO_2e/PKM passenger-kilometer)
	GHG Scope 3 Emissions, Intensity (tCO_2e/number of passengers)
	GHG Scope 3 Emissions, Intensity (tCO_2e/LTK load tonne-kilometre)
	GHG Scope 3 Emissions, Intensity (tCO_2e/room-night)
Scope 3 Upstream: Purchased Goods and Services (tCO_2e)	
Scope 3 Upstream: Capital Goods (tCO_2e)	
Scope 3 Upstream: Fuel- and Energy-Related Activities (tCO_2e)	
Scope 3 Upstream: Transportation and Distribution (tCO_2e)	
Scope 3 Upstream: Waste Generated in Operations (tCO_2e)	
Scope 3 Upstream: Business Travel (tCO_2e)	
Scope 3 Upstream: Employee Commuting (tCO_2e)	
Scope 3 Upstream Leased Assets (tCO_2e)	
Scope 3 Downstream Transportation and Distribution (tCO_2e)	
Scope 3 Downstream: Processing of Sold Products (tCO_2e)	
Scope 3 Downstream: Use of Sold Products (tCO_2e)	
Scope 3 Downstream: End-of-Life Treatment of Sold Products (tCO_2e)	
Scope 3 Downstream: Leased Assets (tCO_2e)	
Scope 3 Downstream: Franchises (tCO_2e)	
Scope 3 Downstream: Investments (tCO_2e)	
Scope 3 Other Significant Air Emissions (tCO_2e)	
Carbon Dioxide (CO_2) Emissions, Total (tCO_2)	Carbon Dioxide (CO_2) Scope 1 (tCO_2)
Methane (CH_4) Emissions in CO_2e, Total (tCO_2e)	Methane (CH_4) Scope 1 in CO_2e (tCO_2e)
Nitrous Oxide (N_2O) Emissions in CO_2e, Total (tCO_2e)	Nitrous Oxide (N_2O) Scope 1 in CO_2e (tCO_2e)
Fluorinated GHGs in CO_2e, Total (tCO_2e)	Fluorinated GHGs Scope 1 in CO_2e (tCO_2e)
Nitrogen Oxides (NOx) in CO_2e, Total (tCO_2e)	
Nitrogen Oxides (NOx), Tonnes	
Sulfur Oxides (SOx) in CO_2e, Total (tCO_2e)	
Sulfur Oxides (SOx), Tonnes	
Volatile organic compounds (VOC), Total (tCO_2e)	
Volatile organic compounds (VOC), Total (tonnes)	
Internal Carbon Pricing (Y/N)	
Internal Carbon Price per Tonne	
Internal Carbon Price Currency	
GHG Scope 1, Country/Region (Text) (Eg. Singapore; Malaysia; Indonesia)	

