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The Impact of Scientific Research, AI and International Law on Climate Change

Climate Change: International Law and Standards

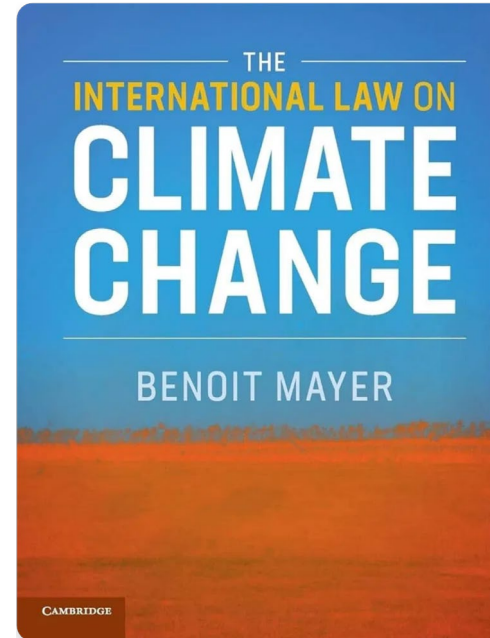
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International Climate Agreements Overview

Agreement	Year	Legal Status	Main Objective	Global Participation
UNFCCC	1992	Framework Convention	Prevent dangerous human interference with climate system	198 Parties
Kyoto Protocol	1997	Legally Binding Treaty	Mandate emission reductions for developed countries	~192 Parties
Paris Agreement	2015	Legally Binding Treaty	Limit global warming to well below 2°C, pursue 1.5°C	195+ Parties
Glasgow Climate Pact	2021	Political Declaration	Accelerate action toward net-zero and phase down coal	COP26 Outcome



Regional Climate Initiatives in Asia-Pacific

Asia Pacific Adaptation Network (APAN)

UNEP, UNESCAP

Climate adaptation, resilience, knowledge sharing

ASEAN Working Group on Climate Change

ASEAN Secretariat

Regional policy coordination, capacity building

Pacific Islands Forum Climate Action

Pacific Islands Forum

Climate resilience, loss and damage, adaptation funding

ADB's 100 Climate Actions in Cities

Asian Development Bank

Urban climate resilience, low-carbon infrastructure

Climate Ambition Alliance (regional arm)

UNFCCC, regional governments

Net-zero pledges, enhanced NDCs





Global Standards and Reporting

Voluntary Guidance

- 🌿 TNFD (Taskforce on Nature-related Financial Disclosures)
- ☁️ GHG Protocol (Greenhouse Gas Protocol)
- 🌱 TCFD (Task Force on Climate-related Financial Disclosures)

Mandatory Regulations

- ✅ IFRS S1 (General Requirements for Sustainability-related Disclosures)
- ✅ IFRS S2 (Climate-related Disclosures)
- ✅ CSRD (Corporate Sustainability Reporting Directive)
- ✅ US SEC Climate Disclosure Rules



Evolution of sustainability reporting standards from voluntary to mandatory frameworks



Regulatory Framework Comparison

Aspect	CSRD (EU)	ISSB	US SEC
Enforceability	Regulated by CSRD	Subject to jurisdictional adoption	Proposed by US SEC
Scope	EU companies & non-EU with significant EU operations	Subject to jurisdictional adoption	Nearly all US SEC registrants
Topics	Broad ESG topics	Climate and sustainability risks	Climate-related risks
Materiality	Double materiality	Financial materiality	1% bright-line threshold
GHG Emissions	Scope 1, 2, and 3 required	Scope 1, 2, and 3 required	Scope 1, 2 required; Scope 3 if material
Assurance	Limited assurance	Based on jurisdictional rules	Limited assurance for Scope 1 & 2
Implementation	Phased by entity type (2024+)	Varies by jurisdiction	Phased by filer type



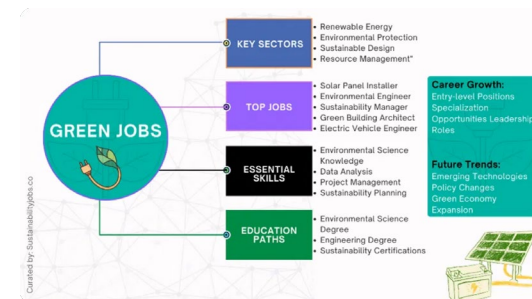
Visualisation of regulatory framework integration and data flow



Localisation of International Standards

Framework	Enforceability	Scope	Materiality	GHG Reporting	Effective Date
ISSB (Global)	Subject to jurisdictional adoption	Subject to jurisdictional adoption	Investor focused	Scope 1, 2, and 3 required	2024
MOF ED (China)	Subject to relevant disclosure requirements	Enterprises in Chinese mainland	Multi-stakeholder (double materiality)	Framework aligned with TCFD	Target 2027
HKEx (Hong Kong)	Mandatory	Main Board and GEM listed companies	Investor focused	Scope 1, 2, and 3 required	2025
Domestic Exchanges (Regional)	Mandatory	Top listed companies in respective indices	Multi-stakeholder (double materiality)	Scope 1 and 2 required, Scope 3 encouraged	2025

Key Insight: While global standards provide the framework, local implementation varies significantly in scope, materiality definitions, and reporting requirements.



