Climate Scenario Analysis

Overview for PRI signatories

FEB 2024

BSR®

Copyright © 2022 by Business for Social Responsibility (BSR)

Business Transformation for a Just and Sustainable World

BSR is a sustainable business network and consultancy focused on creating a world in which all people can thrive on a healthy planet.

With offices in Asia, Europe, and North America, BSR provides its 300+ member companies with insight, advice, and collaborative initiatives to help them see a changing world more clearly, create long-term value, and scale impact.

Check out our About BSR video >>

1
Mission

30+
Years of experience

300+
Member Companies

200+
Global Staff

6
Focus Areas

20+
Collaborative Initiatives

11
Locations

Copenhagen
Guangzhou
Hong Kong
London
New York
Paris
San Francisco
Shanghai
Singapore
Tokyo
Washington, D.C.

We live in a time of accelerating disruption

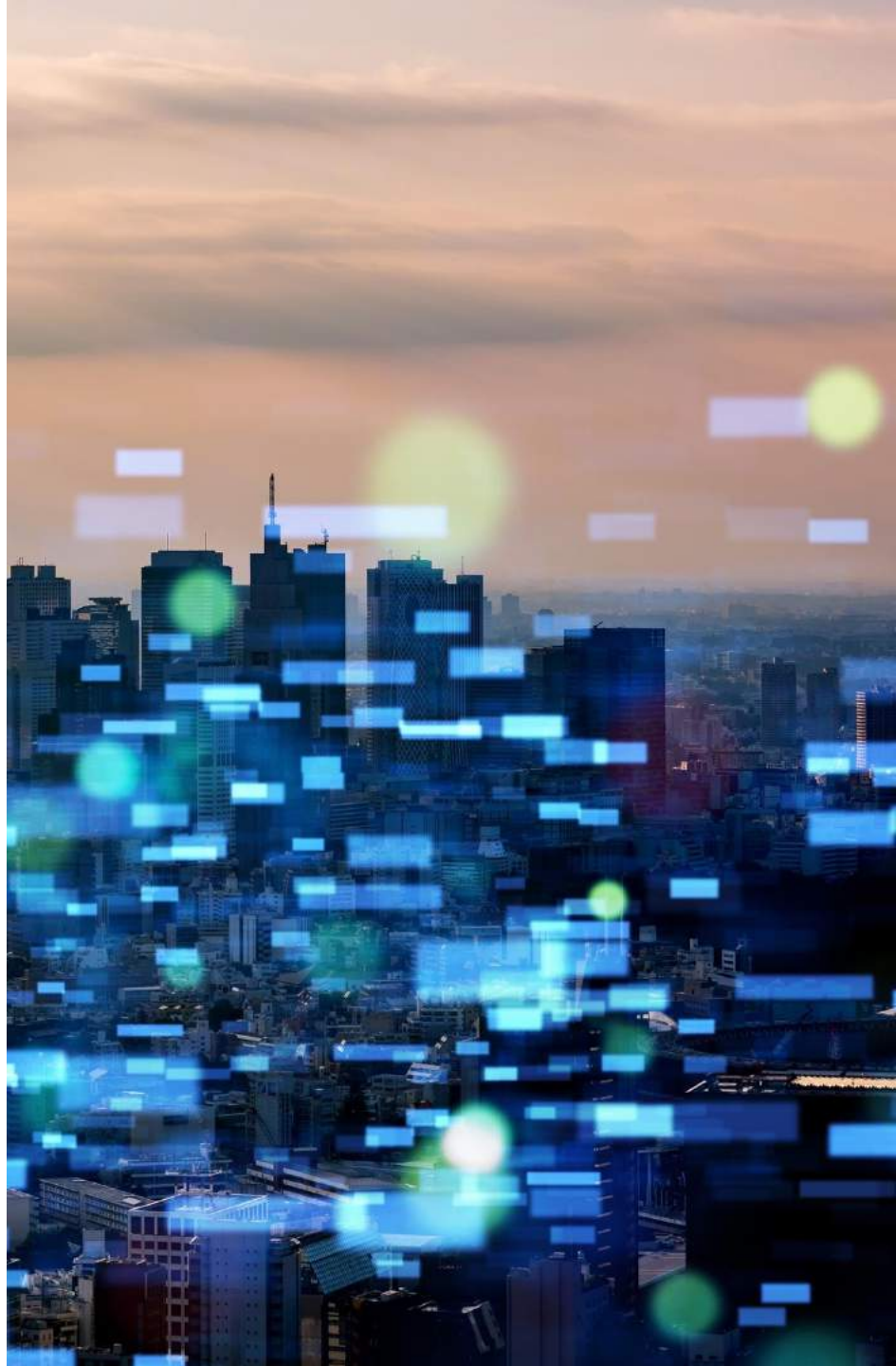
The operating context for business is in constant flux due to a range of dynamic and disruptive trends, including:

