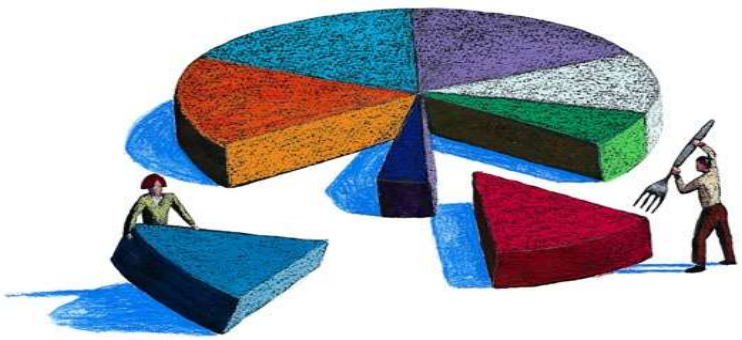
Presented by : Irene Chu

Date: 15 May 2025

Overview of Conducting Scenario Analysis



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With you today

Irene Chu

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Irene has over 20 years of experience in audit and leads the Technology and New Economy sector, and Life Sciences sector for KPMG in the Hong Kong region. Since 2020, Irene has been focusing on ESG advisory services.

Irene leads the ESG reporting and assurance in Hong Kong that supports clients on ESG/climate reporting, sustainability strategies, climate change and decarbonisation and ESG assurance.

Irene is a member of the Sustainability Committee at the Hong Kong Institute of Certified Public Accountants.

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Agenda

01 Understanding Scenario Analysis

02 Conducting Scenario Analysis

03 Key Takeaways

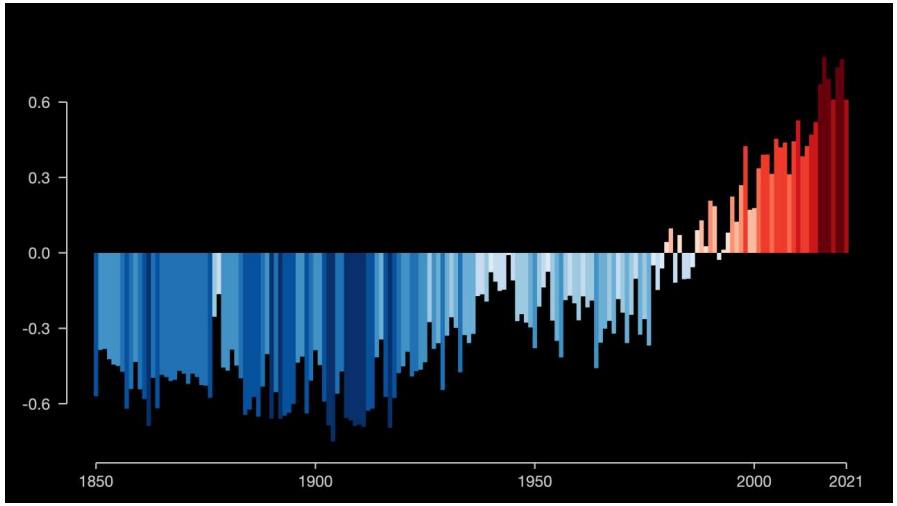
01

Understanding Scenario Analysis

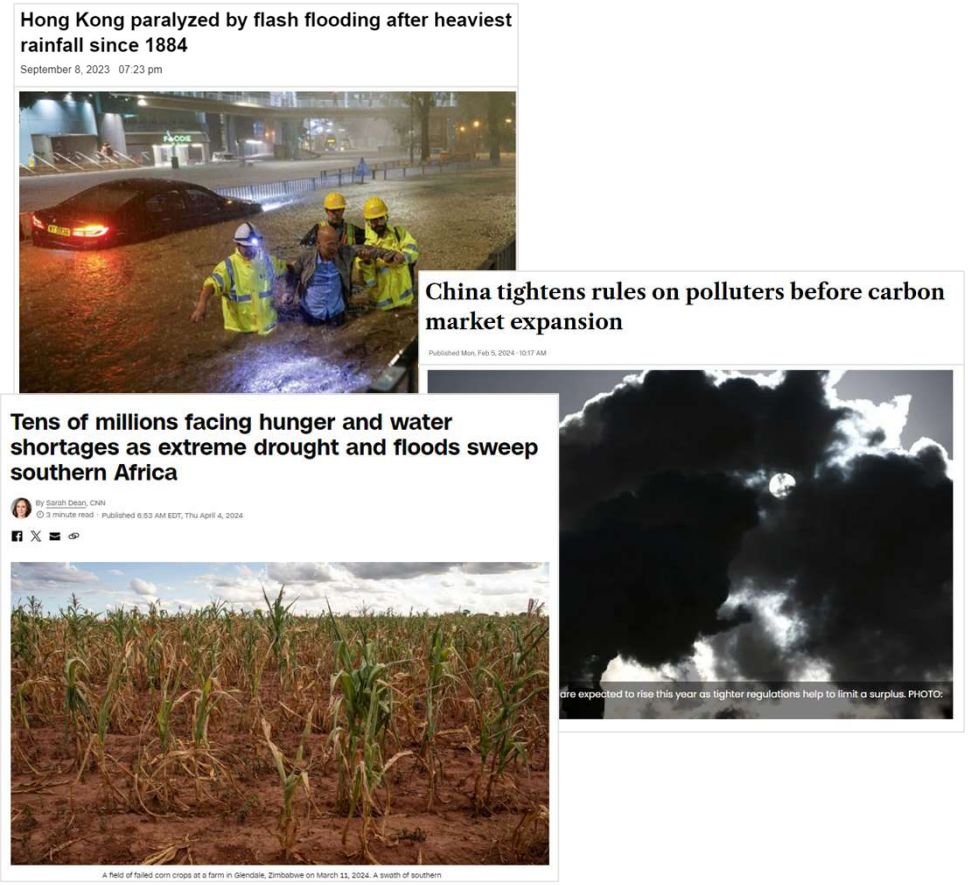
Climate change is not a distance threat

Global temperature change

Relative to average of 1961-2010



Source: Ed Hawkins, National Centre for Atmospheric Science, UoR



Hong Kong paralyzed by flash flooding after heaviest rainfall since 1884

September 8, 2023 07:23 pm

China tightens rules on polluters before carbon market expansion

Published Mon, Feb 5, 2024 · 10:17 AM

dire expected to rise this year as tighter regulations help to limit a surplus. PHOTO:

