NGFS Short-Term Climate Scenarios

An insight into the development of Short-Term Climate Scenarios by the Network for Greening the Financial System

Global Credit Data Webinar
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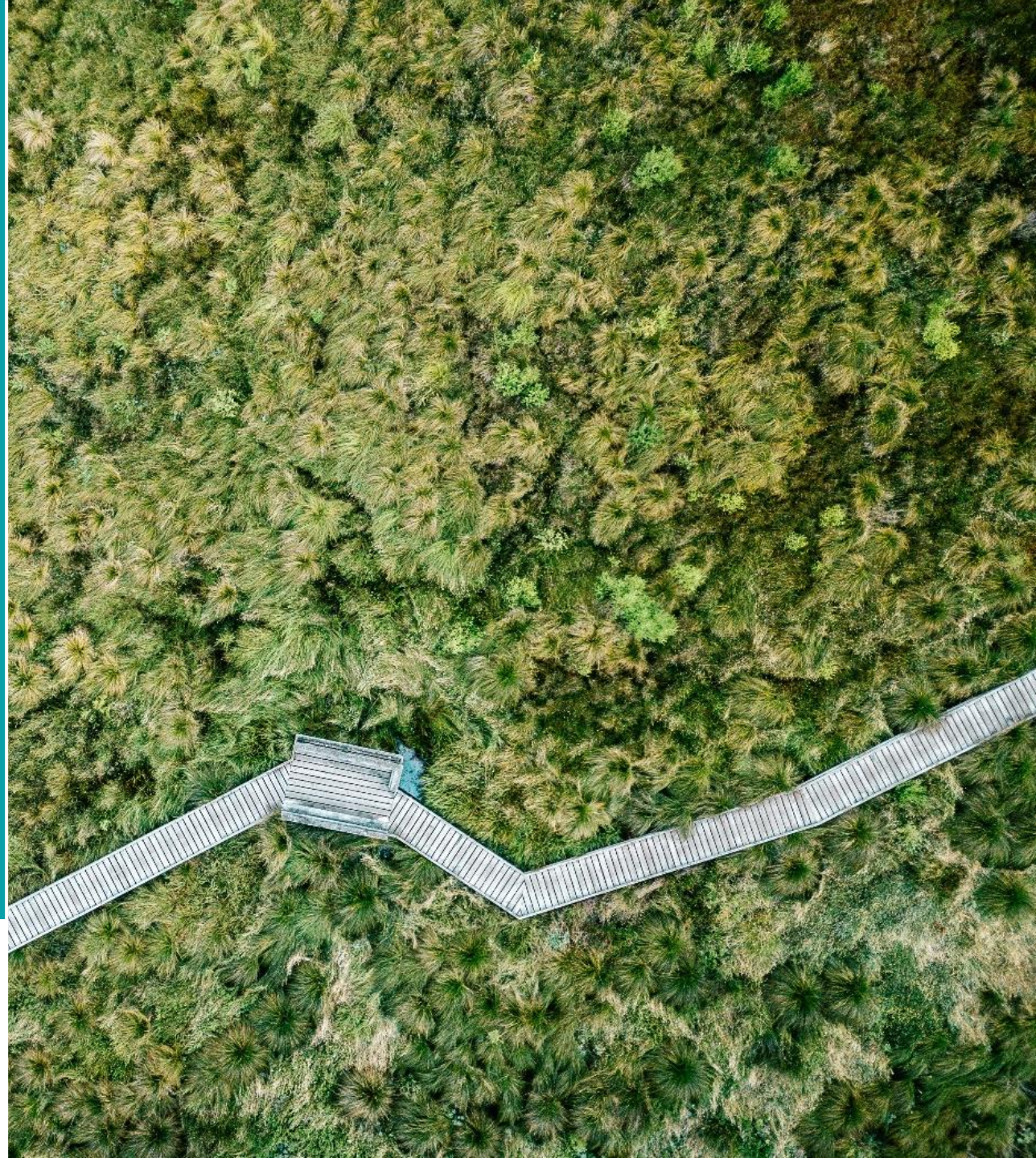
NGFS
Central Banks and Supervisors Network for Greening the Financial System

EUROPEAN CENTRAL BANK
EUROSYSTEM



Agenda

1. **Introduction: why short-term scenarios?**
2. Conceptualisation and scenario narratives
3. Implementation and progress
4. Preview of output design
5. Audience survey and discussion

What are climate scenarios?