- growing geopolitical volatility
- intensifying climate disruption
- new ESG regulatory requirements
- the energy transition
- exponential technologies such as AI
- biodiversity loss
- shifting expectations from consumers and investors

- These trends have **transformative implications** for how we can **achieve a just and sustainable world**.

- Issues that are **material** today will shift in importance and urgency in the coming years, even as new ones emerge

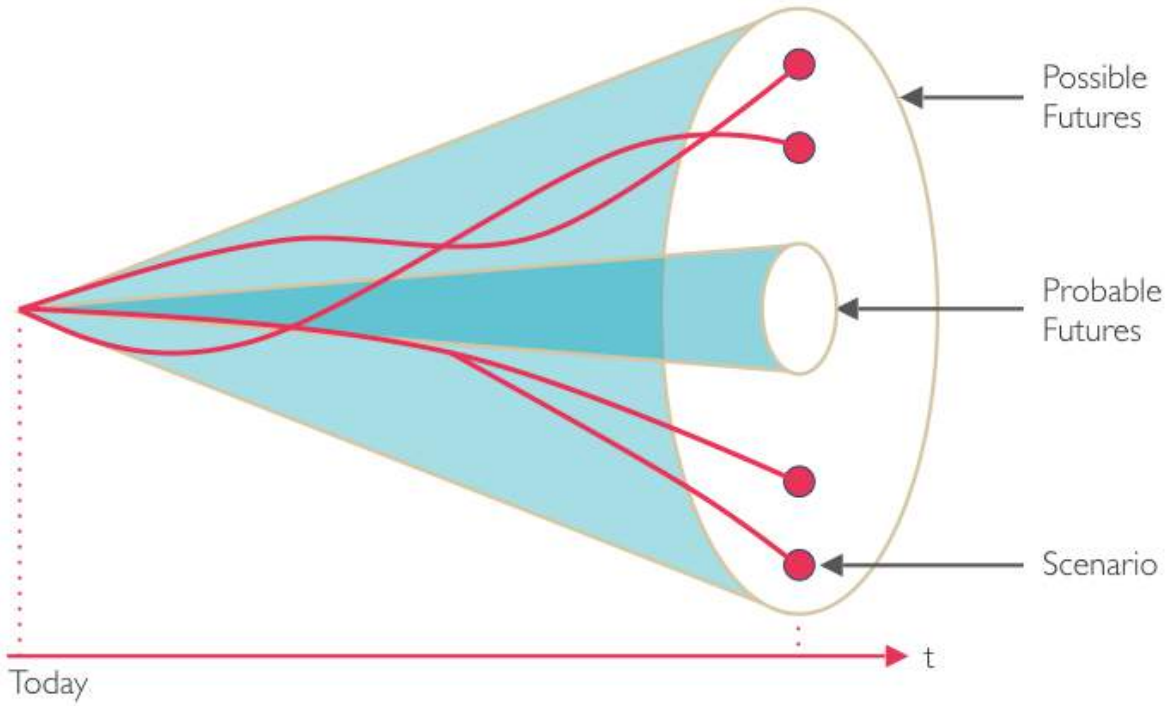
- **Strategies that do not consider the emerging future are *already* becoming obsolete.**



What is Scenario Analysis?

Scenarios are a tool to allow us to explore uncertain futures and make wiser decisions in the present.

Climate Scenarios describe possible future states of the world based on how policies and action affect the trajectory for climate change and related challenges.



- **Scenarios are a set of narrative depictions** of different plausible futures for the operating context of the business.
- **Scenarios are not predictions** about a single "most likely" future. They describe a set of plausible hypothetical futures.
- **Scenarios correct against cognitive biases.** Good scenarios challenge assumptions and help us identify blind spots in our thinking.
- **Scenarios allow us to stress test strategy.** Resilient strategic ideas are those that work across most or all scenarios

Climate Scenario Analysis in Financial Reporting

The Task Force on Climate-Related Financial Disclosures (TCFD) recommends that companies undertake climate scenario analysis to test and disclose the resilience of their business strategy. These recommendations have gained widespread acceptance as a global standard for climate-related disclosures. Many jurisdictions are developing climate-related disclosure rules and standards, often in line with the TCFD recommendations.

