Quantifying the Economic Implication of Sustainability Initiatives and Aligning Reporting with IFRS Sustainability Disclosure Standards

This project helps Samudera Shipping Line ("SSL") anticipate and manage financial and reputational risks from climate change and sustainability disclosure obligations. Our assessment focuses on two strategic components:

Benchmarking & Disclosure Analysis

Evaluated SSL's FY2023 and FY2024 sustainability disclosures against SGX and IFRS S1/S2 standards, identifying key gaps in governance, risk disclosure, and scenario planning. Actionable recommendations were developed to enhance compliance and investor confidence.

Climate Risk Scenario Analysis

Modelled route-level cost impacts of acute weather disruptions, chronic climate shifts, and transition policies (e.g., IMO levies, carbon tax) under SSP2–4.5, SSP3-7.0, and SSP5–8.5 pathways. Results show potential profit margin erosion and call for proactive mitigation.

BENCHMARKING & DISCLOSURE ANALYSIS

Insights from Companies Disclosures

Source: Team analysis based on company Sustainability Report

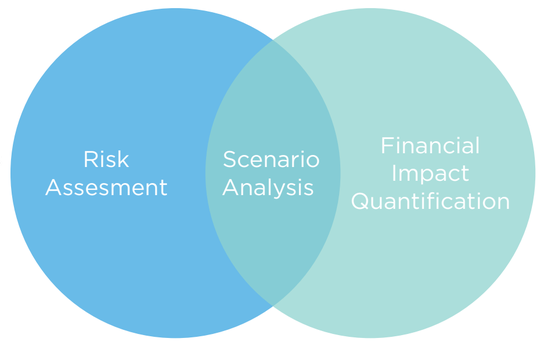
	Governance	Decarbonization Strategy	Disclosure Compliance	Transition Initiatives	GHG Reporting
MAERSK	ESG Committee under Board of Directors	Targeting net-zero emissions by 2040 across all operations	Full alignment with IMO, EU CSRD, SBTi validation for 1.5°C-aligned 2030 targets and net-zero 2040 targets, TCFD and SASB	Leading in green fuel supply chains, including methanol & biofuels for vessels. Industry's first large-scale green methanol offtake agreement	Full Disclosure on Scope 1, Scope 2 & Scope 3
EVERGREEN	Sustainability Committee under Board of Directors	Targeting net-zero emissions by 2050	Full alignment with IMO 2050 decarbonization target, SBTi for 2 years carbon reduction target, GRI	Methanol dual-fuel ship contract signing, testing on marine biofuel oil vessels, MOUs with e-methanol suppliers, GHG Inventory Team to verify emission	Full Disclosure on Scope 1, Scope 2 & Scope 3
PIL	ESG Steering Committee (but not board level)	Fully aligned with the 2023 IMO Decarbonisation Strategy to achieve net-zero GHG emissions by 2050	Full alignment with IMO 2030 decarbonization target, GRI, TCFD	Centre for Maritime Efficiency (CME) to optimize voyages, LNG dual-fuel container vessels	Full Disclosure on Scope 1, Scope 2 & Scope 3
SSL	SSC under Audit Committee	Reduce Scope 1 emissions by at least 20% by 2030, from 2008 baseline	Alignment with the principles outlined in the GRI, TCFD, and IMO 2020 regulations	Vessels retrofitting, emission control technology, exploring alternative fuels and implement Engine Power Limitation (EPL) systems	Full Disclosure on Scope 1 & Scope 2

Recommendation from the Benchmarking & Disclosure Analysis

Improving Company's Disclosures Through Scenario Analysis

Scenario analysis is the core decision-making tool, integrating risk assessment and financial impact quantification to enhance strategic resilience.

A structured risk assessment frame work helps businesses anticipate potential risks and align them with strategic planning.



Quantifying financial risks ensures informed decision-making and strengthens business resilience.

CLIMATE RISK SCENARIO ANALYSIS

Route-level Scenario Analysis for SSL

OBJECTIVES

Leverage scenario analysis to inform strategic planning and strengthen resilience across SSL's feeder routes—while also meeting IFRS S2 disclosure expectations.

- Identify climate-related material risks and opportunities under different plausible futures
- Estimate financial impact from transition risks, physical risk (both acute and chronic) to the business.
- Prioritize and quantify risk severity and use the result to support strategic planning.

FOCUS

SSL's route-level scenario analysis focuses on identifying material climate-related risks—through climate risk modelling and financial impact assessment.

OUTPUT

Risk based **financial impact estimation** under:

SSP2-4.5 (Middle-of-the-Road scenario)
SSP3-7.0 (Current Trajectory, ≥4°C warming)
SSP5-8.5 (Business-as-Usual, ≥4°C warming)

along with an **assessment of materiality** to the company.

