Grant Thornton

FINANCIAL SERVICES ADVISORY

Climate risk quantification

How Grant Thornton can help to quantify and manage your climate risk

Overview

The global economic crisis that resulted as a consequence of the pandemic has stressed the relevance of prioritising sustainability pillars within financial services.

In addition, it is becoming increasingly clear that such risks are being realised and can be measured, monitored, and mitigated. This has driven the global regulatory community to seek ways in codifying ESG risks, especially those that are climate change-related, into a single risk type.

Of course, risk is inversely linked to opportunity and the emergence of such additional risks presents potential areas of growth and competitive advantage for banks in recognising such pathways more efficiently than their competitors.

Grant Thornton's ESG services are across three pillars, Strategy, Risk Management and Integration. This document outlines our focus on the development of a climate change risk quantification, stress testing, and portfolio management framework. This framework aims to identify and measure key vulnerabilities in a bank's portfolios given the negative effects of climate change, as well as to identify opportunities for growth in reference to risk based pricing reflective of climate risks.

Our services

Grant Thornton provides a full suite of Environmental, Social and Governance (ESG) advisory services for Financial Services institutions across:

Strategy

Risk Management

Integration

Grant Thornton's dedicated financial services advisory teams across Consulting, Risk and Advisory can deliver across each of these key areas. This document focuses on Risk Management. Details of our Strategy and Integration services are also available.

ESG pillars

Environmental:

- climate change strategy;
- biodiversity;
- resource depletion;
- air and water pollution;
- Deforestation;
- water efficiency;
- energy efficiency;
- carbon intensity;
- environmental;
- management system.

Social:

- diversity and equal opportunities;
- human rights;
- employee training/upskilling;
- freedom of association;
- health and safety;
- human rights;
- customer and products responsibility;
- child labour;
- local and indigenous communities.

Governance:

- business ethics;
- compliance;
- board independence, diversity and structure;
- executive compensation;
- shareholder democracy;
- bribery and corruption;
- tax strategy;
- transparency;
- shareholder rights.

Climate risk and regulations

Institutions are expected to:

- include climate-related and environmental risks in all stages of credit-granting process and credit processing (impact on PD);
- adjust risk classification procedures in order to identify and evaluate climate-related and environmental risks (impact on PD);
- consider climate-related and environmental risks in collateral valuations (impact on LGD);
- monitor and manage credit risks in their portfolios, through sectoral/geographic/single-name concentration analysis, including credit risk concentrations stemming from climate- related and environmental risks (impact on Economic Capital, RWA, and ECL provisions);
- reflect credit risk appetite and business strategy in their loan pricing frameworks with regards to climate-related and environmental risks (impact on ICAAP, ILAAP, SREP); and
- reflect the different costs in their loan pricing driven by climate-related and environmental risks (impact on RAROC).

Relevant policies include, but are not limited to:

Prudential Regulatory Authority (PRA)

The impact of climate change on the UK Insurance sector ***Report*** *September 2015*

General Insurance Stress Test ***Guidelines and Instructions*** *June 2019*

Enhancing banks' and insurers' approaches to managing financial risks from climate change ***Supervisory Statement SS3/19*** *April 2019*

Dear CEO ***Letter*** *July 2020*

Financial Conduct Authority (FCA) & Bank of England (BoE)

Climate Change and Green Finance ***Discussion Paper DP 18/8*** *October 2018*

Proposals to enhance climate related disclosures by listed issuers and clarification of existing disclosure obligations ***Consultation Paper CP20/3*** *March 2020*

European Central Bank (ECB)

ECB report on institutions' climate-related and environmental risk disclosures ***Report*** *November 2020*

ECB economy-wide climate stress test ***Occasional Paper Series No 281*** *September 2021*

UK government

Green Finance Strategy ***Policy Paper*** *July 2019*

The ten point plan for a green industrial revolution ***Policy Paper*** *November 2020*