NGFS scenarios have been developed to provide a common starting point for analysing climate risks to the economy and financial system

They help answering the questions:

What can happen? If climate change is not mitigated

What should happen? To shed light on long-term benefits from green transition

The NGFS Scenarios…

…**have been created as a tool to shed light on potential future risks**, and to prepare the financial system for the shocks that may arise

…**explore a range of plausible outcomes** by employing different models and examining a wide range of scenarios across regions and sectors

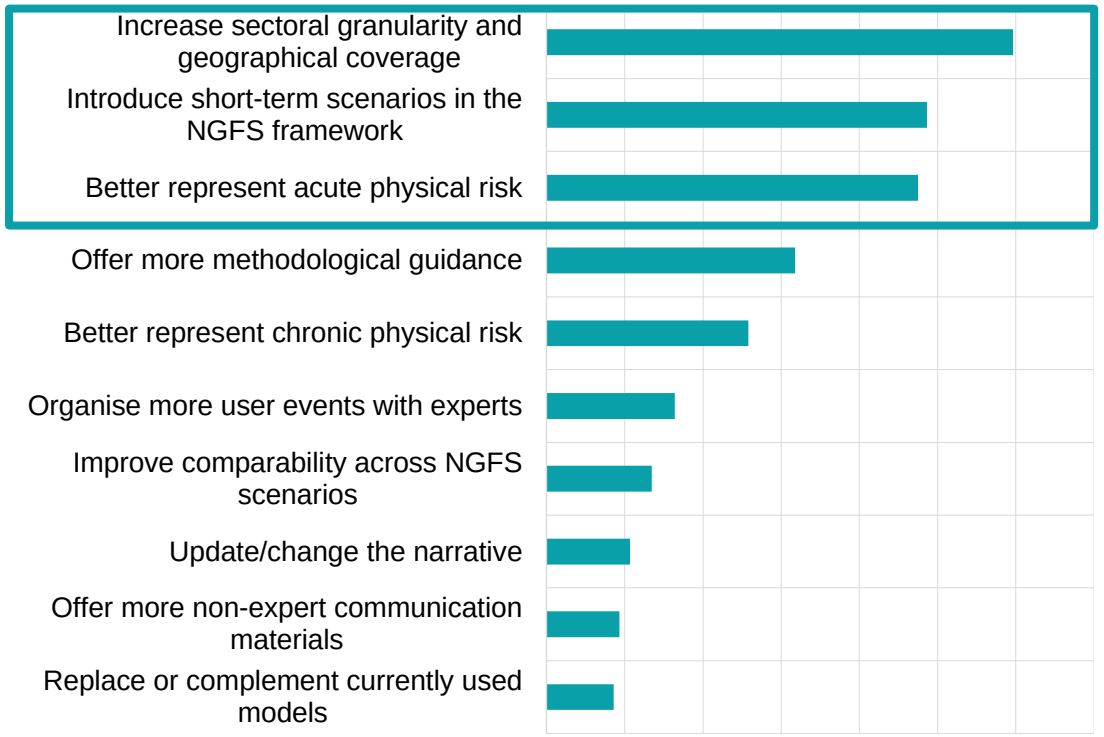
…**present unique features that make them suitable for a wide range of applications**, with results freely accessible through an online platform

…**are not forecasts** as they are intended to explore the bookends of plausible futures (neither the most probable nor the most desirable)

Why do we need short-term scenarios?

Production of short-term climate scenarios is high in the priority of the NGFS, following feedback from users and members

Survey responses: priorities for improving the NGFS scenarios



Accounting for shocks that have a short-term impact and subside in the medium/long term:

- **Cyclical factors** such as commodity prices and consumer confidence.
- **Physical risk** capturing the effects of acute weather events or climatic disasters
- **Country specific shocks,** like new country policies and developments
- **Sectoral analyses**, e.g. direct and indirect impact on financial sector

Short term modelling frameworks more suitable to analyse:

- **Compound shocks and tipping points**, e.g., climate and business cycle shocks
- **Feedback loops** between physical and transition risk
- **Financial amplification,** e.g., intra-finance contagion, assets fire sales
- Alternative **transmission channels** of transition policies and physical damages