Identifying the Risks

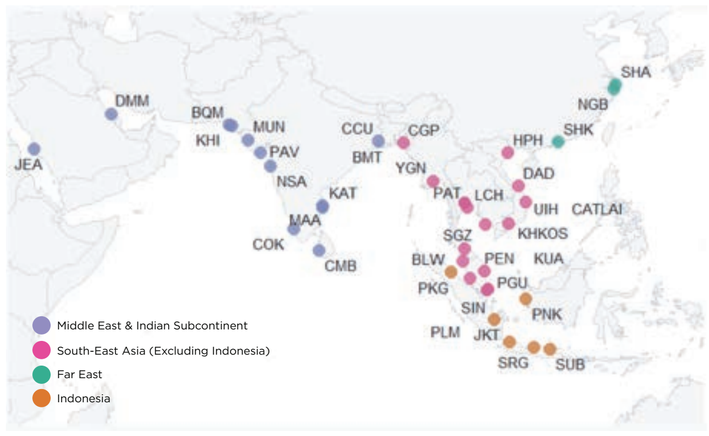
To assess the financial impact of the climate-related risks for SSL, we based our analysis on the risk categories identified by the company in its 2024 Sustainability Report.

Risk Type	Risk Category	Time Horizon	Risk Event
Physical Risk	**Acute Risk** Extreme weather events (typhoons, storms, floods)	Short-term	Supply chain disruption
		Short-term	Cargo loss or equipment damage
		Medium-term	Increased insurance, tax and compensation costs
	Chronic Risk Rising temperature and sea level	Long-term	Heat stress on crew, increased marine fouling on ship hulls, and higher cooling requirements on board
		Long-term	Port inundation and infrastructure damage
Transition Risk	**Market Risk**	Short-term	High costs and limited availability of alternative fuels
		Medium-term	Shifting customer demand and increased competition from low-carbon shipping companies
	Policy & Legal Risk	Short-term	Stricter emissions regulations which could lead to potential for non-compliance penalties
	Technology Risk	Medium-term	Technological uncertainty and risk which could require costly upgrades or replacement costs
	Reputation Risk	Long-term	Changing consumer, employee, and stakeholder preferences that could influence public perception

Short-term: < 3 years Mid-term: 3 - 10 years Long-term: > 10 years : Selected risks for scenario analysis

Identifying the Routes

To conduct the analysis of both physical and transition risks, we used company's 25 shipping routes, which are distributed across 4 geographical regions and others*.



*Routes classified as "Others" are excluded from the analysis

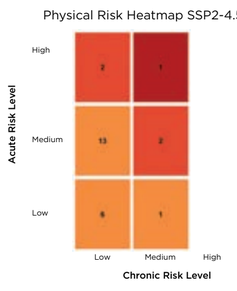
These routes connect major ports across four key geographical regions according to SSL segment performance, Far East, South-East Asia (excluding Indonesia), Indonesia, and the Middle East & Indian Subcontinent, representing a diverse exposure to regional climate hazards.

How Physical Climate-Related Scenarios Shift SSL's Route-Level Risk Exposure

Route Risk Classification by Acute–Chronic Exposure Quadrant

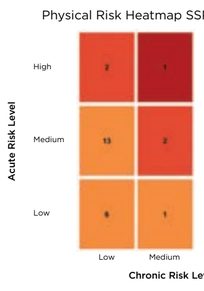
Risk classification matrix showing the number of routes falling under each acute vs. chronic risk combination. Scores are based on Monte Carlo simulations across the [SSP scenario] pathway.

Physical Risk Heatmap SSP2-4.5



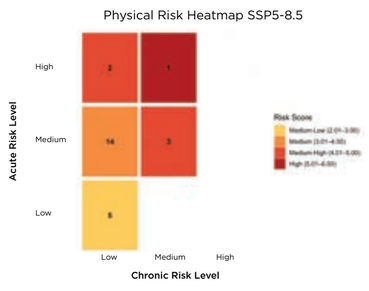
Most routes fall under Medium–Low quadrants, indicating moderate acute risk and limited chronic stress.

Physical Risk Heatmap SSP3-7.0



Risks begin shifting toward Medium–Medium and High–Low quadrants, signaling more volatile acute conditions.

Physical Risk Heatmap SSP5-8.5



Risk concentration intensifies in both acute and chronic dimensions, especially within the High–Medium and Medium–Medium quadrants.