The **TCFD recommendations** specify that disclosure of this analysis will assist investors, underwriters, insurers, and other stakeholders to better understand:

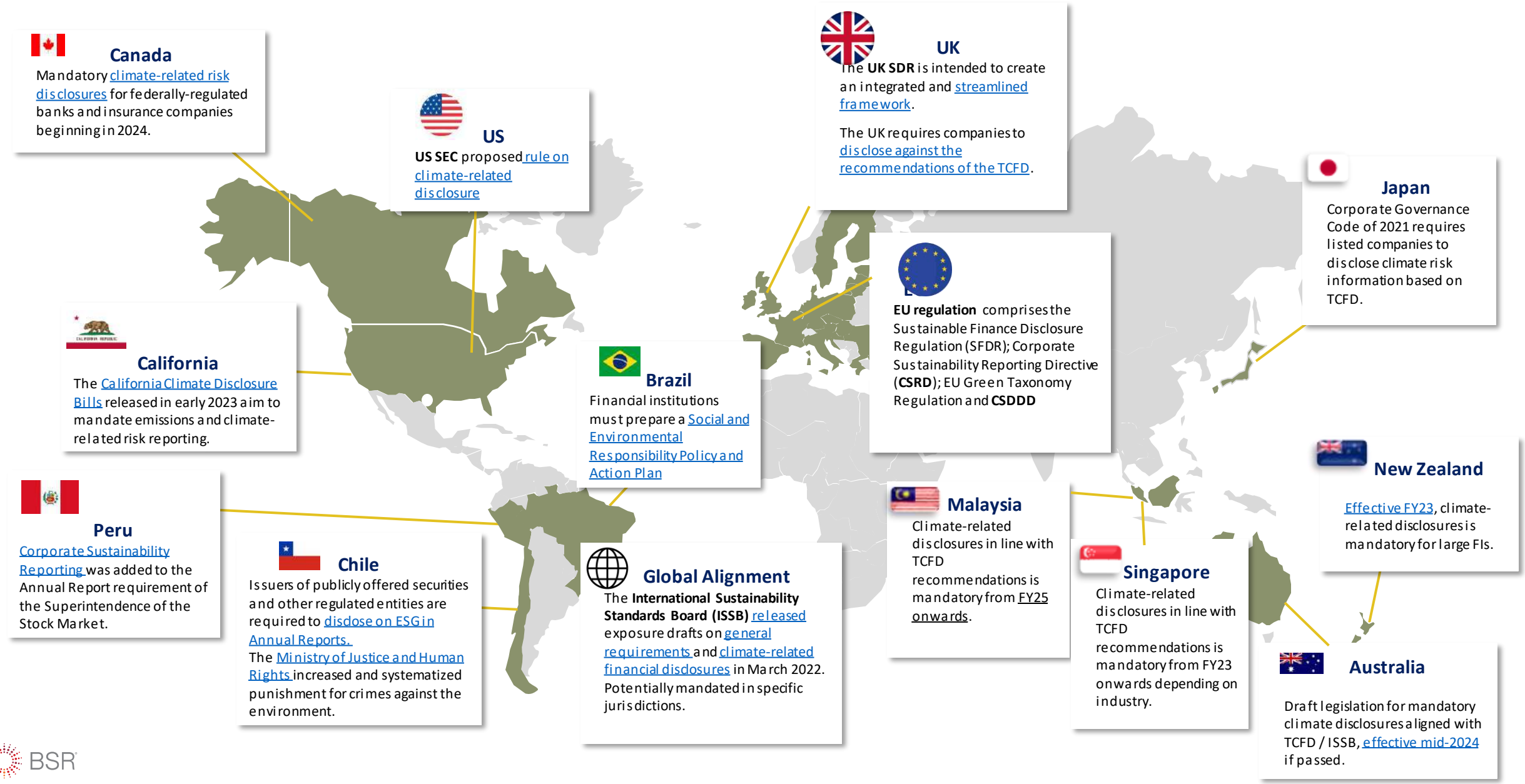
- "the degree of robustness of the organization's strategy and financial plans under different plausible future states of the world;
- how the organization may be positioning itself to take advantage of opportunities to mitigate or adapt to climate-related risks;
- how the organization is challenging itself to think strategically about longer-term climate-related risks and opportunities."