GHG Scope 1, Emissions by Country/Region (Metric tons (tonnes) of carbon dioxide equivalent (tCO_2e)	
GHG Scope 2, Country/Region (Text)	
GHG Scope 2 Location-Based, Emissions by Country/Region (tCO_2e)	
GHG Scope 2 Market-Based, Emissions by Country/Region (tCO_2e)	
Scope 3 Other (Upstream) Significant Air Emissions (tCO_2e)	
Scope 3 Other (Downstream) Significant Air Emissions (tCO_2e)	
Persistent Organic Pollutants (POP), Total (tonnes)	
Hazardous Air Pollutants (HAP), Total (tonnes)	
Particulate Matter 10 (PM10), Total (tonnes)	
Emissions of Ozone-Depleting Substances (ODS) (tonnes)	
	Nitrogen Oxides (NOx), Total (tonnes)
	Sulfur Oxides (SOx), Total (tonnes)
	Volatile organic compounds (VOC), Total (tonnes)
Energy	
Energy Use, Total (GJ)	
Non-Renewable Energy Use, Total (GJ)	
Renewable Energy Use, Total (GJ)	
Fuel Use, Total (GJ)	
Fuel Use, Total (L)	
Fuel Use, Total, Renewable (GJ)	
Fuel Use, Total, Non-renewable (GJ)	Fuel Use, Natural Gas (m^3)
	Fuel Use, Natural Gas (kg)
	Fuel Use, Coal/Lignite (tonnes)
	Fuel Use, Crude Oil (m^3)
Fuel Use, LPG (kg)	
Electricity Use, Total (GJ)	
Electricity Use, Renewable (GJ)	
Electricity Use, Non-Renewable (GJ)	
Heating, Cooling, and Steam Use, Total (GJ)	
Heating, Cooling, and Steam Use, Renewable (GJ)	
Heating, Cooling, and Steam Use, Non-Renewable (GJ)	
Energy Intensity, Total	Energy Intensity, Total (Units)
	Energy Intensity, Total (GJ/MT of product)
	Energy Intensity, Total (GJ/unit of production)
	Energy Intensity, Total (GJ/vehicle produced)
	Energy Intensity, Total (GJ/unit of service)
	Energy Intensity, Total (GJ/unit hour worked)
	Energy Intensity, Total (GJ/m^2)
	Energy Intensity, Total (GJ/TEU twenty-foot equivalent unit)
	Energy Intensity, Total (GJ/TB terabyte)
	Energy Intensity, Total (GJ/BOE barrel of oil equivalent)
	Energy Intensity, Total (GJ/kilometer)
	Energy Intensity, Total (GJ/PKM passenger-kilometer)
	Energy Intensity, Total (GJ/number of passengers)
	Energy Intensity, Total (GJ/LTK load tonne-kilometre)
	Energy Intensity, Total (GJ/room-night)
	Energy Intensity, Total (GJ/room)
Energy Intensity, Non Renewable	Energy Intensity, Non Renewable (Units)
	Energy Intensity, Non Renewable (GJ/MT of product)
	Energy Intensity, Non Renewable (GJ/unit of production)
	Energy Intensity, Non Renewable (GJ/vehicle produced)
	Energy Intensity, Non Renewable (GJ/unit of service)
	Energy Intensity, Non Renewable (GJ/unit hour worked)
	Energy Intensity, Non Renewable (GJ/m^2)
	Energy Intensity, Non Renewable (GJ/TEU twenty-foot equivalent unit)
	Energy Intensity, Non Renewable (GJ/TB terabyte)

	Energy Intensity, Non Renewable (GJ/BOE barrel of oil equivalent)
	Energy Intensity, Non Renewable (GJ/kilometer)
	Energy Intensity, Non Renewable (GJ/PKM passenger-kilometer)
	Energy Intensity, Non Renewable (GJ/number of passengers)
	Energy Intensity, Non Renewable (GJ/LTK load tonne-kilometre)
	Energy Intensity, Non Renewable (GJ/room-night)
Energy Intensity, Renewable	Energy Intensity, Renewable (Units)
	Energy Intensity, Renewable (GJ/MT of product)
	Energy Intensity, Renewable (GJ/unit of production)
	Energy Intensity, Renewable (GJ/vehicle produced)
	Energy Intensity, Renewable (GJ/unit of service)
	Energy Intensity, Renewable (GJ/unit hour worked)
	Energy Intensity, Renewable (GJ/m²)
	Energy Intensity, Renewable (GJ/TEU twenty-foot equivalent unit)
	Energy Intensity, Renewable (GJ/TB terabyte)
	Energy Intensity, Renewable (GJ/BOE barrel of oil equivalent)
	Energy Intensity, Renewable (GJ/kilometer)
	Energy Intensity, Renewable (GJ/PKM passenger-kilometer)
	Energy Intensity, Renewable (GJ/number of passengers)
	Energy Intensity, Renewable (GJ/LTK load tonne-kilometre)
	Energy Intensity, Renewable (GJ/room-night)
Renewable Energy Certificates Purchased (MWh)	
Fuel Intensity, Total	Fuel Intensity, Total (Units)
	Fuel Intensity, Total (GJ/MT of product)
	Fuel Intensity, Total (GJ/unit of production)
	Fuel Intensity, Total (GJ/vehicle produced)
	Fuel Intensity, Total (GJ/unit of service)
	Fuel Intensity, Total (GJ/unit hour worked)
	Fuel Intensity, Total (GJ/m²)
	Fuel Intensity, Total (GJ/TEU twenty-foot equivalent unit)
	Fuel Intensity, Total (GJ/TB terabyte)
	Fuel Intensity, Total (GJ/BOE barrel of oil equivalent)
	Fuel Intensity, Total (GJ/kilometer)
	Fuel Intensity, Total (GJ/PKM passenger-kilometer)
	Fuel Intensity, Total (GJ/number of passengers)
	Fuel Intensity, Total (GJ/LTK load tonne-kilometre)
	Fuel Intensity, Total (GJ/room-night)
Electricity Intensity, Total	Electricity Intensity, Total (Units)
	Electricity Intensity, Total (GJ/MT of product)
	Electricity Intensity, Total (GJ/unit of production)
	Electricity Intensity, Total (GJ/vehicle produced)
	Electricity Intensity, Total (GJ/unit of service)
	Electricity Intensity, Total (GJ/unit hour worked)
	Electricity Intensity, Total (GJ/m²)
	Electricity Intensity, Total (GJ/TEU twenty-foot equivalent unit)
	Electricity Intensity, Total (GJ/TB terabyte)
	Electricity Intensity, Total (GJ/BOE barrel of oil equivalent)
	Electricity Intensity, Total (GJ/kilometer)
	Electricity Intensity, Total (GJ/PKM passenger-kilometer)
	Electricity Intensity, Total (GJ/number of passengers)
	Electricity Intensity, Total (GJ/LTK load tonne-kilometre)
	Electricity Intensity, Total (GJ/room-night)
Energy Produced, Total (GJ)	
Non-Renewable Energy Produced (GJ)	
Renewable Energy Produced (GJ)	
Electricity Produced, Total (GJ)	
Heating, Cooling, and Steam Produced (GJ)	