Tens of millions facing hunger and water shortages as extreme drought and floods sweep southern Africa

By Sarah Dean, CNN

3 minute read · Published 6:53 AM EDT, Thu April 4, 2024

A field of failed corn crops at a farm in Glendale, Zimbabwe on March 11, 2024. A swath of southern

2024 is the first year with average temperature exceeding 1.5°C

Key temperature statistics for 2024

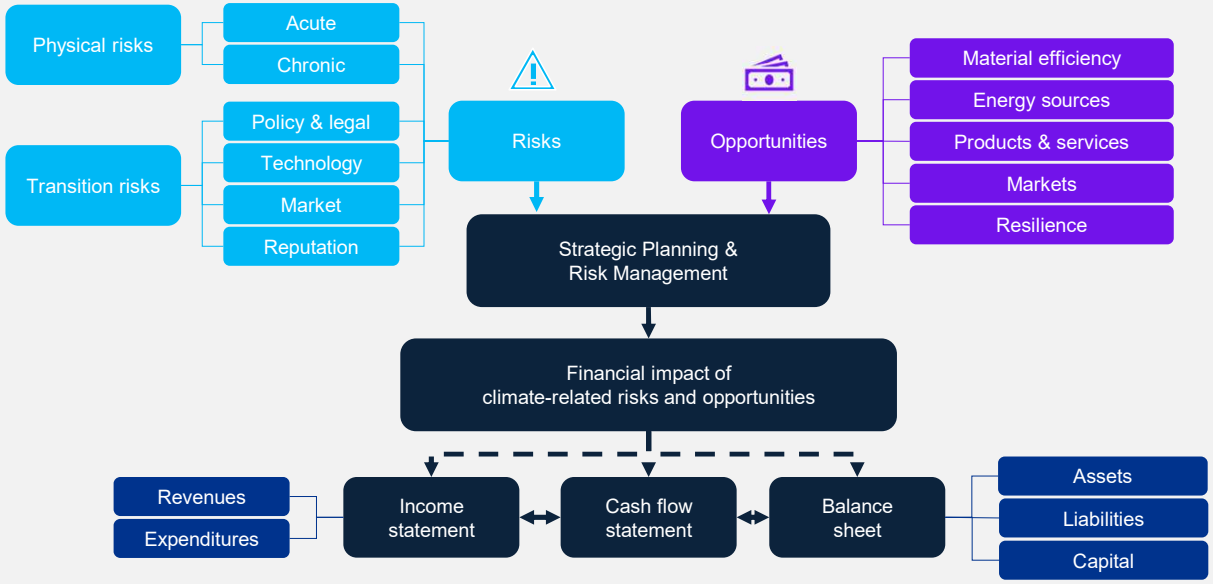
Region	Anomaly (vs 1991–2020)	Actual temperature	Rank (out of 85 years)
Globe	**+0.72°C** (+1.60°C vs pre-industrial)	15.10°C	**1st highest** 2nd - 2023
Europe	**+1.47°C**	10.69°C	**1st highest** 2nd - 2020
Arctic	**+1.34°C**	-11.37°C	**4th highest** 1st - 2016
Extra-polar ocean	**+0.51°C**	20.87°C	**1st highest** 2nd - 2023

Source: The 2024 Annual Climate Summary, Global Climate Highlights, Copernicus Climate Change Service (C3S), Global Climate Highlights 2024 | Copernicus

Financial impacts of climate risks and opportunities

- Climate risks include both increased **physical risks**, arising from changing weather patterns and **transition risks**, as global economies transition towards a lower-carbon future.
- Both types of risks may affect companies' revenues and expenses, asset and liability and cost of capital
- Storms, fires and droughts are already damaging real estate and infrastructure holdings and disrupting supply chains in many industries.

The fundamental changes stemming from the emergence and intensification of physical hazards and transition factors present both financial risks and opportunities for businesses