Challenges with the TCFD recommendations

Unfortunately, the TCFD does not specify how to implement the recommendations, leaving uncertainty and room for interpretation. This compounds other challenges in undertaking appropriate climate scenario analyses, such as:

1. A poor understanding of climate risks and how climate impacts can exacerbate other crises and risks;
2. No specified methodology for scenario analysis or how to integrate climate risks into management systems; and
3. Lack of precedent.

Climate Reporting is Being Mandated Across the Globe



Canada
Mandatory climate-related risk disclosures for federally-regulated banks and insurance companies beginning in 2024.

US
US SEC proposed rule on climate-related disclosure

UK
The **UK SDR** is intended to create an integrated and streamlined framework.

The UK requires companies to disclose against the recommendations of the TCFD.

Japan
Corporate Governance Code of 2021 requires listed companies to disclose climate risk information based on TCFD.

California
The California Climate Disclosure Bills released in early 2023 aim to mandate emissions and climate-related risk reporting.

EU
EU regulation comprises the Sustainable Finance Disclosure Regulation (SFDR); Corporate Sustainability Reporting Directive (**CSRD**); EU Green Taxonomy Regulation and **CSDDD**

Brazil
Financial institutions must prepare a Social and Environmental Responsibility Policy and Action Plan

New Zealand
Effective FY23, climate-related disclosures is mandatory for large FIs.

Peru
Corporate Sustainability Reporting was added to the Annual Report requirement of the Superintendence of the Stock Market.

Malaysia
Climate-related disclosures in line with TCFD recommendations is mandatory from FY25 onwards.

Chile
Issuers of publicly offered securities and other regulated entities are required to disdose on ESG in Annual Reports.

The Ministry of Justice and Human Rights increased and systematized punishment for crimes against the environment.

Global Alignment
The **International Sustainability Standards Board (ISSB)** released exposure drafts on general requirements and climate-related financial disdosures in March 2022. Potentially mandated in specific jurisdictions.

Singapore
Climate-related disclosures in line with TCFD recommendations is mandatory from FY23 onwards depending on industry.

Australia
Draft legislation for mandatory climate disclosures aligned with TCFD / ISSB, effective mid-2024 if passed.

The Case for Climate Scenario Analysis

Climate scenarios analysis can help organizations:

1. Identify and assess **climate-related risks and opportunities** and stress-test **business strategies** against plausible futures.

2. Enhance **strategic conversations** by challenging business-as-usual assumptions and considering novel, disruptive developments.

3. Promote **collaboration among internal stakeholders** through shared discussion of key drivers reshaping the external operating environment.

4. **Create more robust business strategies and financial planning** by identifying management actions that are robust across a wide range of plausible climate futures.

5. **Improve strategic agility by establishing indicators to monitor the changing business environment** and rehearsing responses to disruption in advance.

6. **Meet disclosure requirements** and requests from investors and other stakeholders for information on climate-related risks and opportunities, and resilience of its business strategy.

BSR's Climate Scenarios

Businesses are using climate scenario analysis to identify climate-related risks and opportunities, enhance strategic resilience, and respond to burgeoning climate risk disclosure requirements. To support these efforts, BSR has developed three **extended climate scenario narratives built on the Network for Greening the Financial System (NGFS) climate scenario framework** and corresponding datasets. BSR's scenario set provides more holistic business-relevant narratives with decade-by-decade accounts of plausible socioeconomic, political, and technological developments, grounded in the NGFS data.

Benefits of the NGFS Scenario Framework

A range of third-party climate scenarios are publicly available. Most of these are narrowly focused, explore only transition or physical risks, and are based on assumptions not always relevant for the business community. BSR chose the Network for Greening the Financial System (NGFS) scenarios as the foundation for this set of climate scenarios for several reasons:

The scenarios were derived from multiple **reputable climate models** by the Potsdam Institute for Climate Impact Research, the University of Maryland, and the International Institute for Applied System Analysis, among others.

They were developed with reference to the **TCFD recommendations** and are suitable for all sectors, not just finance, to undertake climate scenario analysis in line with the recommendations.