Energy Purchased, Total (GJ)	
Non-Renewable Energy Purchased (GJ)	
Renewable Energy Purchased (GJ)	
Electricity Purchased, Total (GJ)	
Heating, Cooling, and Steam Purchased (GJ)	
Electricity Sold, Total (GJ)	
Heating, Cooling, and Steam Sold (GJ)	
Heating, Cooling, and Steam Intensity, Total	Heating, Cooling, and Steam Intensity, Total (Units)
Land Usage and Biodiversity	
Environmentally Sensitive Areas, Number of Sites	
Environmentally Sensitive Areas, Areas of Operations (Hectares)	
Land Disturbed (Hectares)	
Land/Habitats Restored/Protected (Hectares)	
IUCN Red List/Conservation List Species	
Critically Endangered, IUCN Red List/Conservation List Species	
Endangered, IUCN Red List/Conservation List Species	
Vulnerable, IUCN Red List/Conservation List Species	
Near Threatened, IUCN Red List/Conservation List Species	
Least Concern, IUCN Red List/Conservation List Species	
Waste Management	
Waste, Total (tonnes)	
Waste Diverted from Disposal, Total (tonnes)	
Waste Diverted from Disposal by Recycling (tonnes)	
Waste Directed to Disposal, Total (tonnes)	
Waste Directed to Disposal by Incineration (tonnes)	Waste Directed to Disposal by Incineration (with Energy Recovery) (tonnes)
	Waste Directed to Disposal by Incineration (without Energy Recovery) (tonnes)
Waste Directed to Disposal by Landfilling (tonnes)	
Hazardous Waste (tonnes)	
Non-Hazardous Waste (tonnes)	
Hazardous Waste: Recycling (tonnes)	
Non-Hazardous Waste: Recycling (tonnes)	
Waste Generated, Intensity	Waste Generated, Intensity (Units)
	Waste Generated, Intensity (tonnes/MT of product)
	Waste Generated, Intensity (tonnes/unit of production)
	Waste Generated, Intensity (tonnes/vehicle produced)
	Waste Generated, Intensity (tonnes/unit of service)
	Waste Generated, Intensity (tonnes/unit hour worked)
	Waste Generated, Intensity (tonnes/m^2)
	Waste Generated, Intensity (tonnes/TEU twenty-foot equivalent unit)
	Waste Generated, Intensity (tonnes/TB terabyte)
	Waste Generated, Intensity (tonnes/BOE barrel of oil equivalent)
	Waste Generated, Intensity (tonnes/kilometer)