Localisation requires specialised skills and adaptation to regional contexts



Technology and Data Management

Identify Source Data

Structured, semi-structured, and unstructured data from internal systems (ERP, operational data) and external sources (supply chain, climate statistics, regulatory data)

Data Collection & Integration

API connections, file transfers, RPA (Robotic Process Automation), streaming data collection from IoT devices and sensors

Transform & Validate

Data mapping, calculations, cleansing, validation checks, standardization, enrichment, and optimization with AI-powered quality controls

Report & Analyse

Internal dashboards, data visualisations, regulatory reporting, investor reporting, and rating agency submissions with automated compliance checks

AI Integration for Climate Data Management

- Machine learning for anomaly detection in emissions data
- Natural language processing for automated regulatory compliance scanning
- Predictive analytics for climate risk assessment and scenario planning
- Blockchain for transparent and immutable carbon credit tracking



Technology integration requires specialised roles across the ESG data lifecycle



Case Study: Huzhou City Transition Finance

In June 2023, Huzhou followed the relevant requirements of the 'G20 Transition Finance Framework' for defining standards for transition activities and investments. Based on principles of technological advancement and significant emission reductions, Huzhou iteratively launched the 'Huzhou City Transition Finance Activities Catalogue (2023 Edition)'.

G20 Transition Finance Framework Pillars:

- 1 Approaches to Identification of Transitional Activities and Investments
- 2 Reporting of Information on Transition Activities and Investments
- 3 Transition-Related Financial Instruments
- 4 Designing Policy Measures
- 5 Assessing and Mitigating Negative Social and Economic Impact

Huzhou City Transition Finance Activities Catalogue (2023 Edition)

- Part 1: Industry categories
- Part 2: Transition technologies or pathways
- Part 3: Low-carbon transition baseline values
- Part 4: Low-carbon transition target values



Implementation of transition finance frameworks requires specialized sustainability expertise



Hong Kong's Progress as a Green Finance Hub

📈 Market Leadership (2024-2025)

- USD 43.1 billion in international GSS+ bonds (43.2% increase YoY)
- 45% market share of Asia's cross-border sustainable debt

🏛️ Government Initiatives

- HK\$220 billion in government green bonds issued (April 2025)
- Sustainable Bond Programme expanded to HK\$500 billion ceiling

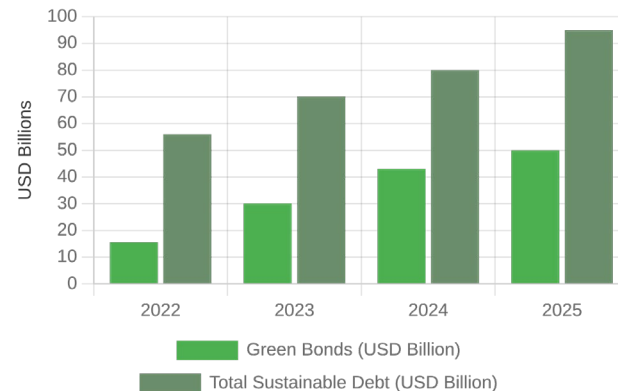
⚙️ Infrastructure Development

- Hong Kong Taxonomy launched in May 2024
- Green Finance Grant Scheme extended to 2027

Key Performance Indicators (2024-2025)

Green bonds market share in Asia: **45%**
 Total sustainable debt issued: **USD 80+ billion**
 Government green bonds outstanding: **HK\$220 billion**

Hong Kong Green Finance Growth

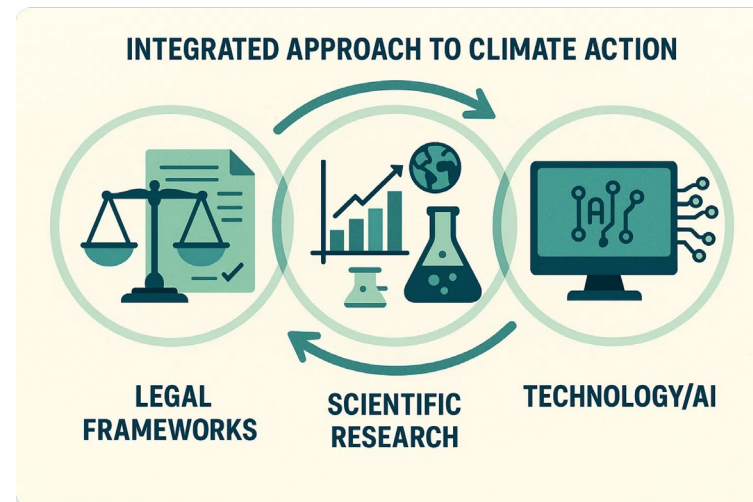


Hong Kong's sustainable finance growth



Conclusion and Next Steps

- ✓ International climate agreements provide the legal foundation for global climate action, with increasing focus on implementation and accountability.
- ✓ Regional initiatives in Asia-Pacific demonstrate the importance of localized approaches to address specific climate vulnerabilities and opportunities.
- ✓ Reporting standards are evolving from voluntary to mandatory frameworks, with increasing harmonization across jurisdictions.
- ✓ Technology and AI are critical enablers for data collection, analysis, and compliance with increasingly complex climate regulations.



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