A roadmap towards mandatory climate related disclosures ***Roadmap*** *November 2020*

Financial Reporting Council

Climate Thematic Review ***Report*** *November 2020*

Basel Committee on Banking Supervision

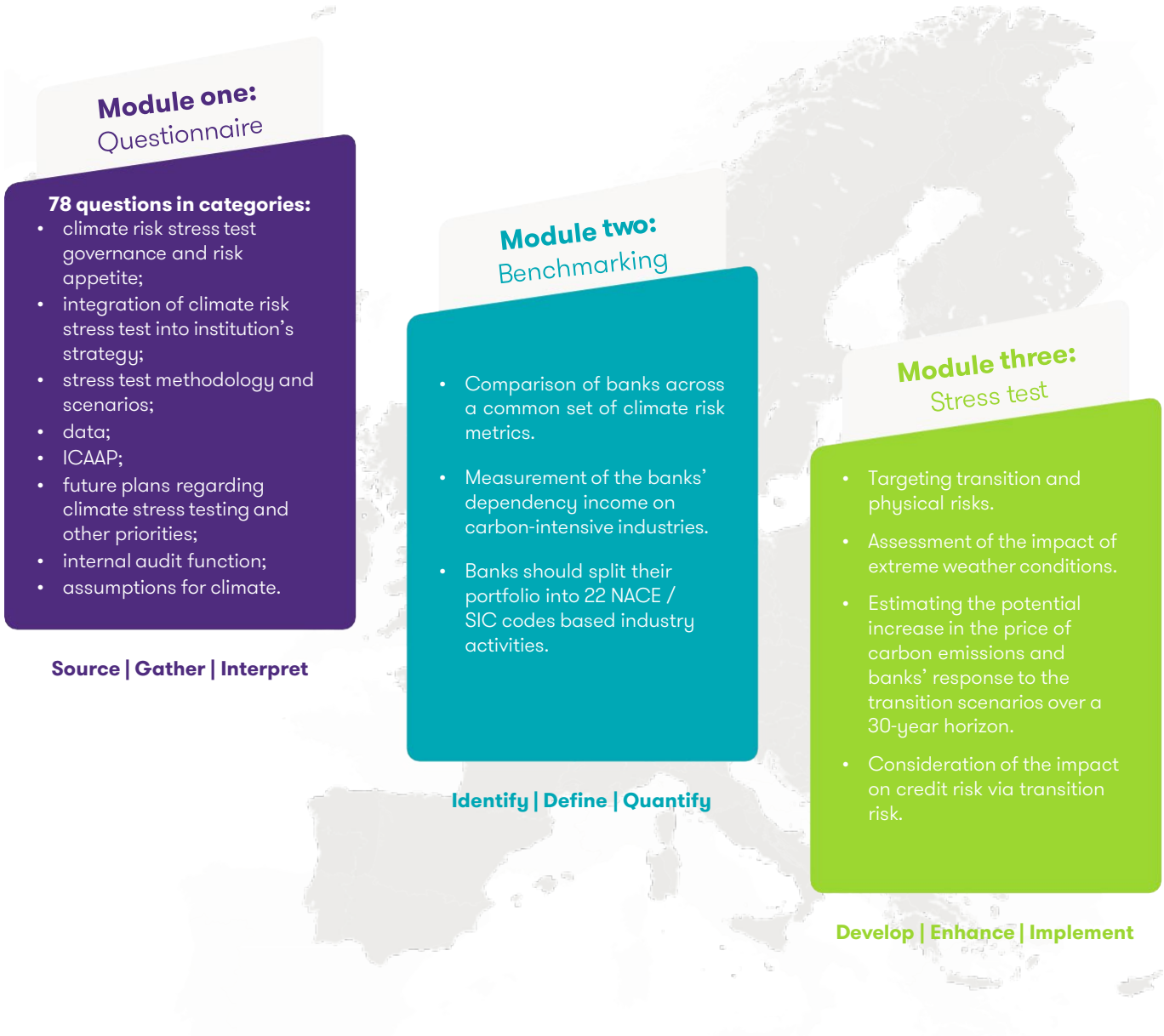
Principles for the effective management and supervision of climate related financial risks ***Principles*** *November 2021*