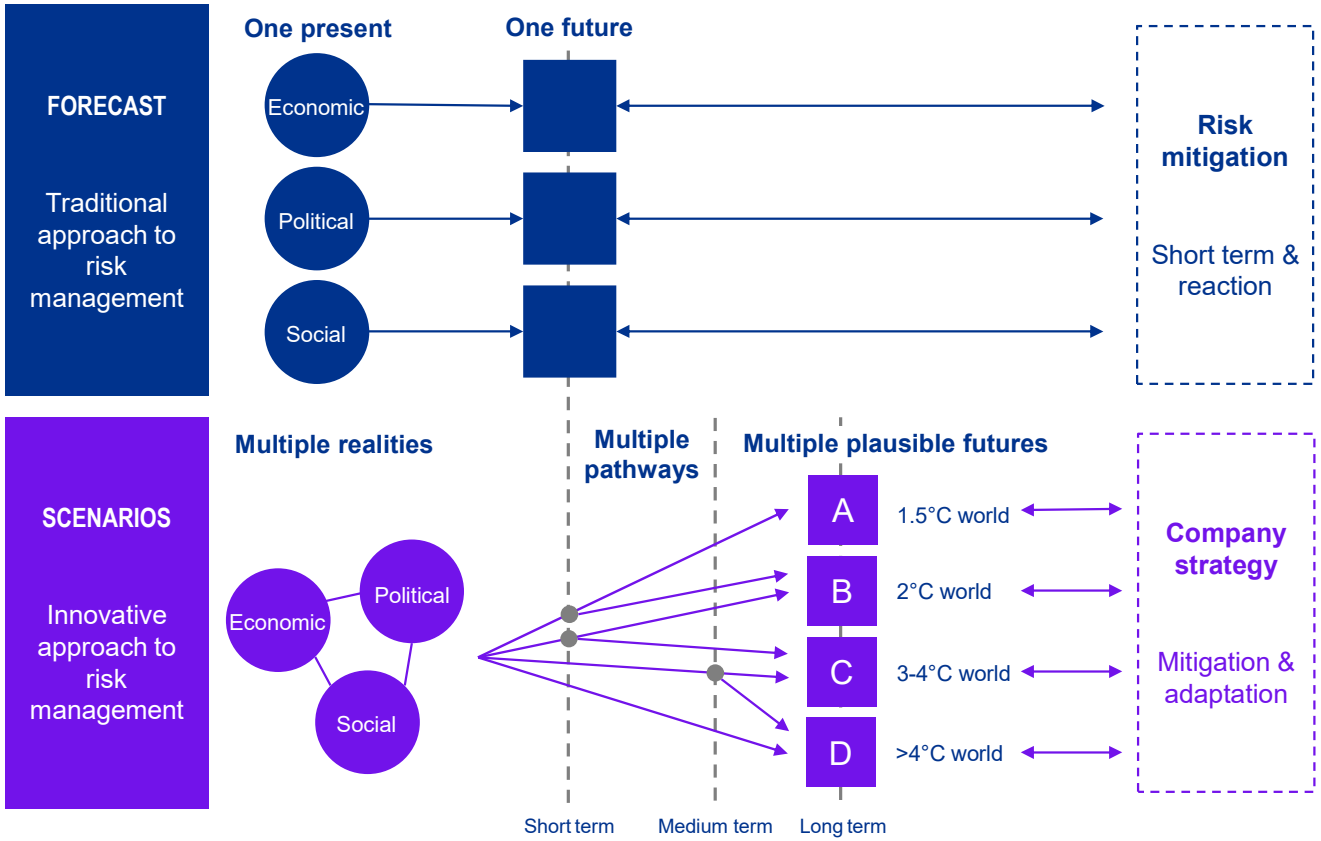
Economic impacts:

- Business disruptions
- Lower productivity
- Asset damage
- Reconstruction and reinvestment
- Higher commodity and energy prices

Financial effects:

- Lower property values and asset devaluation
- Increased CapEx/OpEx
- Lower corporate profit and household wealth
- Financial market losses
- Credit market losses

Why scenario analysis?



What scenario analysis is

- A process for identifying a potential range of outcomes of future events under conditions of uncertainty - *its resiliency / robustness*

What scenario analysis is not

- A forecast or prediction what will happen

02

Conducting Scenario Analysis

The scenario analysis process

1 **Establish the foundation** for effective climate scenario analysis

2 **Define boundaries and select scenarios** that align with your company's context

3 Translate climate scenario outcomes into **financial impacts**

4 **Develop strategies** to manage risks and seize opportunities over short, medium and long term

Setting the scene

Establish governance structure

Assign oversight and determine which stakeholders to involve

Materiality assessment

Evaluate current and anticipated exposures to climate-related risks and opportunities and develop impact pathways

Scenario inputs

Define scope of the analysis

Select appropriate scenarios

Define scenario parameters and assumptions

Gather company data and model inputs

Climate scenario modelling

Integrated assessment model

Process inputs through economic models that evaluate physical and transition risk interactions

Financial impact translation

Convert climate impacts (e.g. asset damage and business interruption) into financial risk drivers (e.g. revenue and cost impacts)

Response planning

Output interpretation

Data feed, dashboard & financial metrics to support strategic decision-making

Risk management and integration

Incorporate results into strategic planning, capital allocation and risk management process

Building the foundation for long-term success

Inform and educate decision-makers and internal stakeholders

Establish executive-level sponsorship and governance

Mobilise sufficient internal and external resources

Identify risk/opportunity factors and transmission channels

The fundamental changes stemming from the emergence of climate risk/opportunities will inevitably impact the balance sheet and the operation of a company. **Companies should also consider climate-related risks and opportunities that have potential to be material in the future**.

Climate-related risks and opportunities

Transition risks and opportunities

- Policy and regulation
- Technology development
- Consumer preferences

Physical risks

- Acute (e.g. heatwaves, floods, cyclones and wildfires)
- Chronic (e.g. temperature, precipitation, agricultural productivity, sea levels)

Economic transmission channels

Micro *(affecting individual business)*

- Property damage and business disruptions from severe weather
- Stranded assets and new capital expenditure due to transition
- Changing demand and costs
- Legal liability (from failure to mitigate or adapt)

Macro *(aggregate impacts on the macroeconomy)*

- Capital depreciation and increased investment
- Shifts in prices
- Productivity changes (from severe heat, diversion of investment to mitigation and adaptation)
- Labour market frictions
- Socioeconomic changes (from changing consumption patterns, migration)

Financial impacts

Operational

- Supply chain disruption
- Forced facility closure
- Loss of labour productivity / decreased attendance

Market risks

- Repricing of equities, fixed income, commodities, etc.

Credit risks

- Defaults by businesses
- Collateral depreciation

Insurance risks

- Change in insurance premiums

Key elements of scenario analysis

Scope of the scenario analysis

Scenario analysis should encompass the entire company including supply and distribution chains.