	Waste Generated, Intensity (tonnes/PKM passenger-kilometer)
	Waste Generated, Intensity (tonnes/number of passengers)
	Waste Generated, Intensity (tonnes/LTK load tonne-kilometre)
	Waste Generated, Intensity (tonnes/room-night)
	Waste Generated, Intensity (tonnes/room)
Paper Consumption (tonnes)	
Paper Recycled (tonnes)	
Waste Diverted From Disposal by Preparation for Reuse (tonnes)	
Waste Diverted From Disposal by Other Recovery Operations (tonnes)	
Waste Directed to Disposal by Other Disposal Operations (tonnes)	
Hazardous Waste: Preparation for Reuse (tonnes)	
Hazardous Waste: Other Recovery Operations (tonnes)	
Hazardous Waste: Incineration (tonnes)	
Hazardous Waste: Landfilling (tonnes)	
Hazardous Waste: Other Disposal Operations (tonnes)	
Non-Hazardous Waste: Preparation for Reuse(tonnes)	
Non-Hazardous Waste: Other Recovery Operations (tonnes)	
Non-Hazardous Waste: Incineration (tonnes)	
Non-Hazardous Waste: Landfilling (tonnes)	
Non-Hazardous Waste: Other Disposal Operations (tonnes)	
E-Waste (tonnes)	
Water	
Water Use, Total (m^3)	
Water Use: Water Stress Area (m^3)	
Water Withdrawal, Total (m^3)	
Water Withdrawal: Water Stress Area (m^3)	
Water Discharge, Total (m^3)	
Water Discharge: Water Stress Area (m^3)	
Water Recycled (m^3)	
Surface Water Withdrawal, Total (m^3)	
Groundwater Withdrawal, Total (m^3)	
Seawater Withdrawal, Total (m^3)	
Produced Water Withdrawal, Total (m^3)	
Third-Party Water Withdrawal, Total (m^3)	
Freshwater Withdrawal, Total (m^3)	
Water Consumption, Intensity	Water Consumption, Intensity (Units)
	Water Consumption, Intensity (m^3/MT of product)
	Water Consumption, Intensity (m^3/unit of production)
	Water Consumption, Intensity (m^3/vehicle produced)
	Water Consumption, Intensity (m^3/unit of service)
	Water Consumption, Intensity (m^3/unit hour worked)
	Water Consumption, Intensity (m^3/m^2)

	Water Consumption, Intensity (m³/TEU twenty-foot equivalent unit)
	Water Consumption, Intensity (m³/TB terabyte)
	Water Consumption, Intensity (m³/BOE barrel of oil equivalent)
	Water Consumption, Intensity (m³/kilometer)
	Water Consumption, Intensity (m³/PKM passenger-kilometer)
	Water Consumption, Intensity (m³/number of passengers)
	Water Consumption, Intensity (m³/LTK load tonne-kilometre)
	Water Consumption, Intensity (m³/room-night)
	Water Consumption, Intensity (m³/room)
	Change in Water Storage (ML)
Materials	
Total Materials Used	Material unit
Materials Used: Non-Renewable	Materials Used: Non-Renewable (Units) (Eg. Tonnes; m³; Pieces)
Materials Used: Renewable	Materials Used: Renewable (Units) (Eg. Tonnes; m³; Pieces)
Recycled Input Material	Recycled Input Material (Units) (Eg. Tonnes; m³; Pieces)
	Recycled Input Material, Percentage
Reclaimed Products and Their Packaging Material	Reclaimed Products and Their Packaging Material, Percentage
	Total Materials Used (Units) (Eg. Tonnes; m³; Pieces)
Products	
Products: Climate Change (Y/N)	
Products: Eco-Labels, Number (Count)	
Remuneration	
Climate-Related Issues, Incentive (Y/N)	
Climate-Related Issues, Monetary Incentive (Y/N)	
Oversight	
Biodiversity Oversight (Y/N)	
Sustainability Oversight (Y/N)	
Sustainability Oversight, Competence (Y/N)	
Policy	
Biodiversity Policy (Y/N)	
Climate Change Policy (Y/N)	
Sustainable Development Goals (Y/N)	
Sustainable Development Goals (Eg. SDG1; SDG2; SDG3)	
Sustainable Development Goals: Quantitative Target (Y/N)	
Sustainable Development Goals: Quantitative Target (Eg. SDG1; SDG2; SDG3)	
Water Policy (Y/N)	
Emissions Trading Scheme Involvement (Y/N)	
Emissions Trading Scheme Involvement (Eg. EU ETS; China National ETS)	
EU Emissions Trading Scheme Involvement (Y/N)	
Mitigation and Adaptation	
Carbon Offsets/Credits Origination (Y/N)	
Carbon Offsets/Credits Purchase (Y/N)	
Carbon Offsets/Credits Purchase, Amount (tCO_2e)	
Carbon Offsets/Credits Purchase, Limit (Percentage)	
Emissions Target, Active (Y/N)	
Net Zero Target, Active (Y/N)	
Net Zero Target, Target Year (Year)	
Net Zero Target, Coverage (Eg. CO_2; NO; CO)	