They integrate **both physical *and* transition risks into the same set**, with shared assumptions and parameters.

They are accompanied by **substantial supporting documentation** and are regularly updated.

The NGFS approach allows for **the exploration of a broad range of temperature pathways as well as different assumptions** that better reflect the uncertainty of future conditions, and guards against model bias.

Scenario analysis results using the NGFS framework represent **aggregate sectors and markets** and can be a guide to assess individual company risks.

Climate Scenario Building – NGFS Assumptions & Characteristics

OVERALL NGFS ASSUMPTIONS

The three NGFS Scenarios have a 2050 horizon year and are differentiated by three key design choices relating to long-term policy, short-term policy, and technology availability.

INDIVIDUAL SCENARIO ASSUMPTIONS

	CURRENT POLICIES	NET ZERO 2050	DELAYED TRANSITION
Scenario	A recovering economy fully embracing the low-carbon transition in a cooperative way, still subject to environmental shocks	Stringent climate policies and innovation, reaching global net zero GHG emissions around 2050	Climate policies are delayed, which forces a very aggressive policy response starting in 2030
Impact of transition and physical risks	**High physical risks** **Low transition risks**	**Low to medium physical risks** **Low to medium transition risks**	**Low to medium physical risks** **Medium to high transition risks**
Policy Ambition*	• 3°C+	• 1.4°C	• 1.6°C
Policy reaction	• No additional** policy reaction	• Immediate and smooth policy reaction	• Delayed policy reaction
Technology	• Slow technology change	• Fast technology change	• Slow then fast technology change
Carbon dioxide removal	• Low use of carbon dioxide removal	• Medium/high use of carbon dioxide removal	• Low/medium use of carbon dioxide removal
Regional policy reaction	• Low regional policy variation	• Medium regional policy variation	• High variation in regional policies

*above pre-industrial levels by 2100c
**because NGFS's phase 3 data set was developed in 2022, this notably does not include major recent policies such as the U.S. Inflation Reduction Act

Scenario descriptions based on the NGFS scenarios framework as well as data from NGFS Climate Impact Explorer and NGFS IIASA Scenario Explorer.

Overview of BSR's Climate Scenario Narratives

Current Policies

2020s

- Climate policies lacked ambition
- Limited investment in the energy system
- **Physical impacts brought disruption**

2030s

- Low carbon prices failed to reduce emissions
- Climate impacts continued to accelerate
- **Assets became uninsurable**

2040s

- Adaptation became the focus of climate action
- Inequality was exacerbated
- **Climate impacts led to economic loss**

Net Zero 2050

2020s

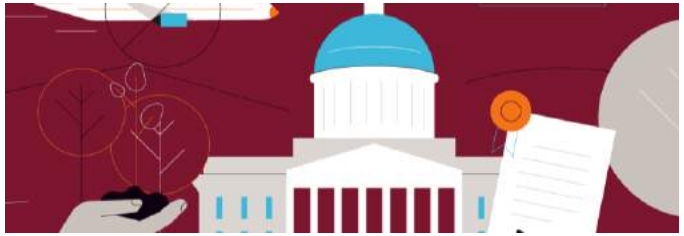
- **Regulation and investment increased dramatically**
- **Economic activities redirected towards emissions reduction**
- Early climate impacts continued to escalate

2030s

- Regional variation in policies created inequality
- Renewable energy system growth strained mineral supply chains
- **Technological innovation brought new opportunities to reduce residual emissions**

2040s

- Fossil fuel investments phased out
- Some manageable climate impacts remained
- Climate reparations facilitated increased equality



Delayed Transition

2020s

- Policymakers and business implemented limited climate action
- Reliance on fossil fuels continued
- **Physical impacts became more severe and apparent**

2030s

- Abrupt crisis response sparked action
- **Businesses struggled amidst high compliance costs**
- Emissions reduction was ultimately successful but turbulent

2040s

- **A new low-carbon economy emerged**
- Decarbonization efforts shifted to hard-to-abate sectors
- Temperatures and physical impacts stabilized

Sample Transition Data Variables in NGFS Dataset

NGFS provides a depth and breadth of data (selection of variables below), regions, and ranges (years). The list is not exhaustive and new data points are added annually.