Current work

Update and explore further avenues to improve the long-term scenarios

- Enhance the **physical risk modelling** (e.g. new damage function, explore how to reflect tipping points & compound risk)
- Expand the **sectoral granularity**, disaggregation methodology to be released with updated long-term scenarios in 2024
- Reflect on the **scenario set**

Develop **short-term climate scenarios**

- Look into short-term **tail risk** scenarios
- Assume very **severe transition risks** due to disorderly transition and/or **severe natural disasters**
- Account for **compound effects** and second round effects of climate change

Timeline

Phase V of LT scenarios:
October 2024 & Q3 2025

First release of ST scenarios: tentatively early 2025

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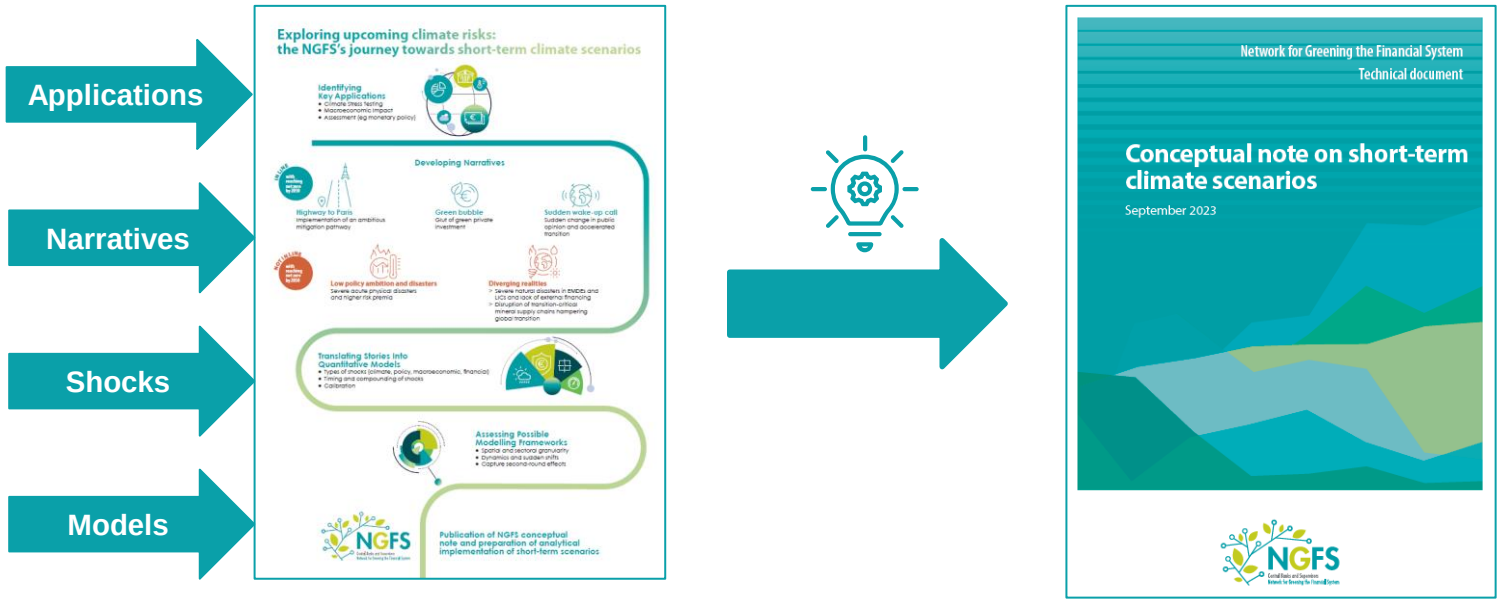
Conceptual note

We published the conceptual note on NGFS short-term scenarios to document our thinking process and give a roadmap of the work ahead.



Accessible via NGFS Portal

Scenario narratives

Five distinct short-term scenario narratives have been chosen for development. They explore a wide range of shocks.