Other Climate-Related Target, Active (Y/N)	
Emissions Reduction Initatives, Active (Y/N)	
Absolute Emissions Reduction Type (Eg. Scope1; Scope2; Scope3)	Absolute Emissions Reductions, Year Target Set (Eg. 2008; 2009; 2010)
	Absolute Emissions Reductions: Scope 1, Baseline (tCO_2e)
	Absolute Emissions Reductions: Scope 2, Baseline (tCO_2e)
	Absolute Emissions Reductions: Scope 3, Baseline (tCO_2e)
Absolute Emissions Reductions, Baseline (tCO_2e)	
Absolute Emissions Reductions, Base Year (Year)	
Absolute Emissions Reductions, Target Year (Year)	
Absolute Emissions Reductions, Targeted Reduction Percentage	
Absolute Emissions Reductions: Target Year Total Emissions (tCO_2e)	
Absolute Emissions Reduction Target: Target Achieved (Y/N)	
Emissions Intensity Reduction Type	Emissions Intensity Reductions, Year Target Set
	Emissions Intensity Reductions:Scope 1, Intensity Figure in Base Year
	Emissions Intensity Reductions:Scope 1, Intensity Figure in Base Year (Units)
	Emissions Intensity Reductions:Scope 2, Intensity Figure in Base Year
	Emissions Intensity Reductions:Scope 2, Intensity Figure in Base Year (Units)
	Emissions Intensity Reductions:Scope 3, Intensity Figure in Base Year
	Emissions Intensity Reductions:Scope 3, Intensity Figure in Base Year (Units)
Emissions Intensity Reductions: Intensity Figure in Base Year	Emissions Intensity Reductions: Intensity Figure in Base Year (Units)
Emissions Intensity Reductions, Base Year (Year)	
Emissions Intensity Reductions, Target Year (Year)	
Emissions Intensity Reductions, Targeted Reduction Percentage	
Emissions Intensity Reductions: Target Year Intensity Figure	Emissions Intensity Reductions: Target Year Intensity Figure (Units)
Emissions Intensity Reduction Target: Target Achieved (Y/N)	
Energy Consumption Reductions, Total (Gigajoules (GJ))	
Energy Consumption Reductions, Baseline (Gigajoules (GJ))	
Energy Consumption Reductions, Base Year (Year)	
Science-Based Targets Initiative (SBTi) (Y/N)	
Science-Based Targets Initiative (SBTi)	
Physical Risk (Y/N)	
Physical Risk (Eg. Flood; Drought)	
Innovation and Development	
Investment in Sustainable Products (Millions of local reporting currency)	
Sustainable Investment/Expenditures (Millions of local reporting currency)	
Green Patent (Y/N)	
Green Building Certification (Y/N)	
Green Building Certification, Number of Buildings (Count)	
Water Technologies (Y/N)	
Environment Management System	
ISO 14001 Certification, Number of Sites (Count)	ISO 14001 Certification (Y/N)
	ISO 50001 Certification (Y/N)
Fines	
Environmental Fines, Amount (Millions of local reporting currency)	
Incidents	

Spills, Count (Count)	
Spills in Volume, Amount (Thousands of barrels)	
Spills in Tonnes, Amount (Metric tons (tonnes))	
Identified Issues	
Recent Environmental Controversies (Y/N)	
Reporting	
GRI Compliance (Y/N)	
SASB Compliance (Y/N)	
ISSB Compliance (Y/N)	
TCFD Recommendations (Y/N)	
CDP Response Status	
Regulation	
Exchange Listing Requirement (Y/N)	
Policy/Law/Regulation: National Level (Y/N)	
Policy/Law/Regulation: Regional Level (Y/N)	
Climate-Impacting Policy/Law/Regulation (Eg. Law 1; Policy 1; Regulation 1)	
Carbon Pricing (Y/N)	
Carbon Pricing Type (Eg. Carbon Tax; EU ETS)	
Supplier Environmental Evaluation	
Suppliers assessed for environmental impacts (Y/N)	
Third-Party Verification	
Third-Party Verification (Y/N)	
Third-Party Verification Standard (Text (Eg. EY; KPMG)	

Appendix B: IFRS S2 Indicators Excluded from SGFIN SEF

While SGFIN SEF provides a broader set of indicators, this does not necessarily imply that IFRS S2 covers a narrower scope of sustainability reporting. Since IFRS S2 is fully aligned with the TCFD framework, it places emphasis not only on metrics and targets but also on strategy and risk management, which may be considered secondary layers of sustainability information for other standards.

