Carbon Measurement, Management, and Ecosystems

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Agenda

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1. Net Zero Journey
2. COP26 Global Climate Pact
3. Carbon Price Landscape and Trends
4. Understanding Carbon Management
5. Carbon Measurement Tools & Regulatory Demands For Disclosures
6. Practical Options for Businesses
7. SG Green Plan 2030

Context: Unchecked Impact of Climate Change

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Means **extreme flash floods** will be more and more common

Will cause the arctic to be **ice free by summer 2040**

Could push an additional hundred million people into **extreme poverty** by 2030

Context: Is 2°c Just A Bad Fever?

How serious can it be with just a few more degrees?

	In a +1.5°C world...	In a +2 °C world...	In a +3°C world...	In a +4°C world...
Acute risks	**10%** probability of ice-free Artic summer at least once before hitting temperature limit.	**80%** probability of ice-free Artic summer at least once before hitting temperature limit.	**100%** probability of ice-free Artic summer at least once before hitting temperature limit.	
	41% increase in area burned by wildfires in an average Mediterranean summer.	**62% increase** in area burned by wildfires in an average Mediterranean summer.	**97% increase** in area burned by wildfires in an average Mediterranean summer.	
	86% increase in economic damages from river flooding in China.	**120% increase** in economic damages from river flooding in China.		**443% increase** in economic damages from river flooding in China.
	2.3°C increase in average temperature in Asia.	**3°C increase** in average temperature in Asia.		**6°C increase** in average temperature in Asia.
Chronic risks	Global average length of drought **increases by 2 months**.	Global average length of drought **increases by 4 months**.	Global average length of drought **increases by 10 months**.	
	Average rainfall in Asia **increases by 4%**.	Average rainfall in Asia **increases by 6%**.	Average rainfall in Asia **increases by 10%**.	
	20% decrease in rainfall in rainy season in South Africa, Western Cape.	**20% decrease** in rainfall in rainy season in South Africa, Western Cape.	**20% decrease** in rainfall in rainy season in South Africa, Western Cape.	
	6.4 million more cases of dengue fever in Latin America by 2050.	**6.7 million more** cases of dengue fever in Latin America by 2050.	**7.5 million more** cases of dengue fever in Latin America by 2050 (in a +3.7°C world).	
	0.3% increase in excess deaths due to heat in Australasia.	**0.5% increase** in excess deaths due to heat in Australasia.		**1.8% increase** in excess deaths due to heat in Australasia.
	8% plants lose over half of their climatic range.	**16% plants** lose over half of their climatic range.		**16% plants** lose over half of their climatic range (in a +4.5°C world)

Primary source: Carbon Brief[11]. (Blanks cells indicate no comparable data available for the specified risk and temperature increase)

Source: IIGCC (2021); p. 7

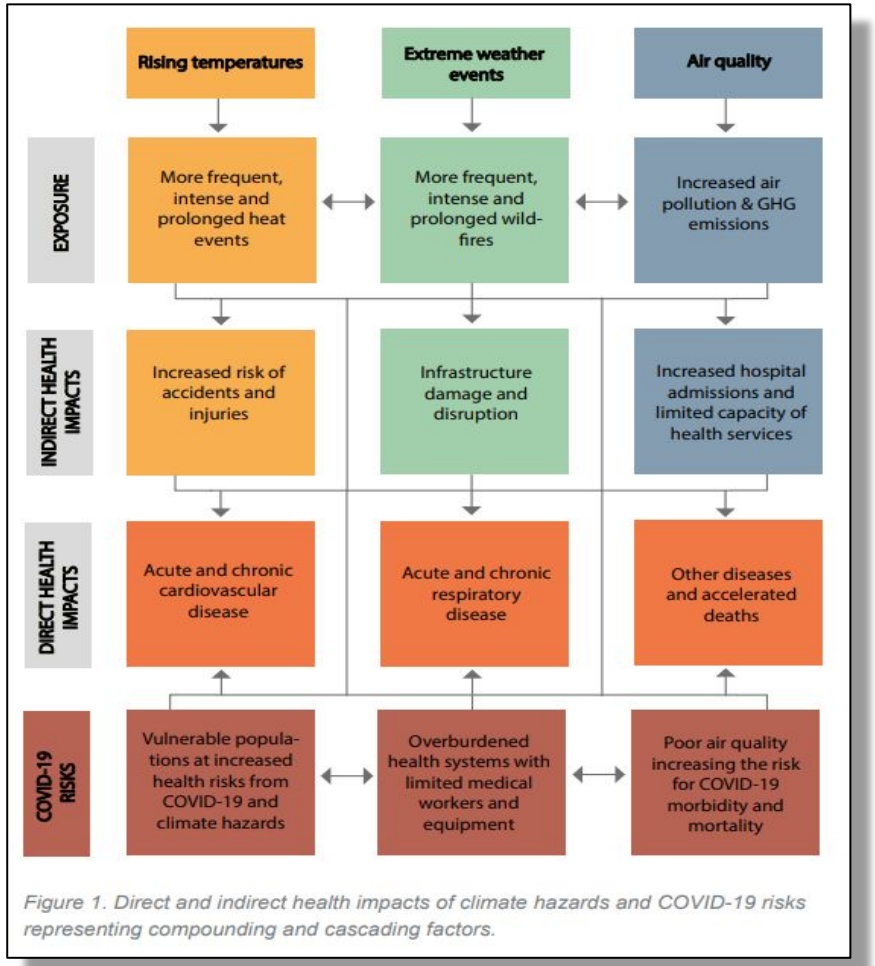
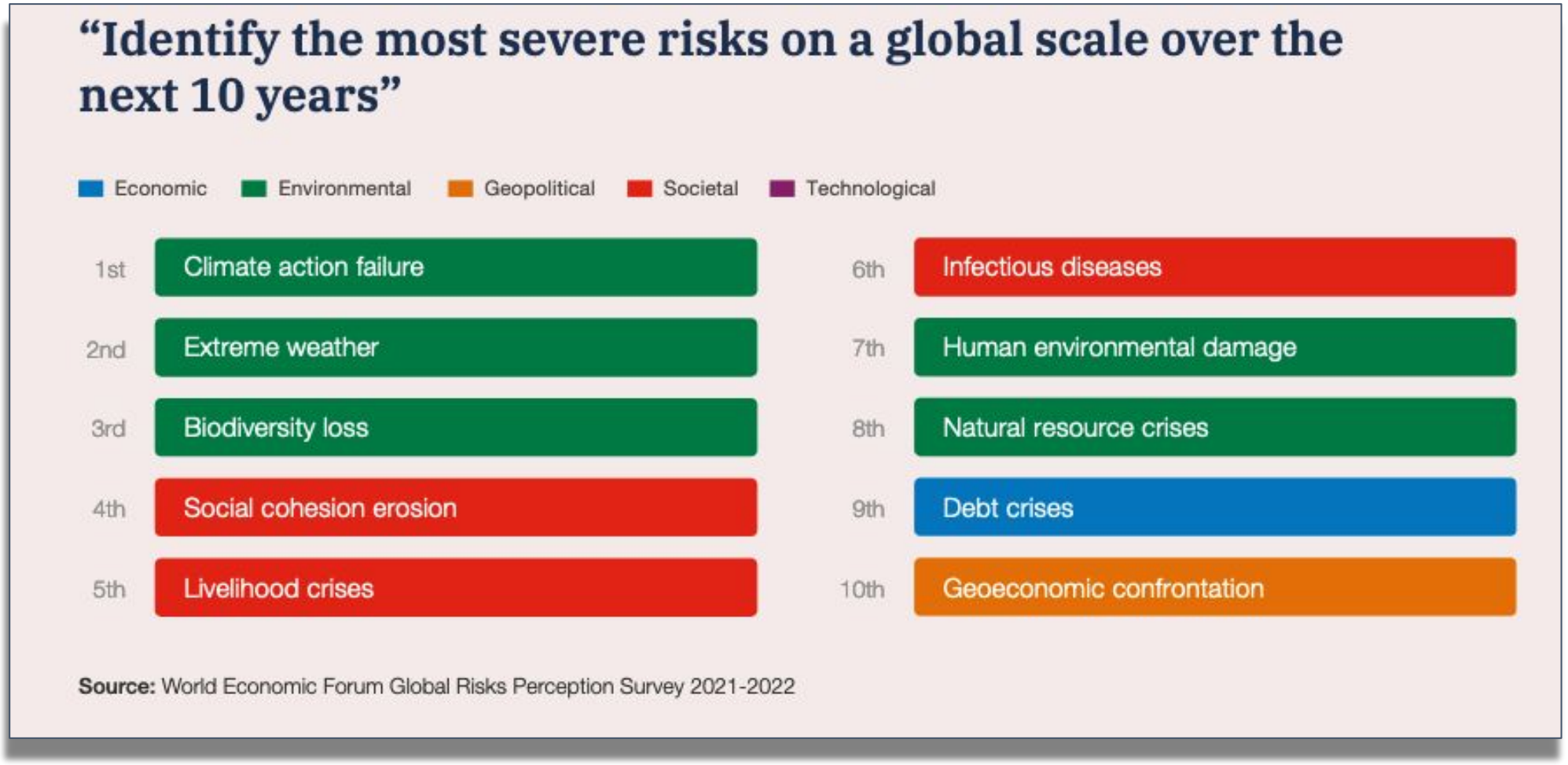