However, companies may start with a narrower focus (specific business unit, product line, or geography) to gain experience before expanding to company-wide analysis.

Time horizon

Companies should select time horizons that are long enough to reveal meaningful climate changes but not so distant that uncertainties overwhelm analysis.

Horizons should align with the company's capital planning cycles, asset lifespans, and climate policy timeframes (e.g. 2030/2050).

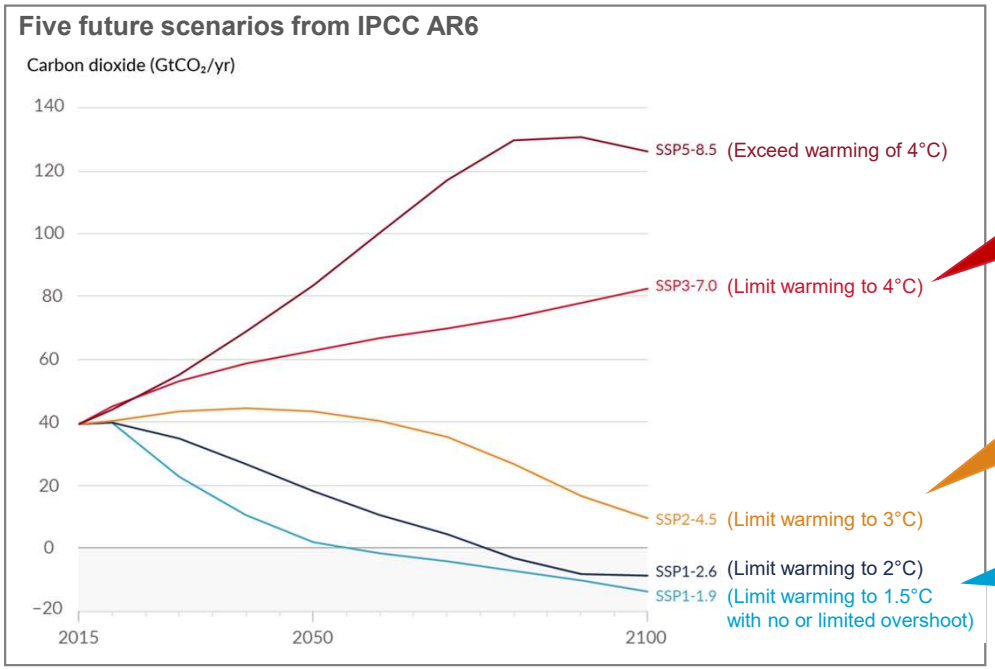
Number and diversity of scenarios

Multiple scenarios should be used to capture a wide range of plausible futures and create challenging "what-if" analyses.

Scenarios should be sufficiently diverse to adequately cover key impacts and uncertainties.

What are climate scenarios?

Companies are asked to consider different scenarios, based on different climate warming trajectories, and the risks associated with them. These trajectories can range from anywhere between 1.5°C to over 4°C. Companies may use different types of scenarios, representing different plausible futures, to assess potential climate-related risks and uncertainties.



Source: IPCC Sixth Assessment Report, Working Group 1: The Physical Science Basis, 2021

Types of scenario narratives

Business as usual (BAU) scenario:
Current policies remain in place; low effort to curb emissions; more adaptation required

Intermediate scenario:
Binding to long-term or net-zero targets; closer to current practice and require some mitigation strategies and technologies

1.5°C-aligned scenario:
Reaching net zero GHG emissions in the 2nd half of this century; less adaptation required

Sources of scenarios

Companies should consider multiple sources of scenarios to understand each scenario's characteristics and select scenarios most aligned with their circumstances.

	Public climate scenarios	Proprietary climate scenarios	Company climate scenarios	Standard scenarios
Characteristics	Created by international agencies and coalitions for widespread adoption or to serve as a point of comparison or benchmark	Developed primarily by consulting and specialist organisations to explore particular aspects of possible climate-related impacts and transitions	Developed by private companies as their own analyses of possible future climate impacts on their businesses	To be used by specific groups according to the prescriptions of the party requiring the use of the scenarios
Examples	• IEA's Global Energy and Climate (GEC) models • NGFS's climate scenarios • IRENA's Planned Energy Scenario and 1.5°C Scenario	• Moody's RMS™ climate-conditioned catastrophe models • MSCI ESG Research's Climate Value-at-Risk • S&P Global's dataset and models • ISS ESG's climate dataset and models	• BP's energy transition scenarios • Lendlease's 2050 Future Scenarios	• The Bank of English's system-wide exploratory scenario

Overview of publicly available scenarios

There are 3 prominent entities that provide comprehensive and in-depth studies regarding climate change scenarios which can be used as references for climate risk scenario analysis. They are **Intergovernmental Panel on Climate Change (IPCC)**, **Network of Central Banks and Supervisors for Greening the Financial System (NGFS)** and **International Energy Agency (IEA)**.

Publisher	Background	Provided Scenario Category(s)
IPCC (Intergovernmental Panel on Climate Change)	**IPCC is a scientific body established by the United Nations.** It provides policymakers with objective and comprehensive assessments of climate change based on the latest scientific research.	• IPCC started with a set of **Representative concentration pathways (RCP)** to determine physical effects of GHG emissions • On Sixth Assessment Report (AR6), these RPCs are integrated to five **Shared Socioeconomic Pathways (SSP)**, which leveraged by socio-economics consideration.
NGFS (Network of Central Banks and Supervisors for Greening the Financial System)	**NGFS is an international group of central banks and financial regulators.** It provides a platform for sharing best practices, conducting research, and developing guidelines on integrating climate considerations into financial systems.	• The scenario(s) development are largely based on IPCC's work • Four representative scenario categories, which are **"Orderly", "Disorderly", "Hot House World" and "Too-little-too –late".** • Banks use the scenario for climate analysis for debtors.
IEA (International Energy Agency)	The IEA is at the heart of global dialogue on energy, providing authoritative analysis, data, policy recommendations, and real-world solutions to help countries provide secure and sustainable energy for all.	• The World Energy Outlook makes use of a scenario approach to examine future energy trends relying on the world energy model. • The 2023 Outlook explores three scenarios – fully updated – that provide a framework for exploring the implications of various policy choices, investment and technology trends

Inputs of scenario analysis

Companies should have a **reasonable and supportable basis** for selecting and using scenarios, variables and other parameters in a climate-related scenario analysis.