The 2021 biennial exploratory scenario (BES) on the financial risks from climate change ***Discussion Paper*** *December 2019*

Climate risk stress test

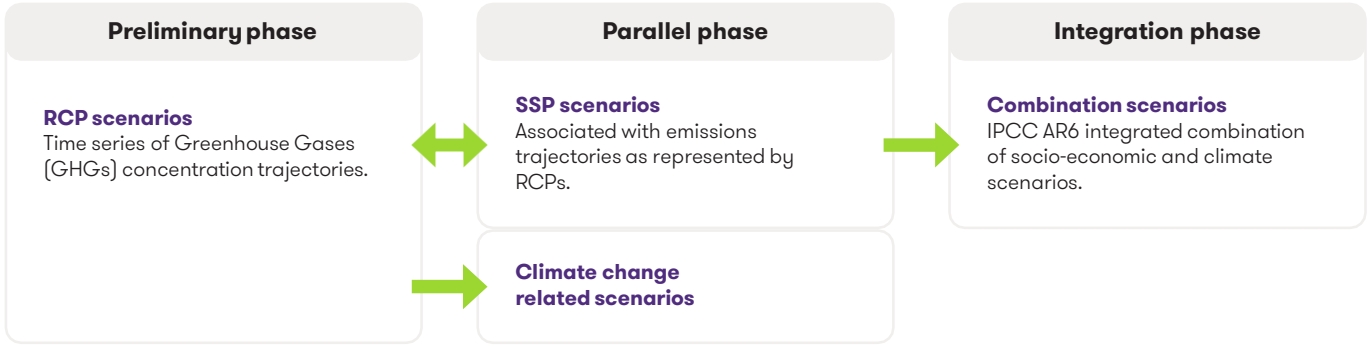
ECB's climate stress test methodology is indicative, with no direct implications linked to the bank's capital requirements.

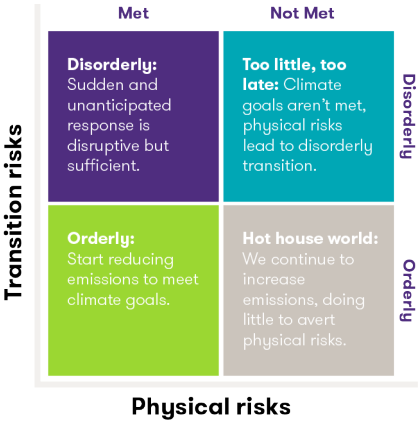
The results of this stress test exercise will provide the regulator with insights into the bank's climate risk exposures, which might affect the Pillar 2 requirements via the Supervisory Review and Evaluation Process (SREP) scores.

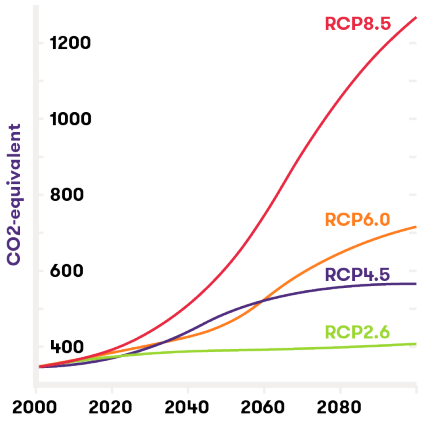


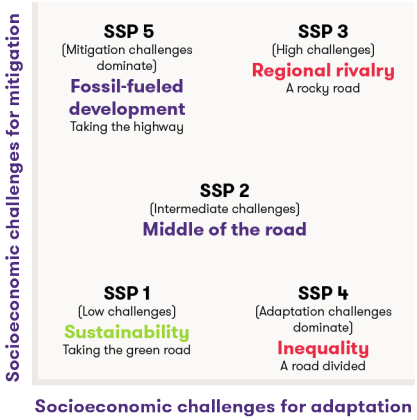
Climate scenario design

Leveraging globally accepted solutions









Network for greening the financial system

Provide framework for analysing climate risks, identifying key transition and physical risks associated with climate change.