Figure 1. Direct and indirect health impacts of climate hazards and COVID-19 risks representing compounding and cascading factors.

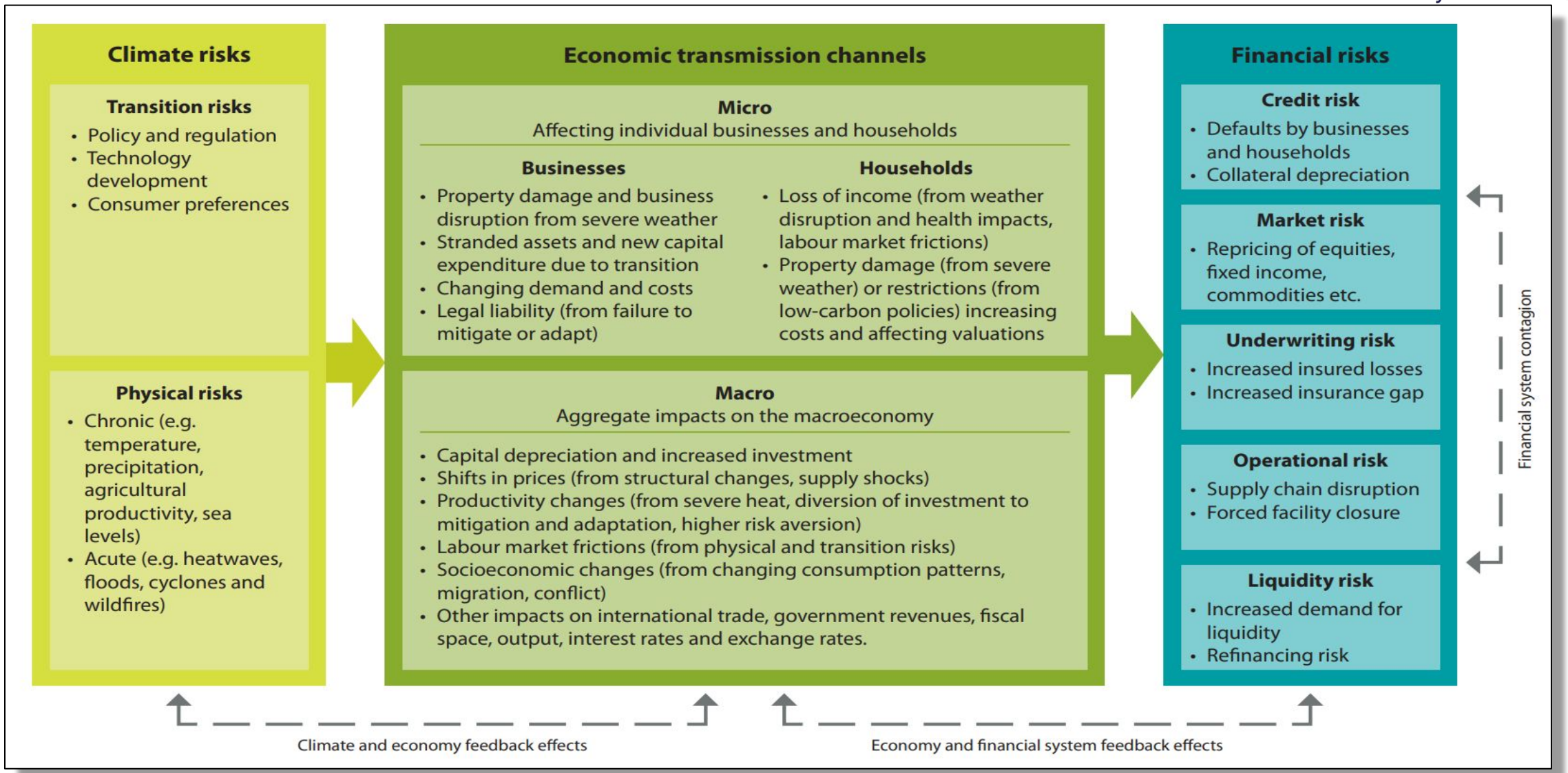
Source: WMO (2021), p. 19

Context: Climate Risk Is Business Risk

It is now well documented that “Climate Risks are [also] Business Risks”, an acknowledgement from the last Word Economic Forum



Context: What Does It Mean For Banks?