Choice of parameter setting

Analytical Choices	Parameters / Assumptions
• Scope of analysis • Time horizons • Number and diversity of scenarios • Qualitative vs quantitative methods • Data availability	**Physical risk parameters** • Frequency and severity of extreme weather • Historical loss data and future projections • Shifts in temperature, precipitation, sea level rise • Impacts on crop yields, energy demand, or building cooling needs **Transition risk/opportunity parameters** • Carbon pricing • Compliance costs and penalties • Shifts in customer preferences • Changes in raw material costs • Supply chain disruptions • Technology disruptions

Data needed for measuring climate risks

Types of data
Operational data • Asset inventory (location, type, value, lifespan) • Production volumes, energy and water consumption • Emissions data **Financial data** • Revenue, cost, and margin breakdowns by segment and geography • CapEx and OpEx projections • Asset impairment and stranded asset risk assessments • Insurance coverage and premiums **Technological and adaptation measures** • Feasibility and cost of emissions reduction technologies • Adoption rates of new technologies • Physical resilience and R&D investments • Business continuity and disaster recovery plans

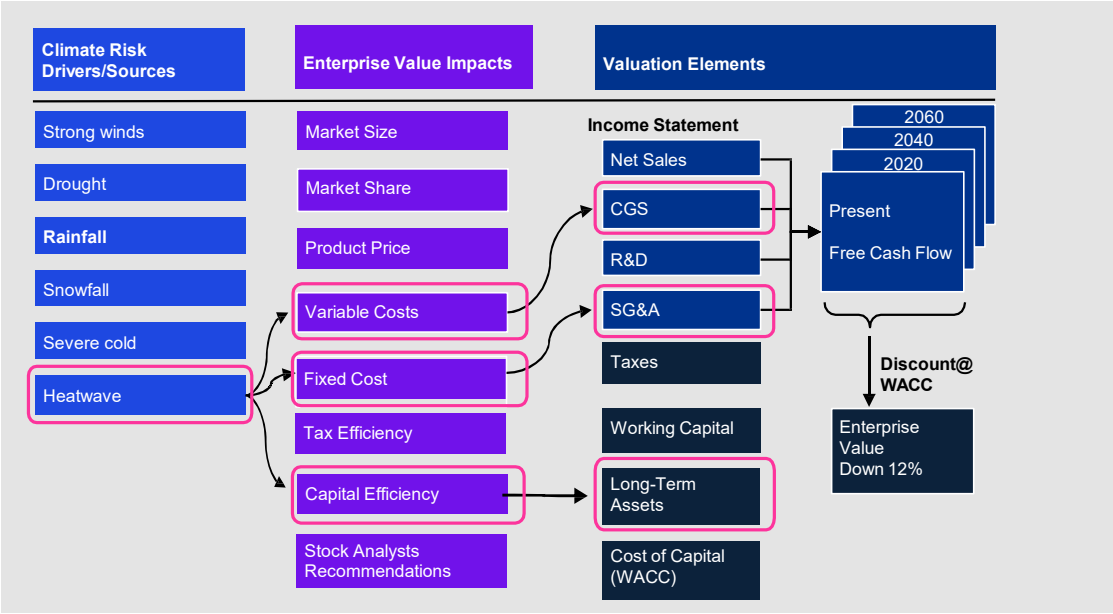
Transition vs physical climate scenario analysis

	Transition risk analysis	Physical risk analysis
Primary driver	Emissions reduction policy, market and technology changes that drive low-carbon transition	Physical climate hazards and their impacts on operations and assets
Impact pathway	**Top-down:** Global / sector emissions pathways affecting company operations	**Bottom-up:** Facility-level impacts that aggregate upward to company level
Sectoral coverage	Often focused on high-emitting sectors	All sectors with physical assets are potentially affected
Time sensitivity	Highly dependent on emissions trajectory chosen	Less variation between scenarios until longer term (post-2050)
Modelling approach	Economic and policy models (IAMs) that optimise economic outcomes	Physical climate models downscaling to relevant geographies
Example of scenarios	NGFS: Current Policies, Net Zero 2050	IPCC: SSP2-4.5, SSP5-8.5
Example of parameters	• Carbon price • Energy mix transition • Policy implementation • Market demand	• Precipitation patterns • Temperature increase • Extreme weather frequency/intensity • Sea level rise

Translate risks and opportunities into financial impacts

When assessing physical and financial costs (e.g. business disruption, damage and loss) of climate change impacts to existing or planned assets, operations, supply and value chains, distribution networks and portfolios, business may use vulnerability and loss & damage functions to quantify the magnitude of potential cost, and to model the materiality of asset financial risk exposure.

Illustrative risk: Buildings with too much glazing facing towards the south or west become unbearably hot, due to the incident solar radiation plus heatwave.