Key Findings – Physical Risk

Projected Climate-Adjusted Cost Impact under SSP Scenario

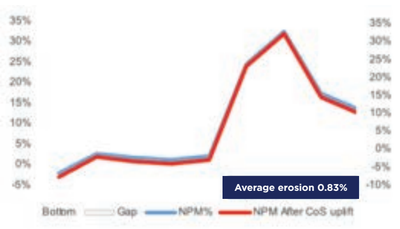
Total cost impact is estimated by applying risk-based uplifts to selected cost items (e.g., charter rates, fuel, labor, depreciation). Route-level classifications determine acute and chronic multipliers. Results reflect the potential exposure-adjusted financial burden on operations under [SSP Scenario].

Scenario	Total Acute Cost Impact	Total Chronic Cost Impact	Combined Cost Impact
SSP2–4.5 (Moderate)	0.55%	0.55%	**1.01%**
SSP3–7.0 (Trajectory)	2.30%	1.43%	**3.73%**
SSP5–8.5 (Worst-case)	3.99%	2.46%	**6.45%**

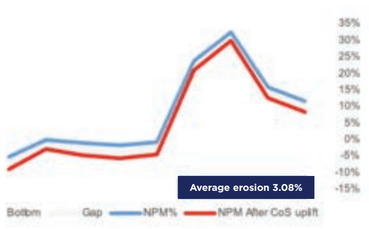
Cost impacts are relative to baseline operational cost (e.g., % of total CoS)

SSL has demonstrated strong operational foresight, with recent performance likely reflecting effective route optimization under SSP2–4.5 conditions. Its feeder network also faces relatively fewer high-risk storm exposures, indicating a thoughtful approach to seasonal planning. However, a 5% climate cost increase could erode ~one-third of average net profit. Some considerations for future planning include incorporating climate-adjusted cost assumptions into budgeting and exploring adaptive charter structures (e.g., pass-through clauses, performance-based incentives).

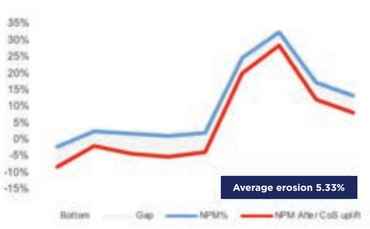
Margin Erosion Under SSP2-4.5 Scenario



Margin Erosion Under SSP3-7.0 Scenario



Margin Erosion Under SSP5-8.5 Scenario



Margin erosion is calculated by applying scenario-based cost uplifts to historical 10-year average data—offering a backward-looking stress-test, not a forecast.

Key Findings – Transition Risk

To assess transition risks, scenario analysis was conducted under two climate pathways as follows:

Results	IMO's Net-Zero Framework and Green Balance Mechanism	Singapore's Carbon Tax
SSP5-8.5 (Business-as-Usual, ≥4°C warming)	S$60,401,150[a]	S$4,249,190[b]
SSP2-4.5 (Middle-of-the-Road scenario)	S$78,604,375[c]	S$7,648,541[d]

[a] 13.5%, [b] 0.95%, [c] 17.57%, [d] 1.71% of CoS, based on average CoS 2020 – 2024, S$447,389,000.

Assumptions:

- We assume that the levy rate and carbon tax values represent the nominal amounts that the company may have to pay **in 2028 to 2030 (per year).**
- We assume **9.63% of emissions fall within Singapore's boundaries** for Singapore carbon tax calculation.
- SSP5-8.5 Business-as-Usual (BAU) Scenario: No emission reductions, assumes operations continue at full emissions capacity. Levy rates of **US$100 – US$380** and a carbon tax of **S$25 per ton of CO2e** are imposed, assuming no change in carbon tax rate from 2025.
- SSP-4.5 Middle-of-the-Road Scenario: No emission reductions, assumes operations continue at full emissions capacity. Levy rates of **US$130–US$495** (20% increase due to more aggressive IMO regulations) and a carbon tax of **S$45 per ton of CO2e** are imposed, with the tax rate adjusted according to NEA guidelines.

The table below presents the estimated financial impacts of emission-related regulations across different geographical areas:

Results	IMO's Net-Zero Framework and Green Balance Mechanism		Singapore's Carbon Tax	
	SSP5-8.5 (BAU)	SSP2-4.5	SSP5-8.5 (BAU)	SSP2-4.5
Indonesia	12,133,999	15,796,041	111,450	200,609
South-East Asia (Exc. Indonesia)	48,267,151	62,808,333	577,371	1,039,268
Middle East & Indian Subcontinent	0	0	2,876,138	5,177,048
Far East	0	0	685,980	1,234,763

Under the IMO mechanism, significant cost exposures are observed in Indonesia and South-East Asia, reflecting the high emission intensity of shorter regional routes. In contrast, under Singapore's Carbon Tax, the highest projected costs are concentrated in the Middle East & Indian Subcontinent routes, likely due to higher absolute emissions.

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