Physical risk: Impact from increasing frequency and magnitude of natural hazards.

Transition risk: Financial loss from the process of adjustments towards a sustainable economy.

Framework allows examination of the economic impact of policies implemented in representative scenarios - namely:

Orderly: Effective policies implemented early.

Disorderly: Policy implantation delayed before abrupt and costly action taken.

Hot house world: Little further action is taken. Limited transition risk but high physical risk.

The Representative Concentration Pathways (RCPs)

RCPs are designed for modelling different climate futures depending on GHG emissions. These give estimates for emissions trajectory based on various assumptions specific to each pathway.

Each RCP pathway defines a specific radiative forcing by 2100 – RCP8.5 implies global warming of 8.5 Wm^{-2} by 2100.

Shared Socioeconomic Pathways (SSPs) framework

The SSPs framework contains alternate socioeconomic scenarios developed to aid in assessing future risks due to the changing socio-economic landscape. The scenarios are:

- Sustainability;
- Middle of the road;
- Regional rivalry;
- Inequality;
- Fossil fueled development.

Scenario construction:

RCP scenarios: Emission trajectories are used as inputs for climate models.

SSP scenarios: Socio-economic narratives are translated into GHG emission trajectories.

NGFS scenarios: Identification of physical and transition risks under different climate futures.

IPCC Assessment Report (AR6): A new 'parallel' process is established for the construction of integrated RCP-SSP combination scenarios.

Risk quantification

Bottom-up approach

- **Adoption of borrower specific climate risk drivers as part of grading**
  e.g. impact based on geolocation and sector
- **Incorporation of ESG drivers in loan pricing for individual borrowers**
  RAROC-based
- **Translation of climate risk drivers into a credit risk profile on a borrower level**
  Scorecard
- **Translation of macro-economic shocks into bank risk measures**
  Stress testing

Scorecards:
Borrower specific ESG risk drivers and metrics available by external agencies, borrower specific financial factors driven by climate change risks.

Stress testing:
Climate model scenarios, socio-economic scenarios, emissions and radiative forcing scenarios

Limitations:
Data granularity not readily available, limited historical data availability, system set-up requirement for data collection.