Qualitative vs quantitative analysis

Effective scenario analysis requires a methodical progression from qualitative narratives to quantitative modelling

Qualitative Scenario Narratives

- Develop storylines that challenge conventional thinking
- Identify key drivers, constraints, and logical relationships
- Link global climate scenarios to company-specific implications

Initial Quantification

- Start with directional indicators (increase/decrease)
- Use orders of magnitude estimates
- Identify key variables to model
- Test sensitivity to assumptions

Advanced Modelling & Financial Impact Analysis

- Develop comprehensive quantitative models
- Assess financial implications across business units
- Support strategic decision-making with concrete metrics

Example – Food manufacturer

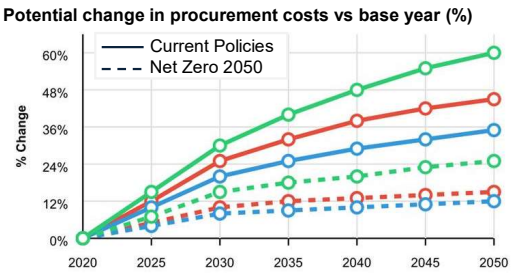
Applied NGFS scenarios to develop narratives showing how yields of core ingredients would change under different climate futures. These narratives qualitatively described how product quality and availability would be affected under each scenario.

Current Policies	Net Zero 2050
Agricultural yields decline gradually as warming continues unchecked, with increasingly frequent extreme weather disrupting harvests. Ingredient quality deteriorates while supply chain disruptions cause significant price volatility.	Agricultural yields stabilise after initial impacts as sustainable farming practices become widespread. Ingredients quality remain largely consistent with historical norms while resilient supply chains moderate price volatility.

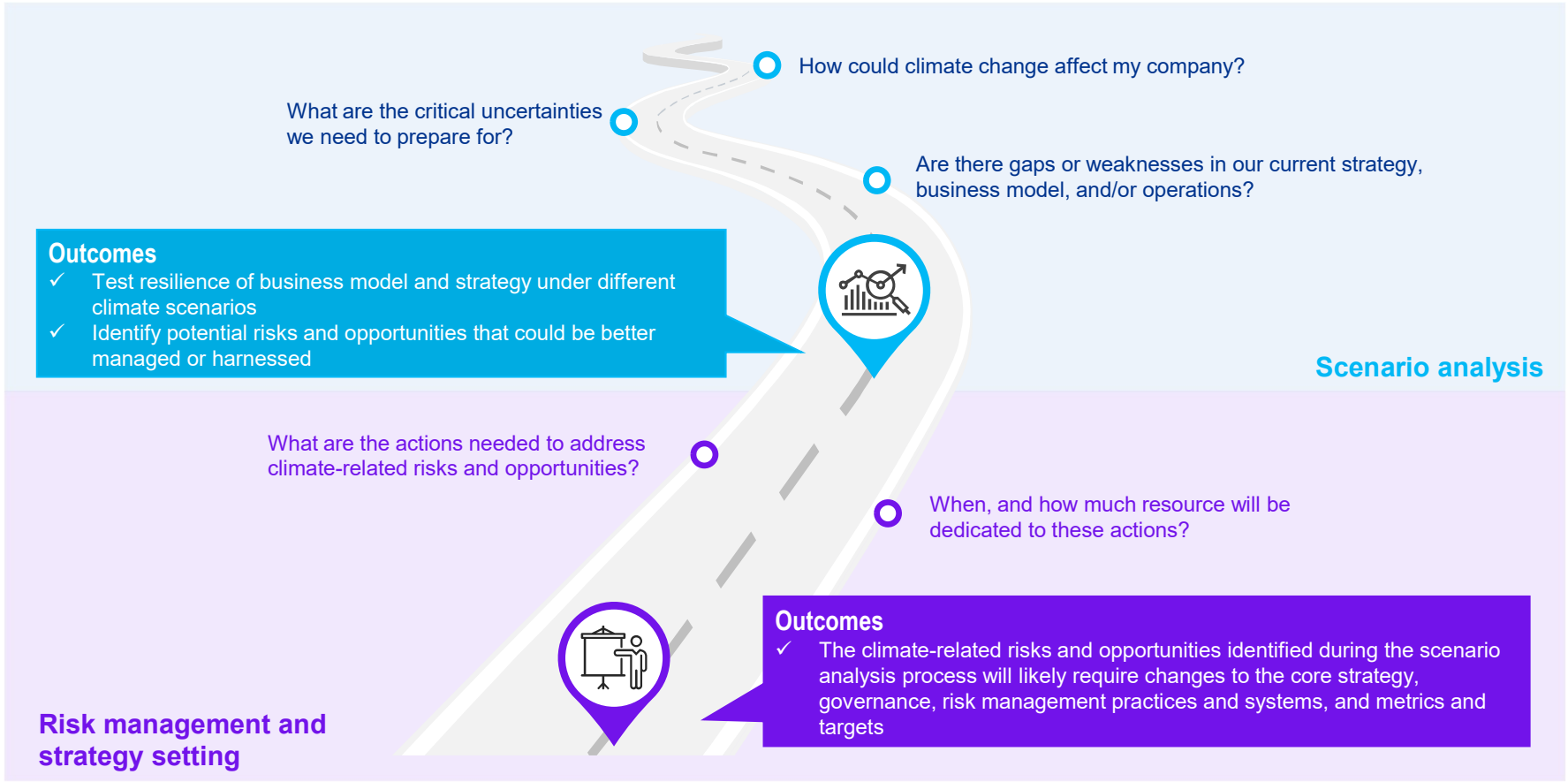
Estimated how procurement costs would vary based on projected crop productivity changes. Created high/medium/low impact categories for different ingredient types. Tested how sensitive across different climate assumptions.

	Current Policies		Net Zero 2050	
	2030	2050	2030	2050
Ingredient 1	Low	Medium	Low	Low
Ingredient 2	Medium	High	Low	Low
Ingredient 3	Medium	High	Medium	Medium

Built financial model integrating climate data with crop yield projections to quantify the potential financial impacts across different business lines and geographies. Results informed strategic decisions.