- Coordinated government action
- Carbon tax, green investment and innovation

- Change in public feeling and confidence
- Delayed and uncoordinated government action

Developing Narratives

Transition risk

IN LINE with reaching net zero by 2050

Highway to Paris
Implementation of an ambitious mitigation pathway

Green bubble
Glut of green private investment

Sudden wake-up call
Sudden change in public opinion and accelerated transition

Physical risk

NOT IN LINE with reaching net zero by 2050

Low policy ambition and disasters
Severe acute physical disasters and higher risk premia

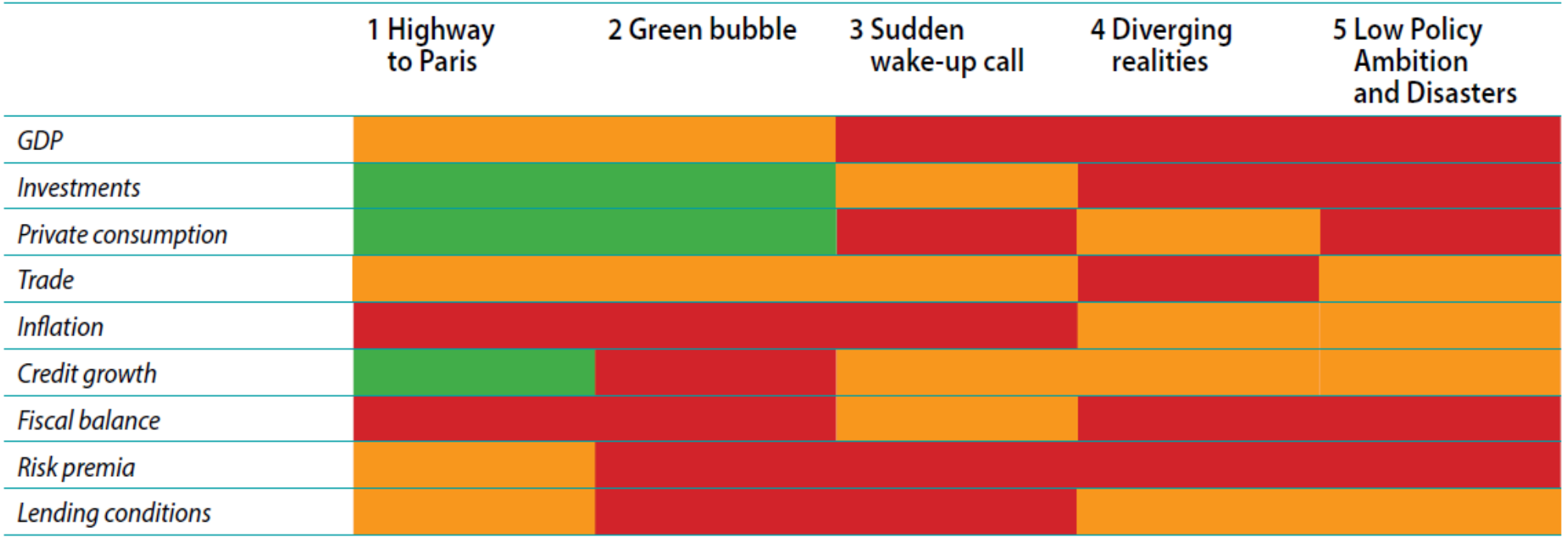
Diverging realities
> Severe natural disasters in EMDEs and LICs and lack of external financing
> Disruption of transition-critical mineral supply chains hampering global transition

- Increased physical risk at regional level
- Compound climate events

*Note that there is no trade-off between transition and physical risk in the short-run.

Scenario narratives: sources of stress

Figure 4 **Sources of stress for each scenario**



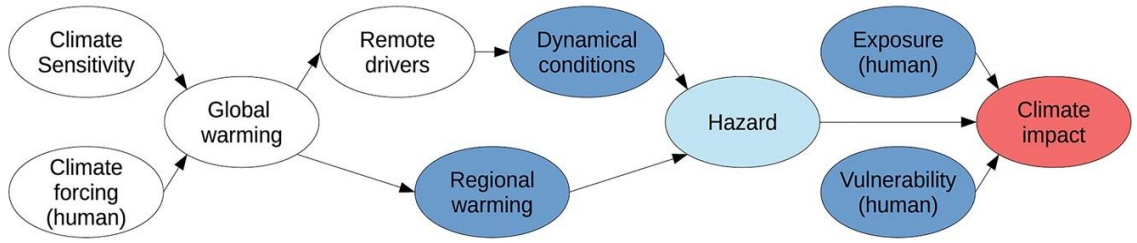
Note: Colours indicate the levels of stress. Red refers to high, orange to medium and green to low levels of stress.