- **Agricultural demand**: crops, livestock
- **Agricultural production**: energy, non-energy
- **Capacity additions (electricity):** biomass, coal, gas, oil, solar, wind
- **Capacity**: electricity, hydrogen, gases, liquids
- **Capital cost**: electricity, hydrogen, gases, liquids
- **Carbon intensity (emissions)**
- **Carbon intensity (production):** cement, steel
- **Carbon sequestration**: CCS, land use
- **Concentration**: CH4, CO2, N2O/ consumption, damage factor
- **Diagnostics**: GDP change (KW panel populations-weighted), GDP, investment (energy efficiency, energy supply, low carbon, total), macro-economic climate damage, policy cost and macro-economic climate damage, temperature (exceedance probability, global mean)
- **Emissions**: BC (C2F6, CF4), CH4, CO, CO2, F-gases, HFC, Kyoto gases, N2O, NH3, OC, Sulfur, VOC
- **Energy Intensity**: Final energy/GDP
- **Energy Intensity**: Primary/GDP
- **Energy Service**: Transportation (freight, passenger)
- **Final Energy**: total by source, industry, non-energy use, other sector, residential and commercial, solids, transportation (freight, liquids, passenger, road)
- **Food demand**: total, crops, livestock
- **Fertilizer production**
- **Forcing**: total, Kyoto gases
- **Forestry demand**: roundwood
- **Forestry production**: roundwood
- **GDP**
- **Investment**: total, energy supply (electricity, extraction, hydrogen, liquids)
- **Land cover**: total, cropland, forest
- **NIGEM** model with 700+ macroeconomic indicators

Sample Physical Data Variables in NGFS Dataset

Physical impact data is pulled from the NGFS Climate Impact Explorer. Data can be retrieved for each scenario and is available across many regions*.

Chronic

- **Agriculture**: maize yield, rice yield, soil moisture, soy yield, wheat yield
- **Climate**:
  - Mean air temperature
  - atmospheric pressure (surface)
  - atmospheric pressure (adjusted sea level)
  - daily maximum and minimum air temperature
  - downwelling longwave radiation
  - precipitation
  - relative humidity
  - Snowfall
  - specific humidity
  - wind speed
- **Freshwater**:
  - Maximum of daily river discharge
  - Minimum of daily river discharge
  - river discharge
  - surface runoff

Acute

- **Economic damages**:
  - 1-in-100-year expected damage from tropical cyclones
  - annual expected damage from river floods
  - annual expected damage from tropical cyclones
  - labor productivity due to heat stress
- **Extreme events**:
  - fraction of population annually exposed to crop failures
  - fraction of population annual exposed to heatwaves
  - fraction of population annually exposed to wildfires
  - land fraction annually exposed to crop failures
  - land fraction annually exposed to heatwaves
  - land fraction annually exposed to river floods
  - land fraction annually exposed to wildfires
  - river flood depth

**The specificity of data by region may be constrained by available data in NGFS database. At times, data is available at the region level (e.g. EU, Norh America), or at the country level (e.g. France, USA). BSR will work with the company to choose data points available in regions of interest.*

BSR's Approach to Climate Scenarios Analysis

Objectives:

1. Build resilience and maximize the opportunities in the company's strategy and risk management processes through scenario analysis which tests potential futures for the business, using credible third-party climate scenarios tailored augmented with business-specific information.
2. Provide clear disclosure to investors on implementation of TCFD recommendation Strategy c) on scenario analysis.

Review the company's climate, risk, and strategy documentation to establish a baseline understanding.

Research additional trends (environmental, economic, social, political, and technological) relevant to industry and geography.

Update BSR's three climate scenarios that depict alternate plausible future operating contexts for the company –integrate climate datapoints from NGFS

Gather feedback and iterate with the the company project team.

Conduct internal stakeholder interviews with functional groups across the company to identify risks and opportunities present for the company in each of the three future climate scenarios.

Conduct a workshop to explore scenarios, identify emerging challenges and opportunities, test strategy against different future possibilities, and generate ideas to help the company refine strategy to enhance resilience.

Develop a report capturing key insights and additional recommendations for the company along with recommended TCFD reporting of scenarios analysis.

Risk Outlook to 2035 | Healthcare in Indonesia

It's 2025 and you're investing in a **medical innovation company in Indonesia**. You're looking to exit by 2030, convincing your buyer of a healthy outlook to 2035. What does it mean to **de-risk for that decade?** The answer depends on critical but uncertain factors, not least climate impacts and the changing policy landscape. This outlook factors in our three different policy trajectories, all of which send global mean temperatures beyond 1.5°C by 2035.