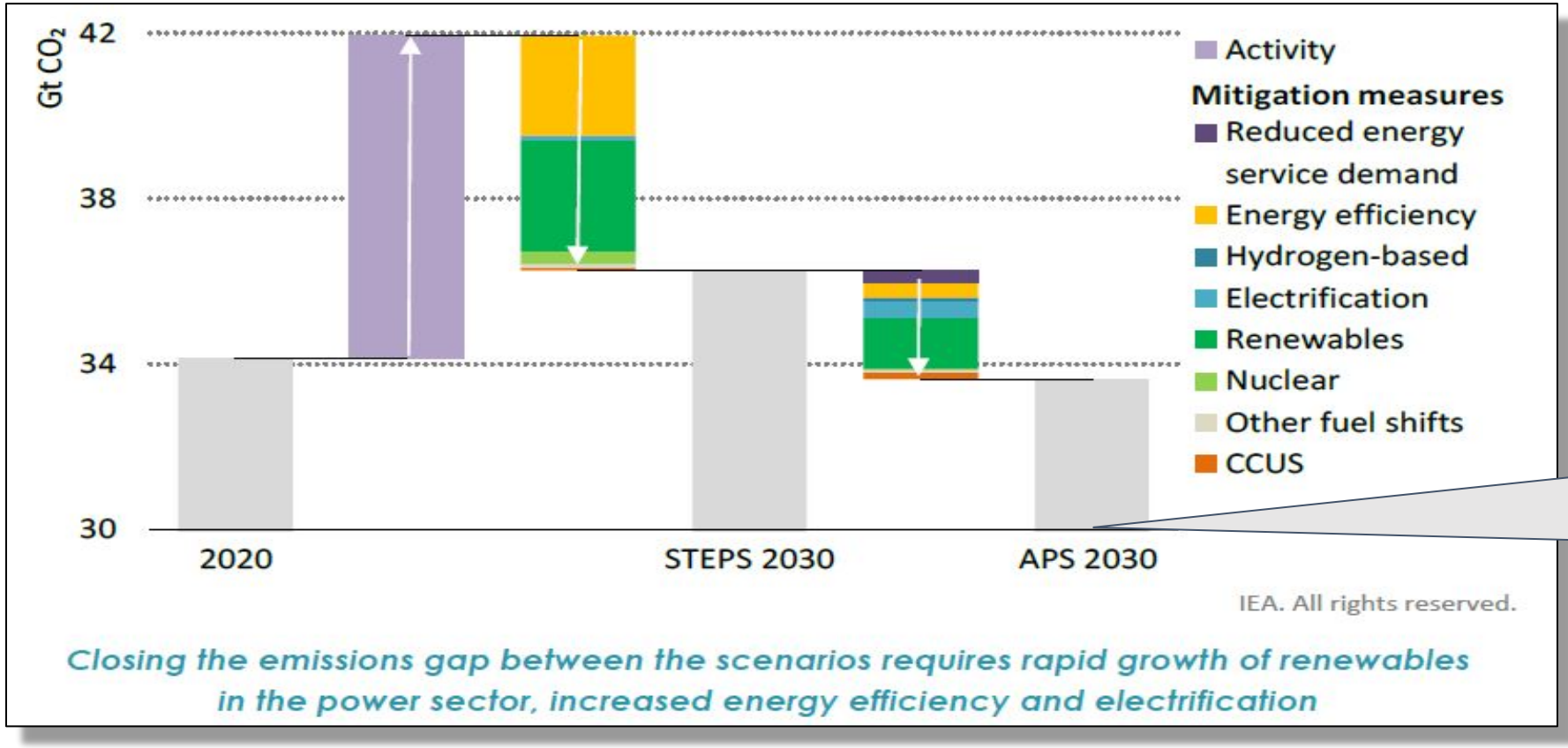


Source: NGFS (2021), p. 10

Net Zero Journey

What Will It Take To Make The Leap?

Aligning with “Net-Zero” means reaching the balance between the amount of greenhouse gas produced and the amount removed from the atmosphere. For the energy powering our activities, it would mean transitioning to renewable sources.



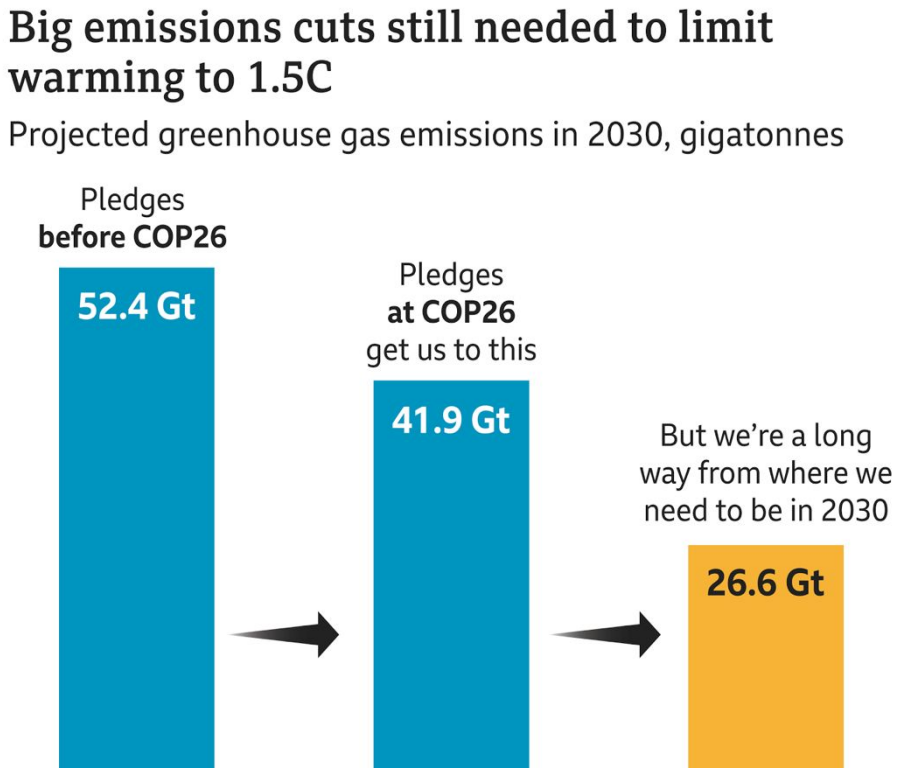
Closing the emissions gap between the scenarios requires rapid growth of renewables in the power sector, increased energy efficiency and electrification

Remaining fossil fuels-based energy sources should be compensated by carbon-capture initiatives

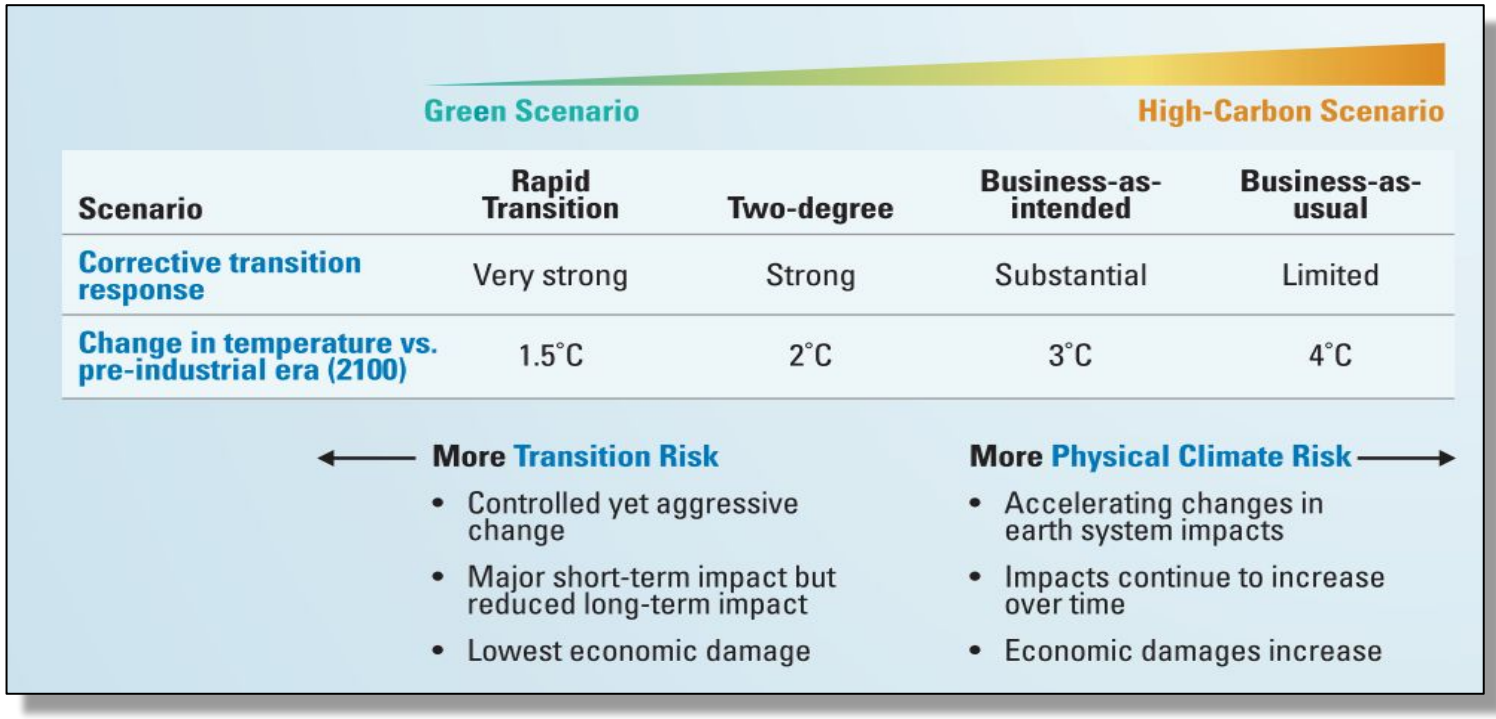
Source: IEA (2021), p. 172

COP26: Global Climate Pact

COP 26 is a step in the right direction but, even if the commitments are met, we will still have to manage both *physical climate risks* **and** *transition risks*.