In the Strategy section, SGFIN's framework excludes seven indicators that are included in IFRS S2 framework:

1. A description of the current and anticipated effects of climate-related risks and opportunities on the entity's business model and value chain
2. A description of where in the entity's business model and value chain climate-related risks and opportunities are concentrated (geographical areas, facilities, and types of assets).
3. Information about how the entity has responded to and plans to respond to climate-related risks and opportunities in its strategy and decision-making
4. Information about how the entity is resourcing, and plans to resource, the activities
5. Quantitative and qualitative information about the progress of plans disclosed in previous reporting periods
6. The entity's assessment of its climate resilience as at the reporting date, which shall enable users to understand: the implications, the significant areas of uncertainty, the entity's capacity to adjust or adapt its strategy and business model to climate change over the short, medium and long term
7. How and when the climate-related scenario analysis was carried out, including: information about the inputs, the key assumptions, and the reporting period

In the Metrics and Targets section, SGFIN's framework does not include three indicators in IFRS S2:

1. Climate-related transition risks: The amount and percentage of assets or business activities vulnerable to climate-related transition risks
2. Climate-related physical risks: The amount and percentage of assets or business activities vulnerable to climate-related physical risks
3. Climate-related opportunities: The amount and percentage of assets or business activities aligned with climate-related opportunities

The S2 Industry Guidance identifies two indicators that are currently excluded from SGFIN's framework: (1) discussion of long- and short-term strategies for managing Scope 1 emissions, including reduction targets and performance analysis, and (2) number of incidents of non-compliance with water quality regulations. Their omission is primarily due to extremely limited data availability in company reports and verification challenges, as the data is typically qualitative and difficult to validate. Given these constraints, we believe that any retrievable information at this stage of IFRS S2's implementation would likely be inaccurate and may offer limited value in assessing the quality, transparency, and integrity of sustainability reporting.

Appendix C: Sustainability Reporting in Indonesia

Sustainability reporting in Indonesia is governed by the Financial Services Authority (Otoritas Jasa Keuangan, or OJK) Regulation No. 51/POJK.03/2017, titled "Implementation of Sustainable Finance for Financial Services Institutions, Issuers, and Public Companies." This regulation mandates that financial services institutions, issuers, and publicly listed companies integrate sustainable finance principles into their operations and disclose their economic, social, and environmental performance through annual Sustainability Reports. These reports can be submitted as part of the annual report or as a separate document and must be provided to the OJK and made publicly available.

The Indonesia Stock Exchange (IDX) has also established regulations concerning the delisting and relisting of companies. While specific requirements for environmental impact reporting in the context of delisting and relisting are not explicitly detailed in the available sources, companies are generally expected to maintain transparency regarding their environmental performance. This includes adhering to sustainability reporting obligations as outlined by the OJK. Compliance with these regulations is crucial for companies to maintain their listing status on the IDX. In POJK 51 attachment 2, If the Sustainability Report is prepared separately from Annual report, it must contain information at least:

a. explanation of sustainability strategy
b. overview of sustainability aspects (economic, social, and Environment)
c. brief profiles of LJKs, Issuers and Public Companies
d. explanation from the Board of Directors
e. sustainability governance
f. sustainability performance
g. written verification from an independent party, if any
h. feedback sheet for readers, if any
i. LJK, Issuer or Public Company response to previous year's report feedback.

In summary, Indonesia's regulatory framework emphasizes the importance of sustainable finance and mandates comprehensive sustainability reporting for financial institutions and publicly listed companies. Adherence to these regulations is essential for companies aiming to maintain good standing within the country's financial markets.

Source: (The Financial Services Authority of the Republic of Indonesia, 2017)

Appendix D: Sustainability Reporting Template in the Philippines

ENVIRONMENT

Resource Management

Energy consumption within the organization:

Disclosure	Quantity	Units
Energy consumption (renewable sources)		GJ
Energy consumption (gasoline)		GJ
Energy consumption (LPG)		GJ
Energy consumption (diesel)		GJ
Energy consumption (electricity)		kWh

Reduction of energy consumption

Disclosure	Quantity	Units
Energy reduction (gasoline)		GJ
Energy reduction (LPG)		GJ
Energy reduction (diesel)		GJ
Energy reduction (electricity)		kWh
Energy reduction (gasoline)		GJ

What is the impact and where does it occur? What is the organization's involvement in the impact?	**Which stakeholders are affected?**	**Management Approach**
Identify the impact and where it occurs (i.e., primary business operations and/or supply chain) *Indicate involvement in the impact (i.e., caused by the organization or linked to impacts through its business relationship)*	*(e.g. employees, community, suppliers, government, vulnerable groups)*	*What policies, commitments, goals and targets, responsibilities, resources, grievance mechanisms, and/or projects, programs, and initiatives do you have to manage the material topic?*
What are the Risk/s Identified?	**Which stakeholders are affected?**	**Management Approach**
Identify risk/s related to material topic of the organization		
What are the Opportunity/ies Identified?	**Which stakeholders are affected?**	**Management Approach**

Appendix E: Sustainability Reporting Regulations in Singapore

The Singapore Exchange (SGX) has developed a set of Core ESG Metrics to assist issuers in delivering standardized ESG data and to provide investors with consistent, comparable, and aligned information. These metrics include detailed definitions, standardized units, and alignment with internationally recognized sustainability reporting frameworks.