Physical Risks: Health

- Rise in heat morbidity for non-communicable diseases (diabetes, cardiovascular)
- Wildfires cause surge in respiratory disease
- Increase in vector, food and water-borne disease, including rising urban transmission and heightened risks for high-density populations
- Sanitation deteriorates due to flooding
- Workforce impacted by health risks

Physical Risks: Operations

- Acute weather events disrupt supply chains: flooding limits delivery of life-saving drugs
- Hotter temperatures require more cold storage, raising energy costs
- Digital infrastructure affected by extreme heat and high energy costs; rising incidence of blackouts
- Flooding damages manufacturing facilities
- Crisis-related migration impacts product/service delivery

Transition Risks

- Mandatory climate disclosure (SEC and other jurisdictions)
- Compliance with standards (ESRS, IFRS) to report on full value chain
- Regional variation in climate policies affects carbon pricing, trade and investment flows
- Steep carbon costs raise energy prices (eg. affecting cold storage)
- Climate impacts bring health equity concerns to the fore, exposing companies in terms of whom they care for and who pays

Risk Outlook to 2035 | Retail logistics in the Philippines

It's 2025 and you're investing in a **grocery and distribution company in the Philippines**. You're looking to exit by 2030, convincing your buyer of a healthy outlook to 2035. What does it mean to **de-risk for that decade?** The answer depends on critical but uncertain factors, not least climate impacts and the changing policy landscape. This outlook factors in three different policy trajectories, and the impact of pre-2020 emissions that in all scenarios take us beyond 1.5°C by 2035.

Physical Risks: Supply Chain

- Cold chain infrastructure costs increase due to rising temperatures
- Losses due to spoilage in transit, alongside reputational risk relating to food safety incidents
- Flooding disrupts delivery of goods from farm to facility to store
- Distribution center energy costs rise as hydropower hit by drought

Physical Risks: Operations

- Frequent flooding and storms cause loss of assets (distribution centers, grocery stores) and disrupts manufacturing operations
- Workforce productivity impacted by extreme weather (heat, flooding, storms)
- Spending power impacted by rising food and energy costs
- Population displacement due to severe weather events reduce spending

Transition Risks

- Carbon border adjustment mechanisms (EU, IRA) affect pricing of imports (including aluminium, plastics)
- Mandatory climate disclosure (SEC and other jurisdictions)
- Compliance with standards (ESRS, IFRS) to report on full value chain
- Energy costs raised by carbon pricing for coal, natural gas, fossils

Risk Outlook to 2035 | Financial services in India

It's 2025 and you're investing in a **property microinsurance company in India**. You're looking to exit by 2030, convincing your buyer of a healthy outlook to 2035. What does it mean to **de-risk for that decade?** The answer depends on critical but uncertain factors, not least climate impacts and the changing policy landscape. This outlook factors in three different policy trajectories, and the impact of pre-2020 emissions that in all scenarios take us beyond 1.5°C by 2035.

Physical Risks: Payouts

- Heavy flooding causes extensive property damage
- Heat and drought cause loss of crops
- Livestock morbidity increases due to heat and drought
- Emerging disease threats due to shifting vector distribution affects livestock
- Climate migration affects property costs and insurance demand

Physical Risks: Operations

- Digital infrastructure (eg. mobile sales and claims channels) impacted by storm-related blackouts
- Operations infrastructure could become expensive to insure or uninsurable

Transition Risks

- Reinsurers raise premiums in response to payout burden
- Policy options collapse as payout burden increases
- Energy costs raised by carbon pricing for coal, natural gas, fossils
- Fossil investments subject to value loss due to policy shifts
- Cost of secure data management to meet transparency requirements

Thank You

BSR™ is an organization of sustainable business experts that works with its global network of the world's leading companies to build a just and sustainable world. With offices in Asia, Europe, and North America, BSR™ provides insight, advice, and collaborative initiatives to help you see a changing world more clearly, create long-term business value, and scale impact.

www.bsr.org

All rights reserved. No part of this publication may be reproduced, distributed, or transmitted in any form or by any means, including photocopying, recording, or other electronic or mechanical methods, without the prior written permission of the publisher, except in the case of brief quotations embodied in critical reviews and certain other noncommercial uses permitted by copyright law.

BSR®

Copyright © 2022 by Business for Social Responsibility (BSR)