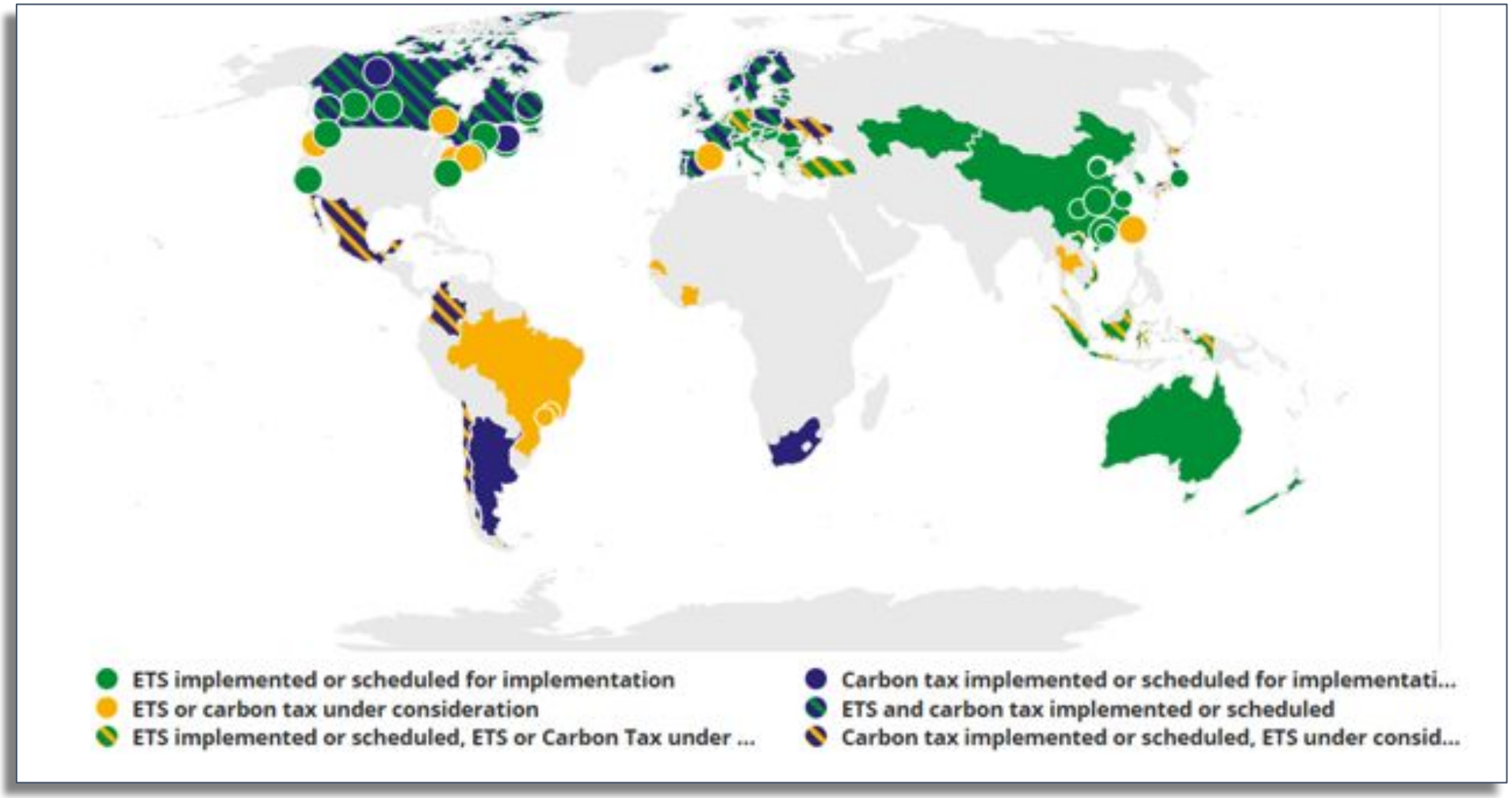
Source: Energy Transitions Commission - BBC



Source: World Bank

Carbon Price Landscape And Trends

Carbon prices are not homogeneous globally - Over 48 different ETS globally



Source: World Bank - Carbon Pricing Dashboards

Carbon Price Landscape And Trends

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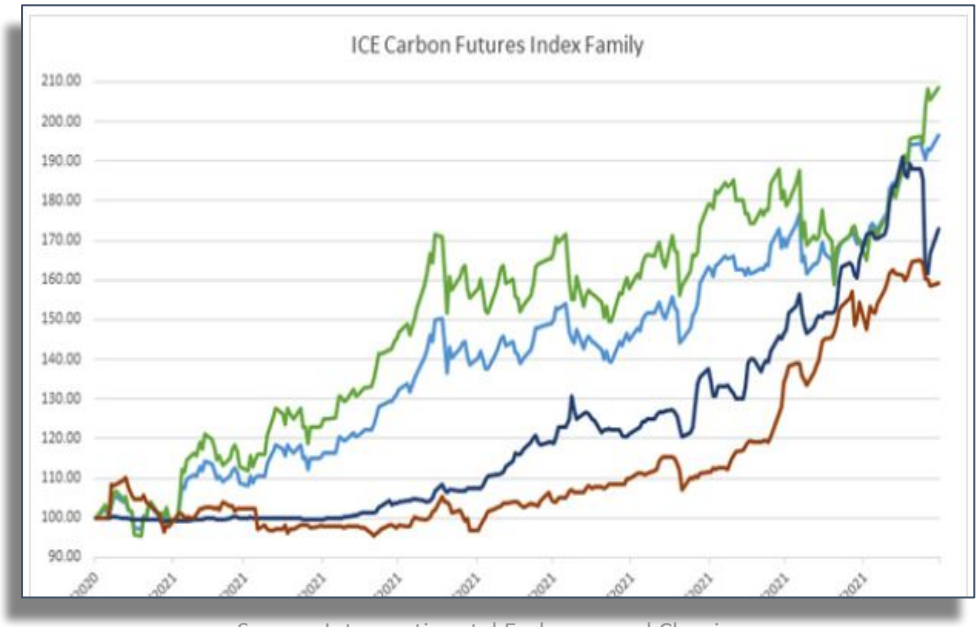
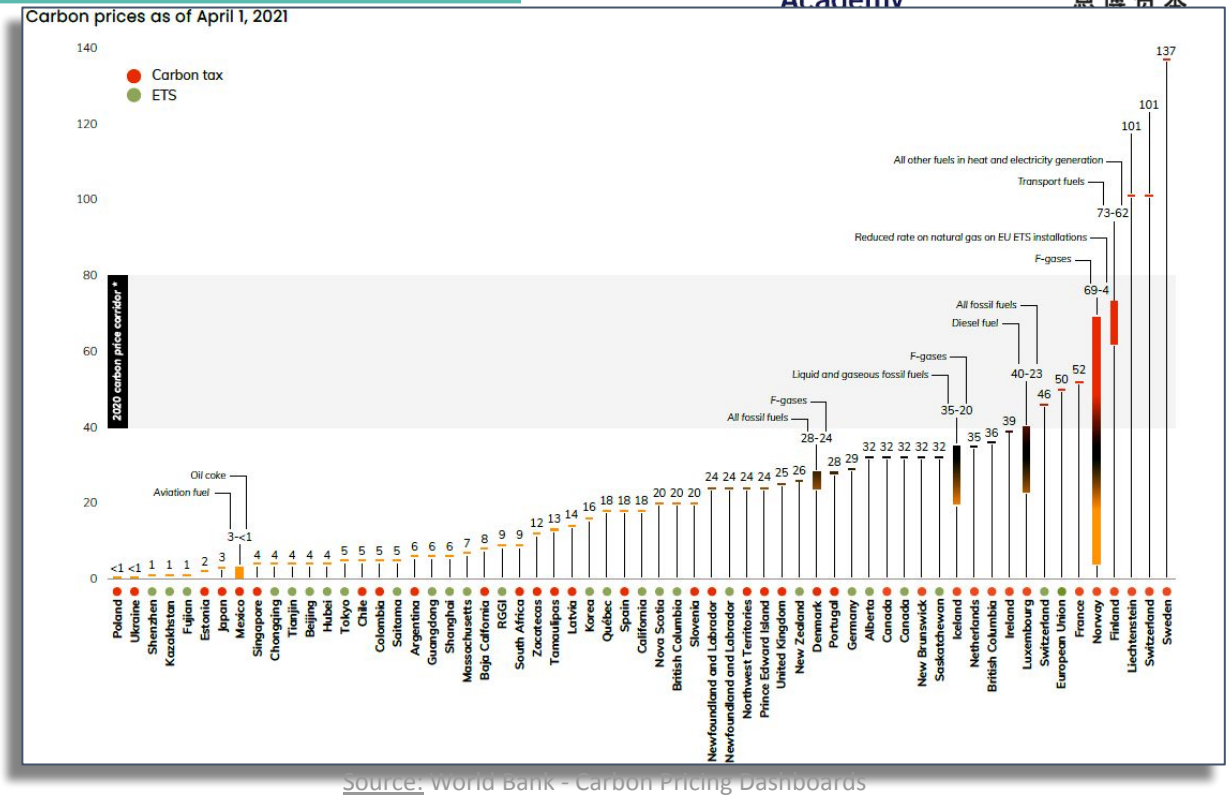