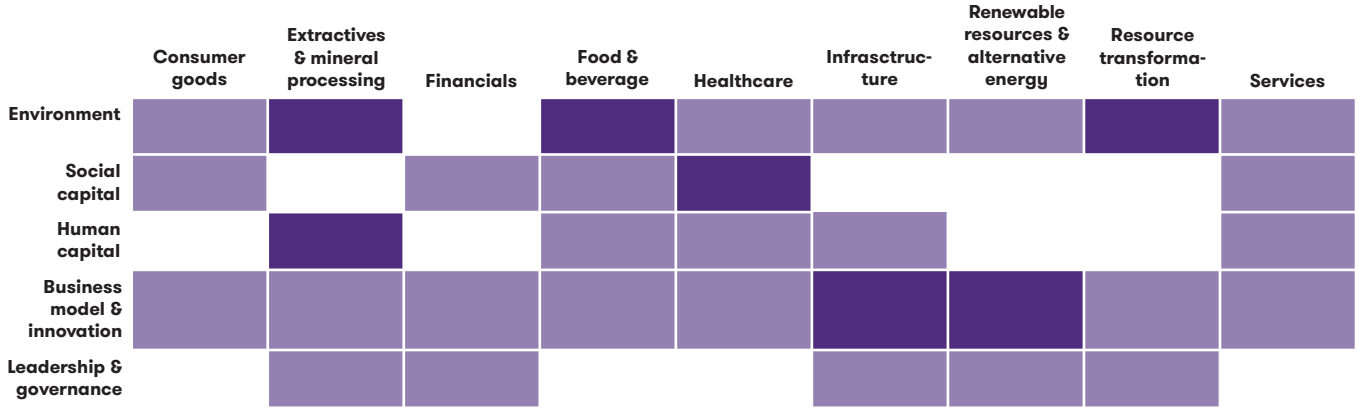
Top-down approach

- **Use of regression models to estimate the relationship between climate risk drivers, economic variables, and bank risk measures**
- **Stress-testing on portfolio, sub-portfolio, or sector level**
- **Translation of climate risk drivers into a credit risk profile measuring the systematic element of the risk**
- **Translation of macro-economic shocks into bank risk measures**

Data requirements:
Bank default rates and macro-economic variables, climate and physical drivers, transition and policy drivers, socio-economic indicators, emission and radiative forcing indicators.

Limitations:
Impact of climate change and environmental risks not available on borrower level.

Heat map that identifies the potential impact of sustainability across the sectors, asset classes and lending activities[1].

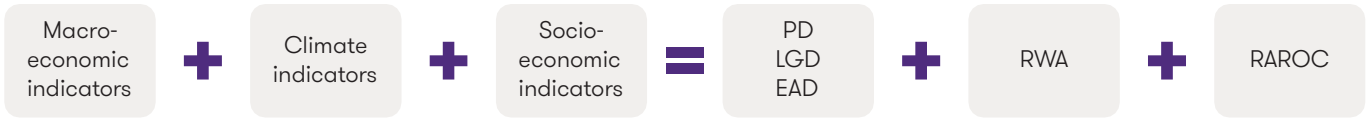


1 SASB Materiality Map

Methodology overview

Input: Data on portfolio, sub-portfolio or sector

Output: Climate risk translation to pricing



Bottom-up

- Operations in high risk flood area
- Energy intensive business producing aluminium components

→

Scoring process:

Initial grade: 3

Climate risk impact: 4

Final grade: 7

→

RAROC based on Grade 7 RWA:

RAROC: 11%

Price/interest rate: 5%

Grant Thornton approach: Climate risk impact can be identified on a borrower level, to be incorporated into the borrower's grade (scorecard). The final grade will be mapped used to calculate RAROC.

Top-down

- Operations in high risk flood area
- Energy intensive business producing aluminium components

→

Scoring process:

Initial grade: 3

Climate risk impact: NA

Final grade: 3

→

RAROC based on Grade 3 RWA:

RAROC: 16%

Climate risk RWA add on:

RAROC: 11%

Price/interest rate: 5%

Grant Thornton approach: Climate risk impact cannot be identified on a borrower level, climate risk will be quantified and included in the RAROC calculation on the portfolio, sub-portfolio, or sector.

Seemingly Unrelated Regression (SUR) model

SUR models identify sector-specific dynamics, considering that climate risks have differing impacts across sectors and geographic locations.

Inter-correlation (correlations between sectors) is factored-in via the correlation of residuals of sector-specific equations which capture systematic risk driven by interdependencies of sectors

The SUR model structure is a follows:

$$y_{ti} = \sum_{j=1}^{n} \beta_{ij} X_{tij} + \varepsilon_{ij}$$

y_{ti} : A vector of computed bank risk measures e.g., defaults rates, for *i* individual sectors.

X_{tij} : A sector-specific explanatory variable *j*, appearing in the i^{th} sectoral equation.

ε_{ij} : Error term.

Contact

Our team would be delighted to discuss your challenges and opportunities in any aspect of climate risk. Our services are flexible and efficient, designed to facilitate and support your business model. Contact us today to discuss.

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