The Core ESG Metrics aim to establish a unified foundation for ESG disclosures, promoting transparency and facilitating comparability across industries. Designed to be quantitative and widely applicable, the metrics reflect prevailing reporting practices and serve as a practical baseline for ESG reporting.

This initiative has received strong endorsement, with positive responses to SGX's consultation paper, *Starting with a Common Set of Core ESG Metrics*. It has also gained support from a broad spectrum of institutional investors, including family offices and global asset managers.

While SGX encourages issuers to adopt the Core ESG Metrics to ensure consistent and comparable reporting, it also advises companies to perform materiality assessments. This allows issuers to customize their disclosures, addressing the specific needs of their stakeholders and industry context in a more comprehensive manner.

Through this initiative, SGX underscores its dedication to enhancing the quality, accessibility, and transparency of ESG data, fostering greater alignment and trust within the investment ecosystem.

The SGX has established comprehensive sustainability reporting requirements for listed companies, primarily outlined in Listing Rules 711A and 711B, and detailed further in Practice Note 7.6: Sustainability Reporting Guide.

Listing Rule 711A mandates that every issuer must prepare an annual sustainability report that describes the issuer's sustainability practices with reference to the primary components set out in Rule 711B.

Listing Rule 711B specifies the primary components that must be included in the sustainability report, which are:

- Material ESG Factors
- Policies, Practices, and Performance
- Targets
- Sustainability Reporting Framework and,
- Board Statement

These components are designed to provide stakeholders with a comprehensive view of the company's sustainability strategies and performance.

To assist issuers in complying with these requirements, Practice Note 7.6: Sustainability Reporting Guide offers detailed guidance on the preparation of sustainability reports. This guide emphasizes the importance of providing a balanced and comparable overview of the company's sustainability practices, ensuring that reports are both meaningful and useful to stakeholders.

Collectively, these regulations underscore SGX's commitment to promoting transparency and accountability among listed companies, encouraging them to integrate sustainable practices into their operations and to communicate these efforts effectively to investors and other stakeholders.

The SGX Sustainability Regulations are detailed in Clause 711B and can be mapped onto Practice Note 7.6.

Clause	Description	Effective Date	Comments	Mapping to Practice Note 7.6
711A	An issuer must issue a sustainability report for its financial year, no later than 4 months after the end of the financial year, or where the issuer has conducted external assurance on the sustainability report, no later than 5 months after the end of the financial year.	Effective from 01 Jan 2022 to 31 Dec 2025		
711B	1) The sustainability report must describe the sustainability practices with reference to the following primary components:	Effective from 01 Jan 2022 to 31 Dec 2024		
	(a) material environmental, social and governance factors;			4.1 (a) Material ESG factors. The sustainability report should identify the material ESG factors and describe both the reasons for and the process of selection, taking into consideration their relevance or impact to the business, strategy, financial planning, business model and key stakeholders.

	(aa) climate-related disclosures consistent with the recommendations of the Task Force on Climate-related Financial Disclosures;		Refer to "TCFD Recommendations" Tab	4.1 (b) Climate-related disclosures. The sustainability report should contain disclosures related to climate risks and opportunities, consistent with the TCFD recommendations.
	(b) policies, practices and performance;			4.1 (c) Policies, practices and performance. The sustainability report should set out the issuer's policies, practices and performance in relation to the material ESG factors identified, providing descriptive and quantitative information on each of the identified material ESG factors for the reporting period. Performance should be described in the context of previously disclosed targets.
	(c) targets;			4.1 (d) Targets. The sustainability report should set out the issuer's targets for the forthcoming year in relation to each material ESG factor identified. Targets should be considered for defined short-, medium- and long-term horizons, and if not consistent with those used for strategic planning and financial reporting, the reasons for the inconsistency should be disclosed.
	(d) sustainability reporting framework; and			4.1 (e) Sustainability reporting framework. The issuer should select a sustainability reporting framework (or frameworks) to guide its reporting and disclosure. For climate-related disclosures, the issuer should report based on the