Source: Intercontinental Exchange and Clearing



Source: World Bank - Carbon Pricing Dashboards

Prices vary greatly between carbon exchanges due to

- ➢ Lack of homogeneous methodology for carbon accounting
- ➢ Large variations in allowances mechanisms and discounting calculations
- ➢ Geographic, economic, and social context

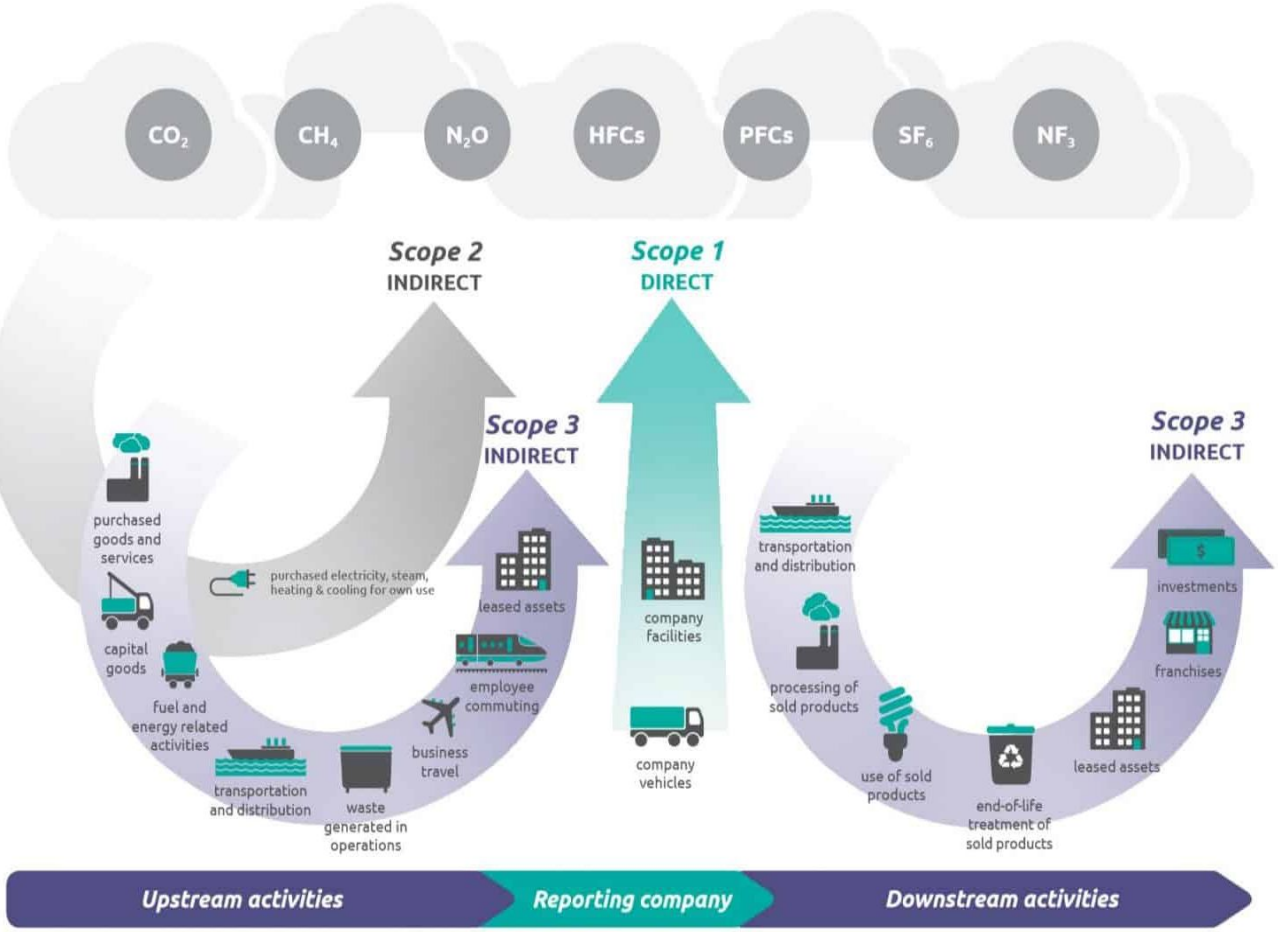
This leads to

- ➢ Arbitrage strategies (production offshoring, layering)
- ➢ Reporting uncertainty and complexity
- ➢ Slower incentive to take action

But the trend is definitely upward for all markets with increasing regulatory pressure on materiality.

Understanding Carbon Management

Scoping your carbon assessment…



Scope 1: All Direct Emissions from the activities of an organization or under their control (e.g. gas boilers, fleet vehicles and air-conditioning leaks).

Scope 2: Indirect Emissions from electricity purchased and used by the organization. Emissions are created during the production of the energy and eventually used by the organization

Scope 3: All Other Indirect Emissions from activities of the organization, from sources that it does not own or control. *These are usually the greatest share of the carbon footprint*, (e.g. business travel, procurement, waste and water). - *See Below full scope*

Source: WRI/WBSD - IPICQ Report

Criteria For Determining Scope 3 Activities

CONSIDERATIONS	CRITERIA FOR DETERMINING MATERIAL RELEVANCE
Size	Activities contribute significantly to the company's total anticipated scope 3 emissions.
Influence	There are potential emissions reductions that could be undertaken or influenced by the company.
Risk	Activities contribute to the company's risk exposure (e.g. climate change-related risks such as financial, regulatory, supply chain, product and customer, litigation, and reputational risks).
Stakeholders	Activities are deemed critical by key stakeholders (e.g. customers, suppliers, investors or civil society).
Outsourcing	Activities are outsourced activities previously performed in-house, or activities outsourced by the accounting company that are typically performed in-house by other companies in the accounting company's sector.
Sector guidance	Activities have been identified as significant by sector-specific guidance.
Other	Activities meet any additional criteria for determining relevance developed by the company or industry sector.