WF 2 - Physical Risk: suggested modelling approach

Physical risk in ST scenarios will be implemented using a "storyline approach"

For each macro-region, a physical climate storyline would be formulated, describing the occurrence of a compound climate events with potential systemic economic and financial impacts

(a) Event storyline



Caviedes-Voullième & Shepherd (2023)

Shepher et al. (2018)

- **Coastal floods**
- **Riverine floods**
- **Tropical cyclones**
- **Extra-tropical storms**
- **Droughts**
- **Heatwaves**
- **Wildfires**

>

- Asset/capital damages
- Business interruptions
- Labour productivity
- Agricultural yields

Challenges & Complexities

Short-term scenarios would not only include direct impacts, buts also macro-financial second-round effects and intra-finance amplification

Table 4 **Short-term amplification of climate risk materialization and feedback loops**

	Climate-economy direct impacts	Macro-financial second-round effects	Intra-finance amplification
Transition risk *(climate policies and regulation, preference shocks or green technological breakthroughs)*	**Energy** prices **Capital obsolescence** **Labour market mismatch** (unemployment) **Consumption** and **Investment** **Innovation**	**Policy responses, accompanying policies** (fiscal, regulatory and monetary) and **pre-existing levels of sovereign debt** are key mitigating or amplifying factors for the impact on: • **Firm and household balance sheets** • **Asset prices** (e.g. via green fin. flows or a deterioration of real estate values) • **Sovereign debt** sustainability (lack of fiscal space could push economies into poverty traps) • **Sudden stops** in capital flows – Exchange rates – Corporate defaults (esp with high in foreign-currency debt levels)	**Expectation** adjustment about the future of climate change and associated value of exposed assets (Climate Minsky moment) • **Asset stranding** • **Corporate defaults** • **Financial institution solvency** (possible amplification via non-bank sectors) • **Access to and affordability of insurance** (rapid re-pricing) **Fire sales** and liquidity shortages **Doom loop** (i.e. a toxic sovereign-bank nexus), whereby runs on banks risk sovereign default due to excessive holdings of domestic bank bonds
Acute physical risk *(climate disasters)*	**Physical capital** destruction **Labour force** size and productivity/agricultural yields **Food and commodity** prices **Business continuity** (e.g. via disruptions in global value chains) **Cost of disaster insurance** **Migration**		

Implementation challenges

- Implementation of many scenarios from scratch
- Consistency to long term scenarios
- Effects of international trade and macro policy
- Reasonable scenarios for policy analysis
- Validation vis-a-vis country level models and data

Targeted applications

The NGFS focuses on the following two main applications of the short-term climate scenarios:

① Climate Stress Testing

- From a supervisory and financial stability perspective, stress testing is a **primary application** of short-term scenarios.
- By nature, stress-testing exercises **focus on short-run spikes or collapses** in key macro-financial variables.
- Reference scenarios to capture shorter **time horizons between 3-5** years.

② Macroeconomic Impact Assessment

- Short-term scenarios enable central banks and supervisors to foster their **understanding of macroeconomic dynamics related to climate shocks and policies**.
- Possibly used as **inputs into monetary policy** decision making
- Could also inform the **sensitivity analysis in financial stability** and stress testing exercises via assumptions used for monetary policy rules.