Developing a response



Integrating results into risk management and business planning – an illustrative example

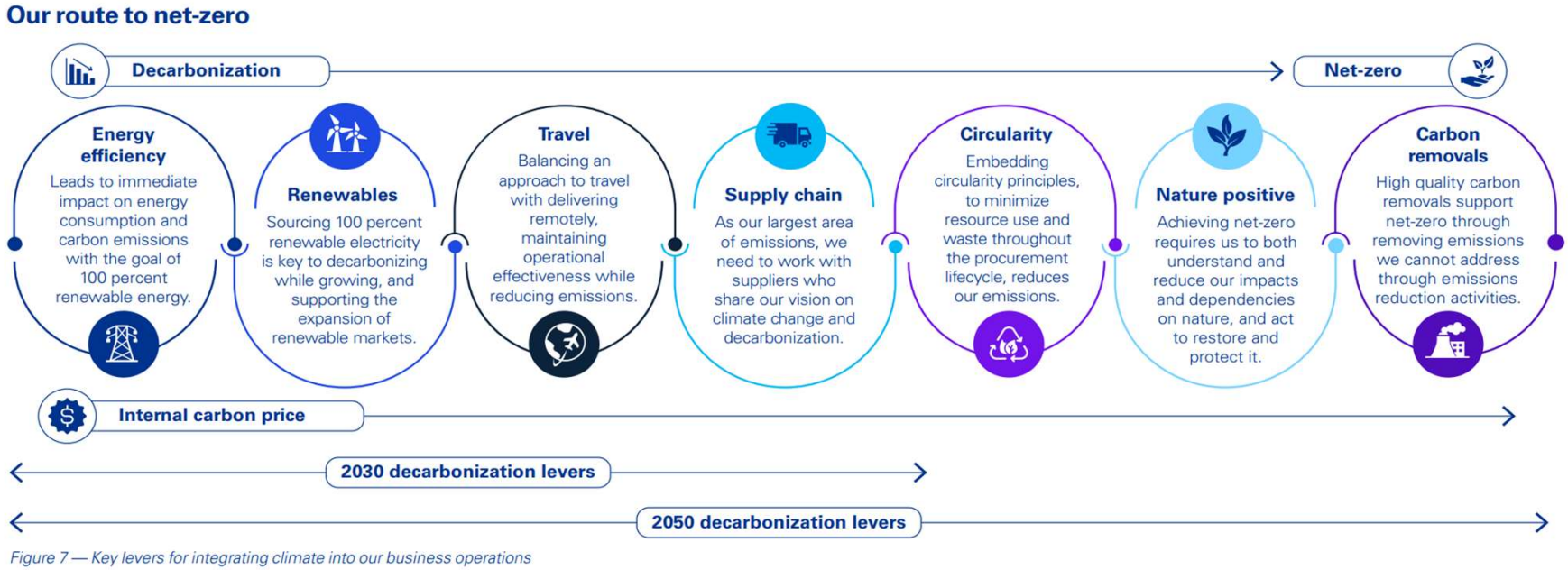


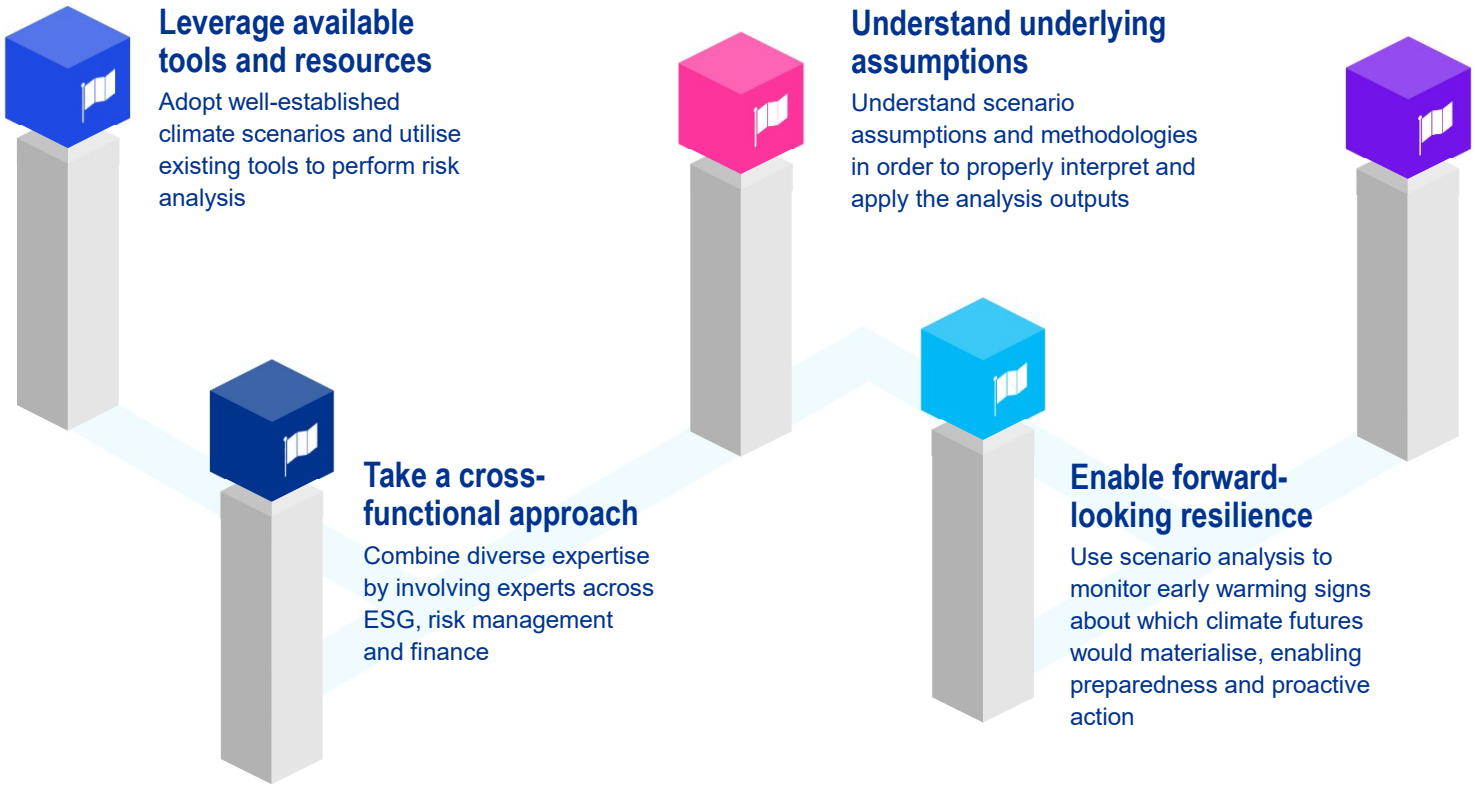
Figure 7 — Key levers for integrating climate into our business operations