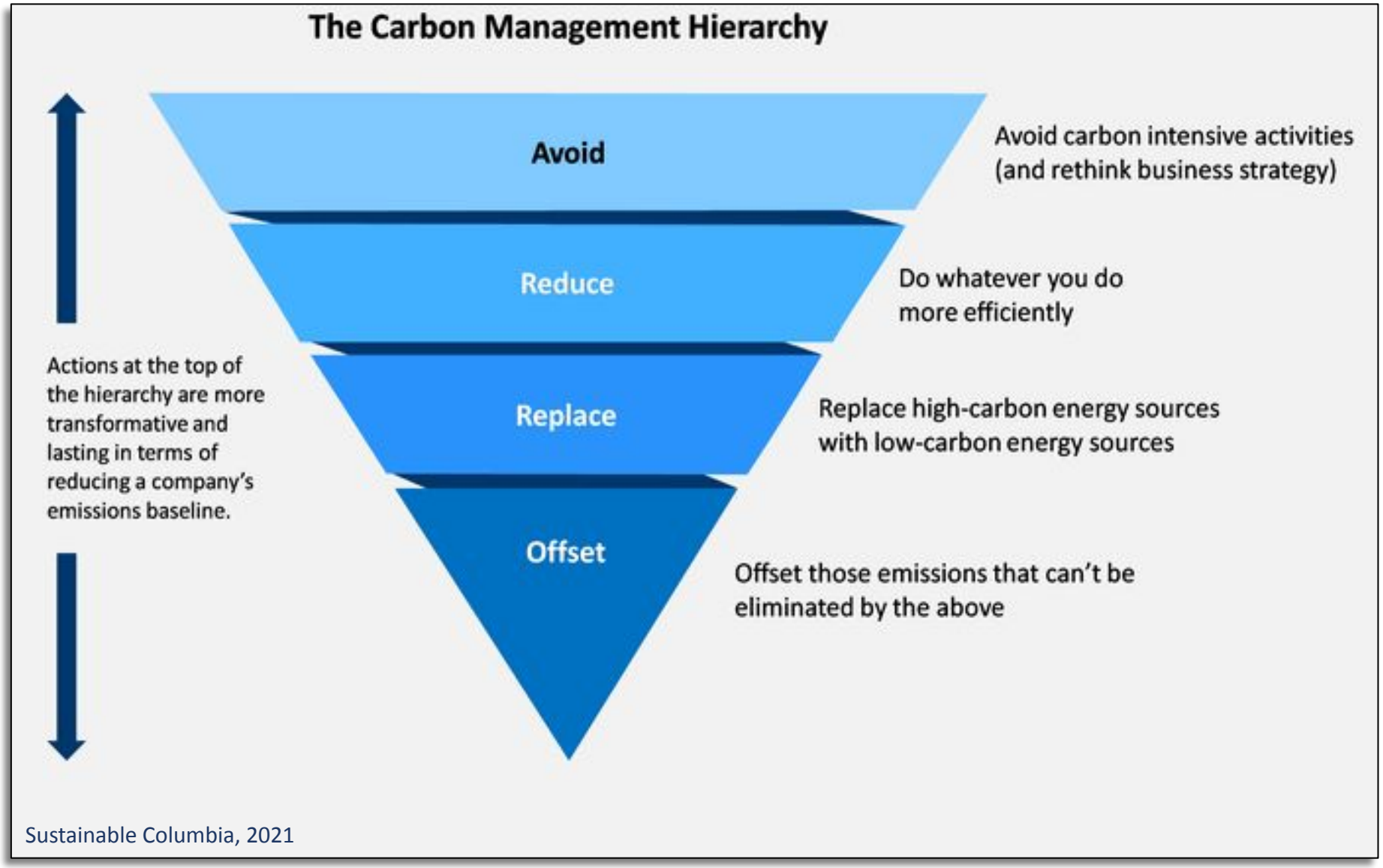
IPIECA, 2022

The Fifteen Scope 3 Categories

1. Purchased goods and services	All cradle-to-gate emissions from the extraction, production, and transport of goods and services not included in categories 2–8.
2. Capital goods	All cradle-to-gate emissions from the extraction, production and transport of capital goods purchased during the accounting year.
3. Fuel and energy	Extraction, production, and transport of purchased fuels and energy, not already accounted for in scope 1 and 2, including extraction, production, and transport emissions of purchased fuels and energy, transmission and distribution losses and generation of purchased energy sold to end users.
4. Upstream transportation and distribution	In this case the term 'upstream' refers to emissions from the transportation and distribution of products (excluding fuel and energy products) purchased or acquired by the reporting company in the accounting year in vehicles and facilities not owned or operated by the accounting company, as well as other transportation and distribution services purchased by the accounting company in the accounting year (including both inbound and outbound logistics).
5. Waste generated in operations	Emissions of waste management suppliers that occur during disposal and treatment of waste generated in the company's operations.
6. Business travel	Emissions of transportation carriers that occur during the transportation of employees for business-related activities.
7. Employee commuting	Transportation of employees between their homes and their worksites.
8. Upstream leased assets	In this case the term 'upstream' refers to operations of assets leased by the company (company is the lessee) not included in scope 1 and scope 2.
9. Downstream transportation and distribution	In this case the term 'downstream' refers to transportation and distribution of products sold by the company between the company's operations and end consumer (if not paid for by the accounting company) including retail and storage.
10. Processing of sold products	Processing by third parties of intermediate products sold by the accounting company.
11. Use of sold products	Direct use-phase emissions of the end use of goods and services sold by the company.
12. End-of-life treatment of sold products	Emission of waste management from the waste treatment and disposal of products sold by the company at the end of their life.
13. Downstream leased assets	In this case the term 'downstream' refers to emissions from the operations of assets owned by the company and leased to other entities, not included in scope 1 and scope 2.
14. Franchises	Emissions from the operations of franchises not included in scope 1 and 2.
15. Investments	Operations of investments in the accounting year not included in scope 1 and 2.