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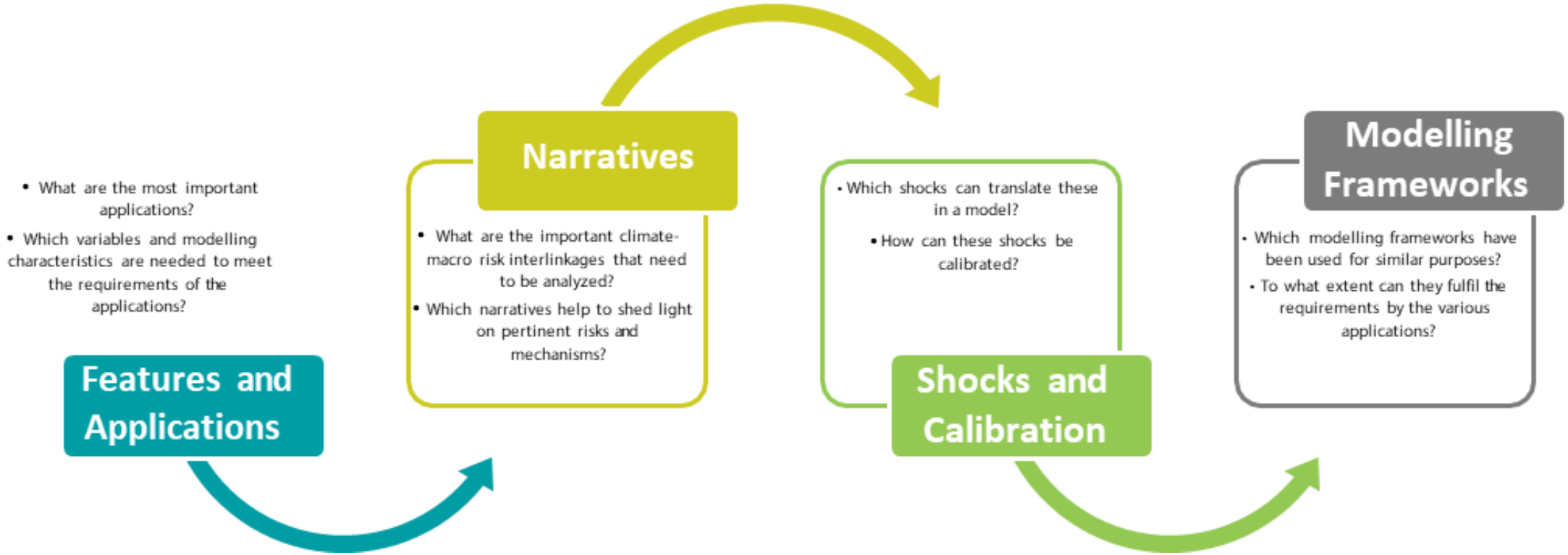
Short-term scenarios: design process

We base our development on the bottom-up approach outlined in the conceptional note, starting with end users and their applications.



Scenario production

We selected a modelling team to calibrate the NGFS short-term scenarios following a Call for Expression of Interest.

The team already started working with the aim of releasing scenarios early 2025.