Source: KPMG Climate Risk Report, KPMG, 2024

03

Key Takeaways

Key takeaways



Leverage available tools and resources

Adopt well-established climate scenarios and utilise existing tools to perform risk analysis

Take a cross-functional approach

Combine diverse expertise by involving experts across ESG, risk management and finance

Understand underlying assumptions

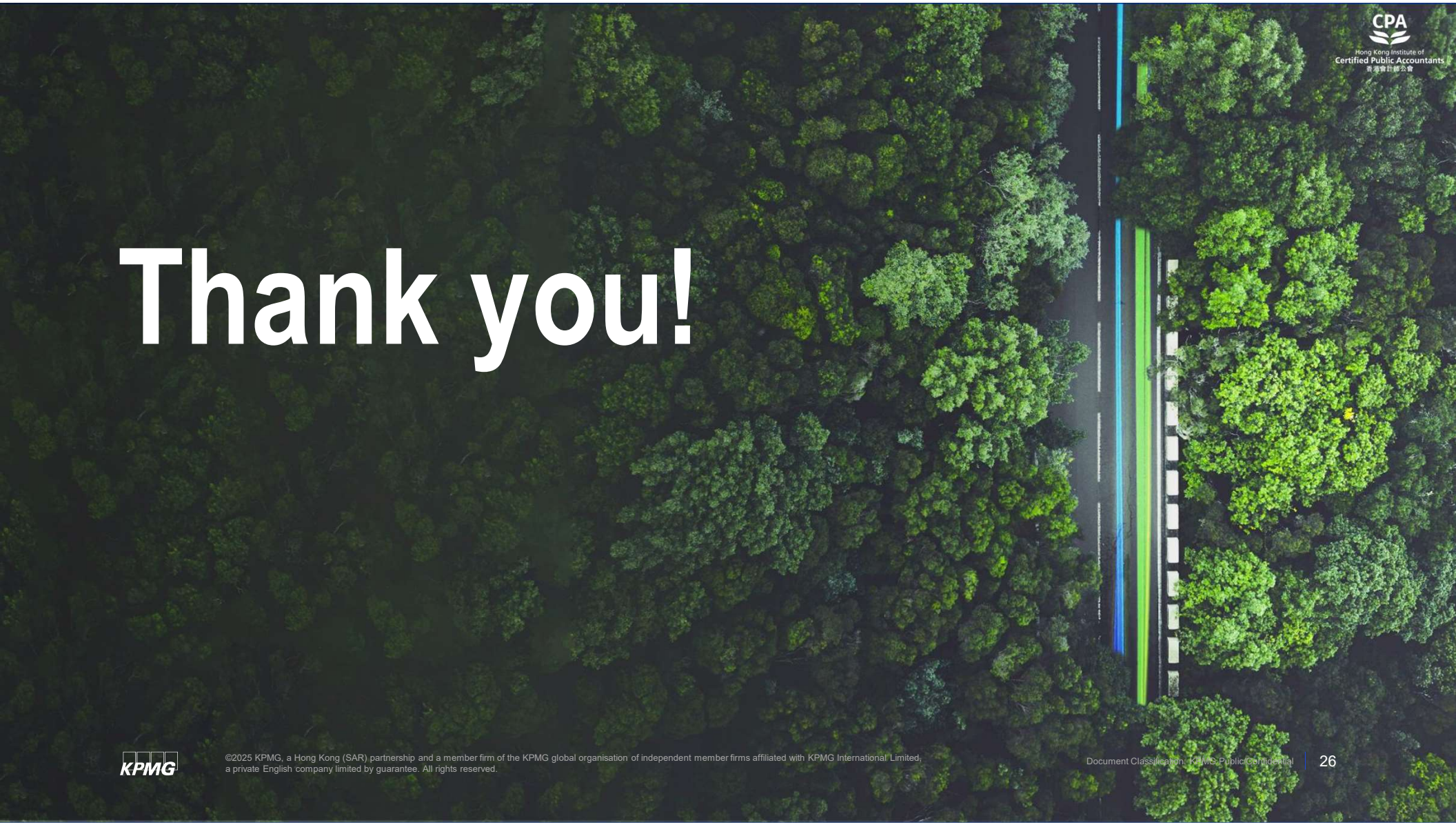
Understand scenario assumptions and methodologies in order to properly interpret and apply the analysis outputs

Enable forward-looking resilience

Use scenario analysis to monitor early warming signs about which climate futures would materialise, enabling preparedness and proactive action

Integrate with strategic planning

Use insights to inform climate transition planning and build adaptive capacity to thrive in a changing business environment



Thank you!