IPIECA, 2022

Carbon Management Hierarchy - Best practices

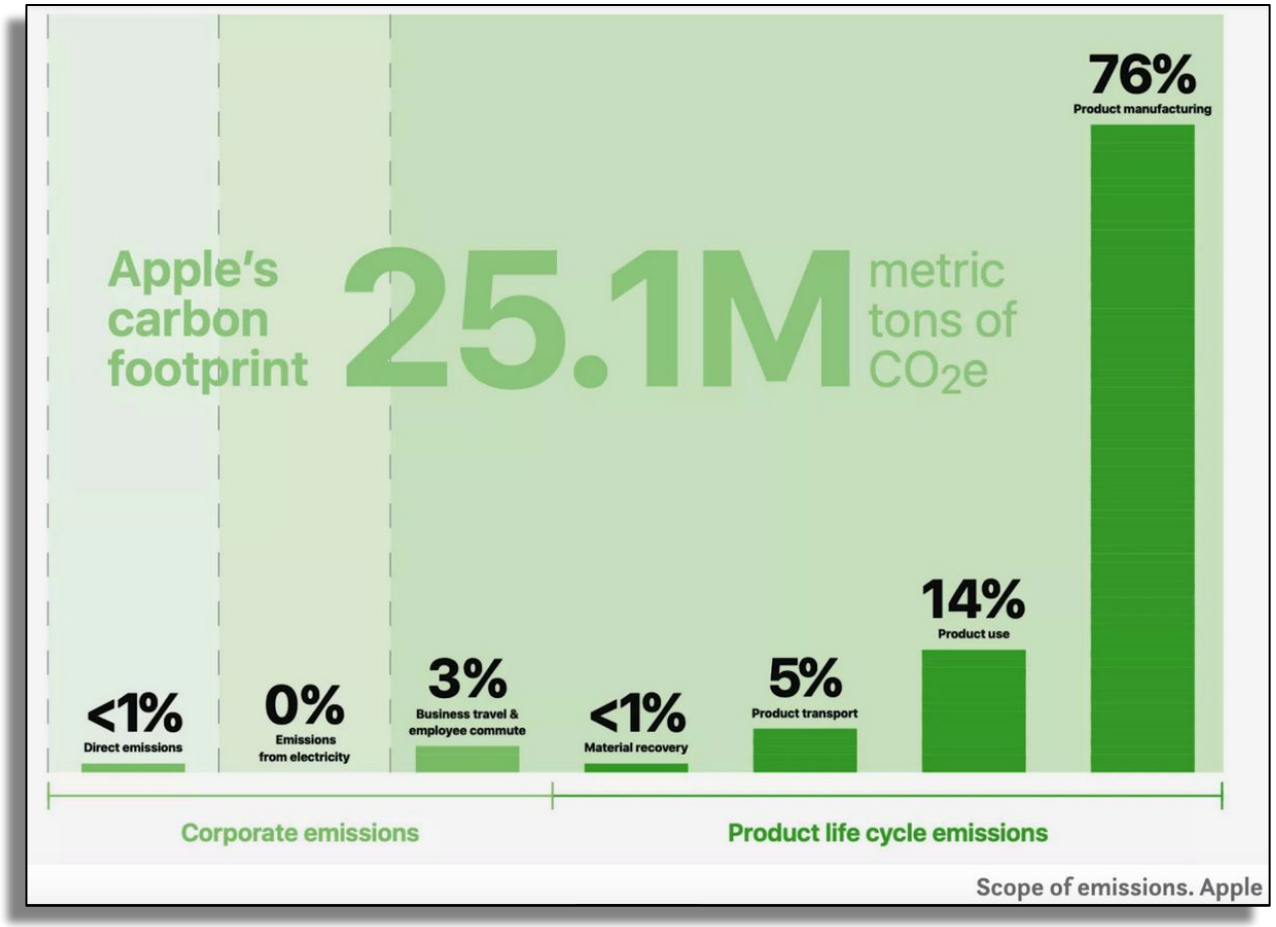


Sustainable Columbia, 2021

- **Targets should include a base year and the target year**. (The base year is the year against which GHG reductions are tracked).
- **The year in which the target will be met should be 5 to 10 years from the base year.**
- **Targets should be aggressive and beyond business as usual**
- **Targets should be for an absolute reduction in GHG emissions**. Targets should be a clearly defined, absolute GHG reduction to be achieved over a specified period of time (e.g., 25% reduction over 10 years).
- **Targets should cover global operations in their geographic boundaries**.
- **Targets should address all three emission scopes**. Targets should include all scope 1 and 2 emissions and at least a portion of scope 3 emissions.

Apple's Scope 1, 2, And 3 Emissions

Illustration with Apple corporate emissions (scope 1&2) vs product life cycle emissions (scope 3)



Apple's carbon footprint resulting from it's scope 3 over-shadows the scope 1 and 2 directly in control of the firm

- Product manufacturing (from the mining of raw material to the packaging of final products) is not part of Apple offset strategy
- The product manufacturing, use and transport accounts for 95% of the carbon footprint of the firm.

Reporting Frameworks

A congested landscape…

Global goals & Principles

SUSTAINABLE DEVELOPMENT GOALS

PRI Principles for Responsible Investment

UN environment programme

GREENHOUSE

RACE TO ZERO

PSI Principles for Sustainable Insurance

United Nations Global Compact

Reporting Standards

CDSB Climate Disclosure Standards Board

Global Reporting

SASB

INTEGRATED REPORTING <IR>

ecovadis

TCFD TASK FORCE ON CLIMATE-RELATED FINANCIAL DISCLOSURES

IFRS

ISO International Standard Organisation

Corporate Sustainability Reporting Directive
Sustainable Finance Disclosures Regulations
EU Taxonomy regulations

Specialized impact reporting frameworks

Gold Standard

The Green Bond Principles

CCB Standards The Climate, Community & Biodiversity Alliance

The Sustainability-Linked Bond Principles

Verified Carbon Standard A VERRA STANDARD

Climate Bonds INITIATIVE

impaakt

Rating agencies disclosure

CDP Carbon Disclosure Project

S&P Global

Moody's

MSCI Morgan Stanley Capital International

SUSTAINALYTICS

vigeo eiris

Dow Jones Sustainability Indexes

ISS-oekom International Shareholder Service

sam sustainable

KLD Independent Research and Indexes since 1988

ASSET4

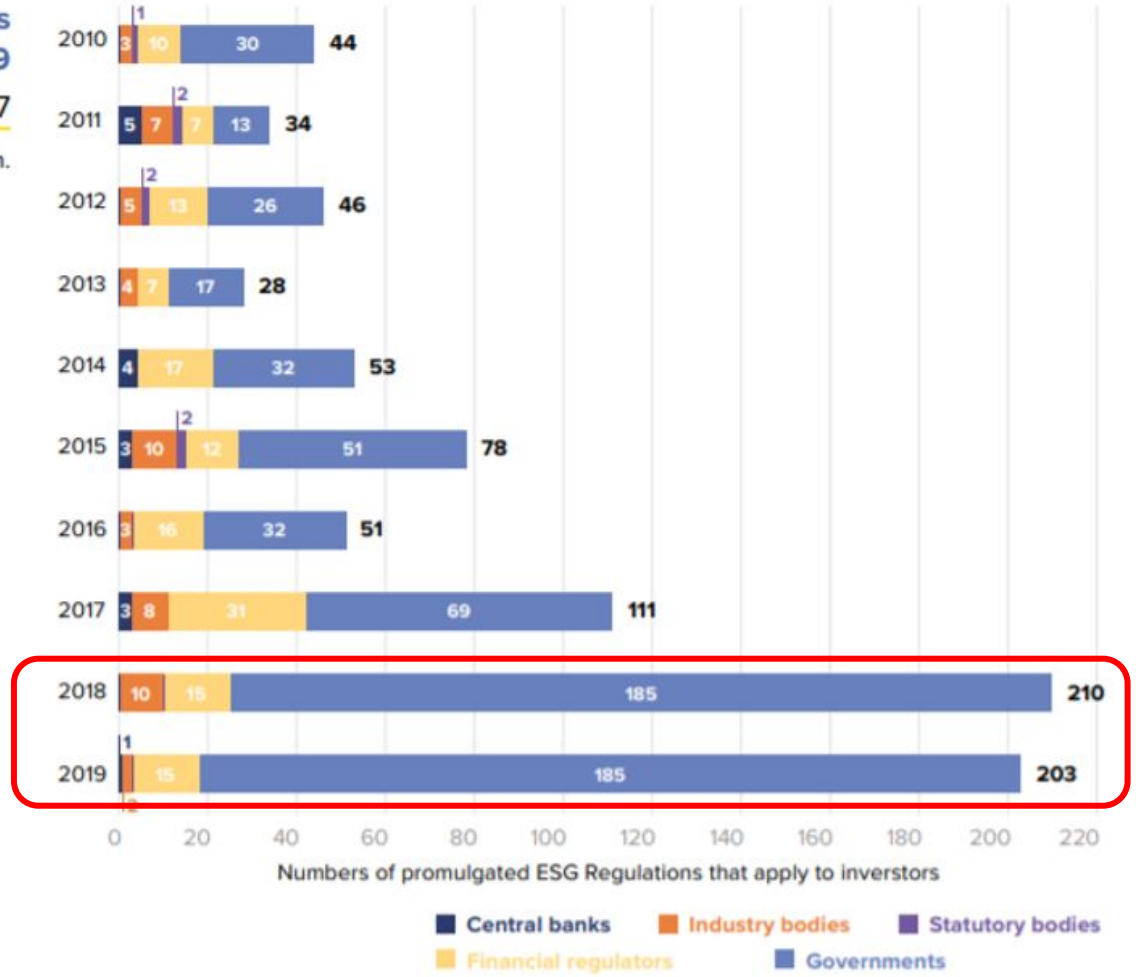
Reporting Frameworks

… doubled with specific government and central banks regulatory requirements

Number of ESG regulations by regulator type, 2010-2019

Figure 1.7

Source: MSCI ESG Research.