				TCFD recommendations. The sustainability reporting framework(s) selected should be appropriate for and suited to its industry and business model. The issuer should state the name of the framework(s), explain its reasons for choosing the framework(s) and provide a general description of the extent of the issuer's application of the framework(s).
	(e) Board statement and associated governance structure for sustainability practices.			4.1 (f) Board statement. The sustainability report should contain a statement of the Board that it has considered sustainability issues in the issuer's business and strategy, determined the material ESG factors and overseen the management and monitoring of the material ESG factors. In addition, the sustainability report should describe the roles of the Board and the management in the governance of sustainability issues.
	(2) If the issuer excludes any primary component, it must disclose such exclusion and describe what it does instead, with reasons for doing so. An issuer in any of the industries identified in Practice Note 7.6 may not exclude the			4.9 May not exclude from FY 2023: Financial; Agriculture, Food and Forest Products; Energy May not exclude from FY 2024: Materials and Buildings; Transportation

	primary component in Rule 711B(1) (aa).			
	(3) The issuer's sustainability reporting process must be subject to internal review. The issuer may additionally commission an independent external assurance on the sustainability report.			5.3 An internal review of the sustainability reporting process builds on the issuer's existing governance structure, buttressed by adequate and effective internal controls and risk management systems. The internal audit function conducts the internal review, and may involve relevant functions, such as risk management, sustainability or other specialist functions. The identified processes relating to sustainability reporting should be incorporated into the internal audit plan, which should cover key aspects of the sustainability report; the review may take place over an audit cycle, which may span one or a few years in accordance with risk-based planning, as approved by the Audit Committee. The expectations of the Board, management and other stakeholders should be considered as part of the prioritisation. The internal review should be conducted in accordance with the International Standards for the Professional Practice of Internal Auditing issued by The Institute of Internal Auditors.

				5.5 External assurance involves the engagement of a third party. The scope of the assurance may include a materiality assessment, and cover different aspects of the sustainability disclosures, for example: (a) data and its associated data collection process; (b) narratives; (c) compliance with the specified sustainability reporting framework; (d) process to identify sustainability information reported; and (e) compliance with the Listing Rules.

Appendix F: Sustainability Reporting Guidelines in Thailand

Thailand's sustainability reporting guidelines outline both core indicators and recommended indicators across the environmental, social, and governance (ESG) dimensions to ensure comprehensive disclosures. These indicators provide a structured approach for companies to report on key aspects of sustainability performance (The Stock Exchange of Thailand, 2022).

- Environmental Indicators: There are 27 indicators spanning five environmental dimensions, of which 13 are core indicators. These indicators focus on critical areas such as emissions, energy use, water management, and biodiversity.
- Social Indicators: A total of 39 indicators are outlined across four social dimensions, with 18 identified as core indicators. These cover topics such as diversity, human rights, labour practices, occupational safety and health, and anti-corruption measures.
- Governance Indicators: Governance has the most extensive set of indicators, with 56 indicators across five governance dimensions, of which 42 are core indicators. These indicators are designed to address areas such as corporate strategy, board oversight, and risk management. The focus on governance reflects the Stock Exchange of Thailand's (SET) effort to ensure robust strategy, oversight, and risk assessment in sustainability reporting, emphasizing the importance of strong governance structures for achieving sustainable business practices.

By prioritizing core indicators while offering flexibility with additional recommended indicators, the guidelines provide a balanced framework that supports both regulatory compliance and strategic sustainability management.

Appendix G: Sustainability Reporting Template in Vietnam

Appendix

Disclosure template

An example of a disclosure template is provided to facilitate data collection.

Notes:

1. Organizations may include in the "Explanation" column a description of the comparability of performance and how they set and monitor targets.
2. If this is the organization's first sustainability report, it should report the "Level of disclosure" according to the framework as stated in this Guide.

Key Performance Indicators – Financial Year 2016								
Disclosure indicator	Data source	Calculation methods	Level of disclosure (FD, PD, NI, NA)	Explanation	Performance			
					Actual 2016	Target 2017	Actual 2017	Target 2018
E.g. Total Amount of Raw Materials Used								

Levels of disclosure

Full Disclosure **(FD)** – Completely sufficient data available for comprehensive disclosure.
Partial Disclosure **(PD)** – Most or some data available for disclosure.
No Information **(NI)** – No data available for disclosure.
Not Applicable **(NA)** – Indicator is not applicable to the organization.

Source: (International Finance Corporation, 2016)

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