Over 200 additional new regulations per year…

Carbon Measurement Tools & Approaches

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Carbon assessments can be performed through 3 approaches:

	In-house Carbon Assessment and Management fully internalised		**Externalised** 3rd party expertise used for all assessment and management		**Mixed** Tactical resort to 3rd party expertise but driven by internal executive teams	
Implementation speed	- - -	Recruitment, training, tooling	+++	"On-the-shelf" expertise	-	Requires coordination team
Knowledge building	++	Steep learning curve	- - -	Limited	+ +	Progressive transfer of knowledge with hands-on practice
Buy-in and involvement of internal teams	- -	Legitimacy issue due to limited expertise	- - -	Push-back due to under-involvement	+ +	Joined design and implementation
Access to expertise practices, tooling, 3rd party datasets	- - -	Lack of access to best practices	+ + +	Leverage vendors expertise	+ +	Whenever necessary
Asymmetry of interest	+ + +	Aligned with company objectives	- - -	Can miss some aspects (ex: E but not S and G)	+ +	Process driven by internal teams
Data privacy	+ + +	Fully controlled	- - -	Risk, particularly for scope 3	+ +	Limited access to sensitive data
Cost on long term	- -	Can be high due to learning curve	- - -	Vedor lock-in	+ +	Progressive industrialization of process and phase out of 3rd part

Aligned with a strategic approach to sustainability

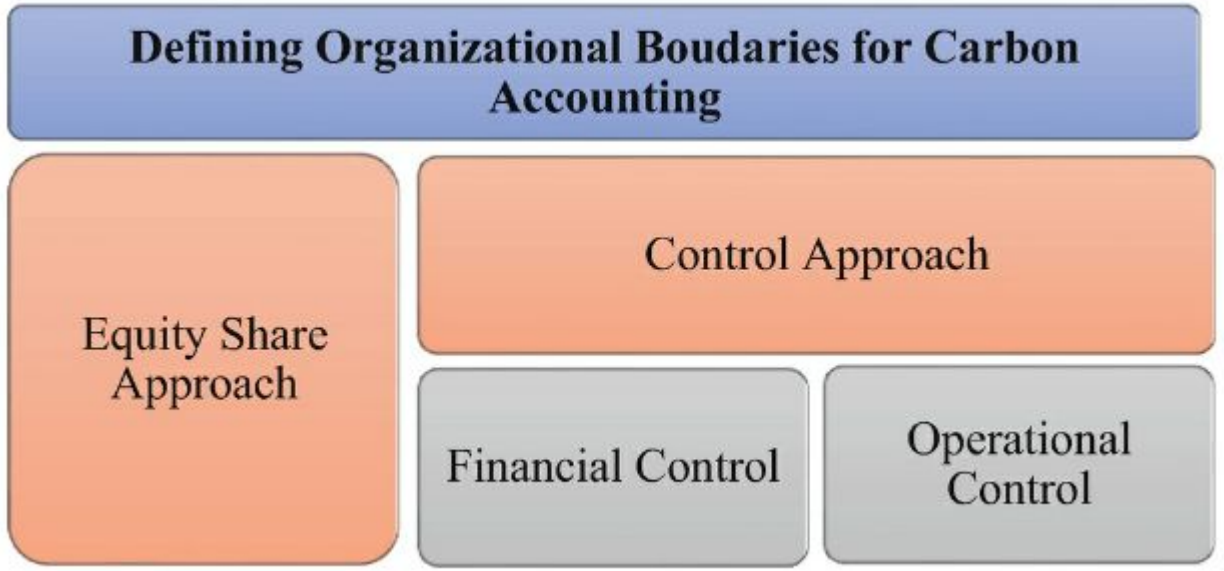
Carbon Measurement Tools & Approaches

On the importance of corporate audit capability and defining organization scope

Building internal capability to proceed to transparent and auditable carbon assessment is paramount to build confidence and opposability to the approach with clear organizational boundaries.

Two main organizational boundaries can be considered for the accounting itself, based on:

- Equity Share Approach:
  - Reflects the percentage of economic interest, normally is the same as the ownership percentage.
  - Report all emissions sources that are wholly owned and partially owned according to your entity's equity share in each.
- Control approach:
  - GHG emissions from operations over which the company has control.
  - Discard GHG emissions from operations in which it owns an interest but has no control.
  - Control scope can be Financial or Operational



Source: "Carbon Managmeent for a Sustainable environment" - Shelley Zhou

Practical Options for Business - DOs and DON'Ts

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Here are a few lessons learned from past experiences

DOs	DON'Ts
➢ Use **industry recognized players** ○ Carbon assessment standards (ex: Verra, Gold Standards) ○ Reporting frameworks (TCFD, SASB, GRI) ○ Datasets and Rating (MSCI, Sustainalytics, Arabesque, Vigeo Eiris) ○ Analytics tools ➢ Learn from blunders and **perform "post-mortem" even on peers failures** - The reputational, and thus market value, stakes cannot be discarded ➢ While looking at end-to-end carbon footprint, **assess also all other ESG aspects**. Doing good on one aspect does not prevent from poor performance on others. ➢ **Prioritize transparency, reproducibility of approach to ensure consistency**, leveraging connected and publicly accessible data sources ➢ **Show the way by optimizing your own emissions** first before going to your 3rd party stakeholders ➢ **Keep track of your offsetting projects** status and ensure integrity (no double counting) and relevance on the long term (forests burn).	➢ **Don't delegate ownership to the head of sustainability alone** - This should be **f**ollowed by all th ExCo under the CEO sponsorship. ➢ **Don't let "nested supply chain" stones unturned:** a scandal could be looming in disguise (high fossil-fuel dependant activities but also human trafficking, banned activities, sanctioned countries, poor labor conditions or heavy pollution) ➢ **Don't discard the core activities** (ex: the carbon from the oil extraction, distribution and *consumption* for an oil & gas company…), tolerance for greenwashing has gone low. ➢ **Don't rely on only one ESG rating** - Be mindful of the gaps between each ESG rating systems. ➢ **Don't rely only on carbon offsetting**: Avoid, Reduce, Replace *then* offset. Offsetting is the least harmful on short term but the most scrutinized approach and challenging for the brand on long term.

Connecting To The SG Green Plan 2030

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Get inspired by the enablers provided in the 2030 plan guidelines, for example:

Check the GreenGov.SG website to adopt the **enhanced green procurement requirements** and keep abreast of latest developments, such as **carbon tax implementation**

Leverage **SG Eco-Fund** or **Green and Sustainability-Linked Bond and Loan Grant Scheme** to drive your decarbonization project and invest in Nature-based Solutions to create natural carbon sinks and rejuvenate biodiversity populations

Take part in the workshops for the design of the rules and licensing frameworks organized by the government, such as the **GFIT Taxonomy** and the **Enterprise Sustainability Programme**

Check the Research, Innovation and Enterprise (RIE) 2025 to leverage R&D in sustainability solutions such as carbon capture, utilisation, storage and low-carbon hydrogen or energy efficient materials, circular economy solutions

Look at the Building Construction Authority (BCA) Green Mark framework guidelines promoting sustainable design, construction and operating practices in buildings

GREEN PLAN GOALS

Key targets of Green Plan 2030 in Singapore

CITY IN NATURE
- Plant 1 million more trees
- Every household will live just a 10-minute walk from a park
- Add 130 hectares of new parks and enhance 170 ha of existing parks by end-2026
- Set aside 1,000 more hectares for green spaces by 2035

SUSTAINABLE LIVING
- Triple length of cycling network to 1,320km by 2030
- Expand rail network to 360km by early 2030s from 230km now
- Reduce waste sent to landfills per capita per day by 20% by 2026, and 30% by 2030
- Increase share of trips taken on mass public transport to 75% by 2030
- At least 20% of schools to be carbon-neutral by 2030

RESILIENT FUTURE
- S$5 billion for coastal and drainage flood-protection measures
- Produce 30% of the country's nutritional needs locally by 2030
- Reduce urban heat by increasing greenery and using cool paint on building facades

ENERGY RESET
- Quadruple solar deployment by 2025, including on rooftops of Housing Development Board blocks. Goal is at least 2 gigawatt-peak, capable of powering 350,000 households, by 2030
- Housing Development Board (HDB) towns to use 15% less energy by 2030
- 80% improvement in energy efficiency over 2005 baseline for best-in-class green buildings by 2030
- New registrations of diesel cars and taxis to cease from 2025
- All new car and taxi registrations to be of cleaner-energy models from 2030
- 60,000 charging points nationwide, including 40,000 in public car parks and 20,000 on private premises by 2030

GREEN ECONOMY
- Enterprise Sustainability Programme to help enterprises, especially SMEs, develop capabilities
- Create new and diverse job opportunities in sectors such as green finance, sustainability consultancy, verification and credits trading
- Be a leading centre for green finance in Asia and globally

GREEN GOVERNMENT
- Emissions from all public service activities to peak in 2025, 5 years ahead of national target
- Greening goes beyond government offices to public infrastructure including transport and healthcare
- Embed sustainability in core business areas, for example, in green procurement and education

Source: SG Green Plan 2030


Thank you!