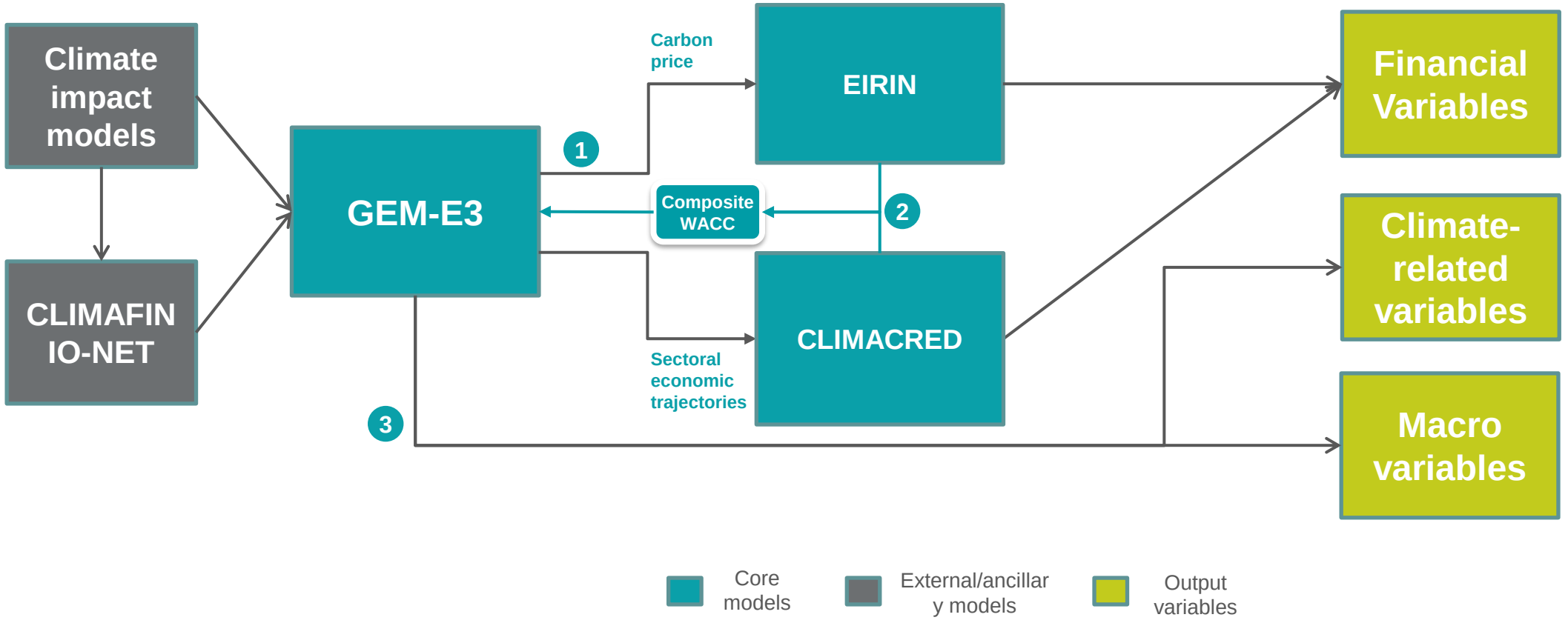
Team

- **Selection** of **CLIMAFIN-E3Modeling-IIASA consortium** to calibrate scenarios produced by EIRIN and GEM-E3 models.

- Close **collaboration** between NGFS Workstreams 2 and 3 as well as modelers on an ongoing basis.

- NGFS **challenger team** to cross-check macro-financial results against the outcomes of internal models.

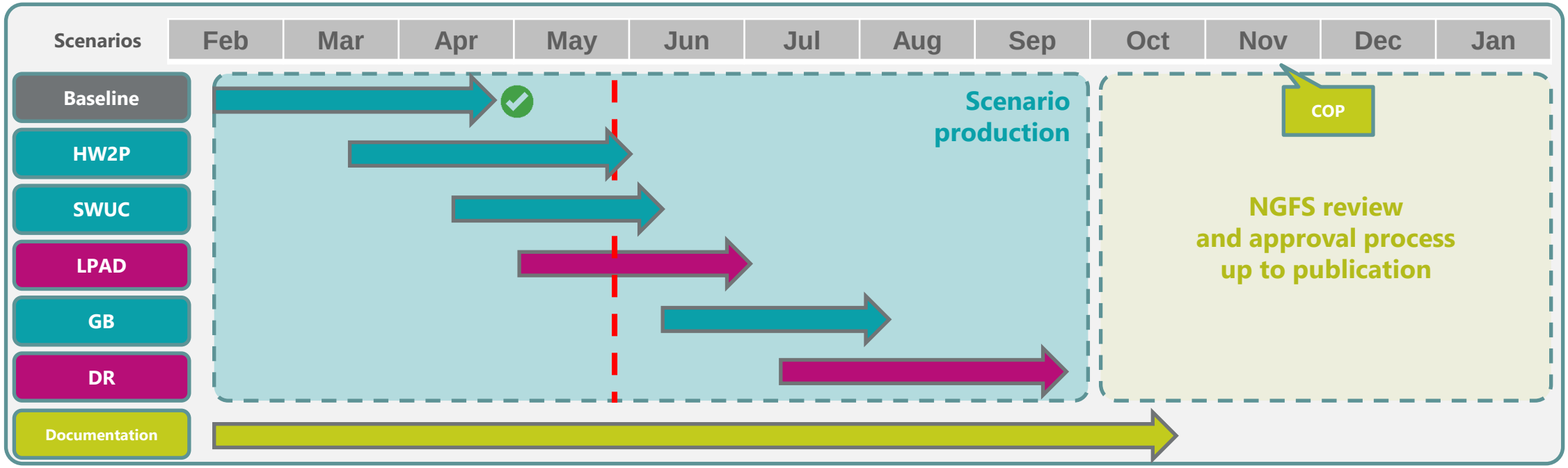
Short-term scenarios: modelling framework



Short-term scenarios: design process

All scenarios are being developed from scratch. The goal is to complete modelling work in 2024 and publish at the beginning of 2025.

The scenarios are being developed in a collaboration between the NGFS and the IIASA-Climafin-E3M consortium. Once the final set is produced, publication is conditional to NGFS procedures, checks and approval.



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Output objectives

NGFS short-term climate scenarios are oriented towards the needs of central banks and supervisors in fulfilling their financial stability, supervisory as well as monetary policy responsibilities.

- **Scenario narratives** will be translated into calibrated shocks or a stack of shocks and paths for exogenous variables to be simulated by a model.

- **Model suite** which features are best-able to capture features needed by the identified applications will be chosen.

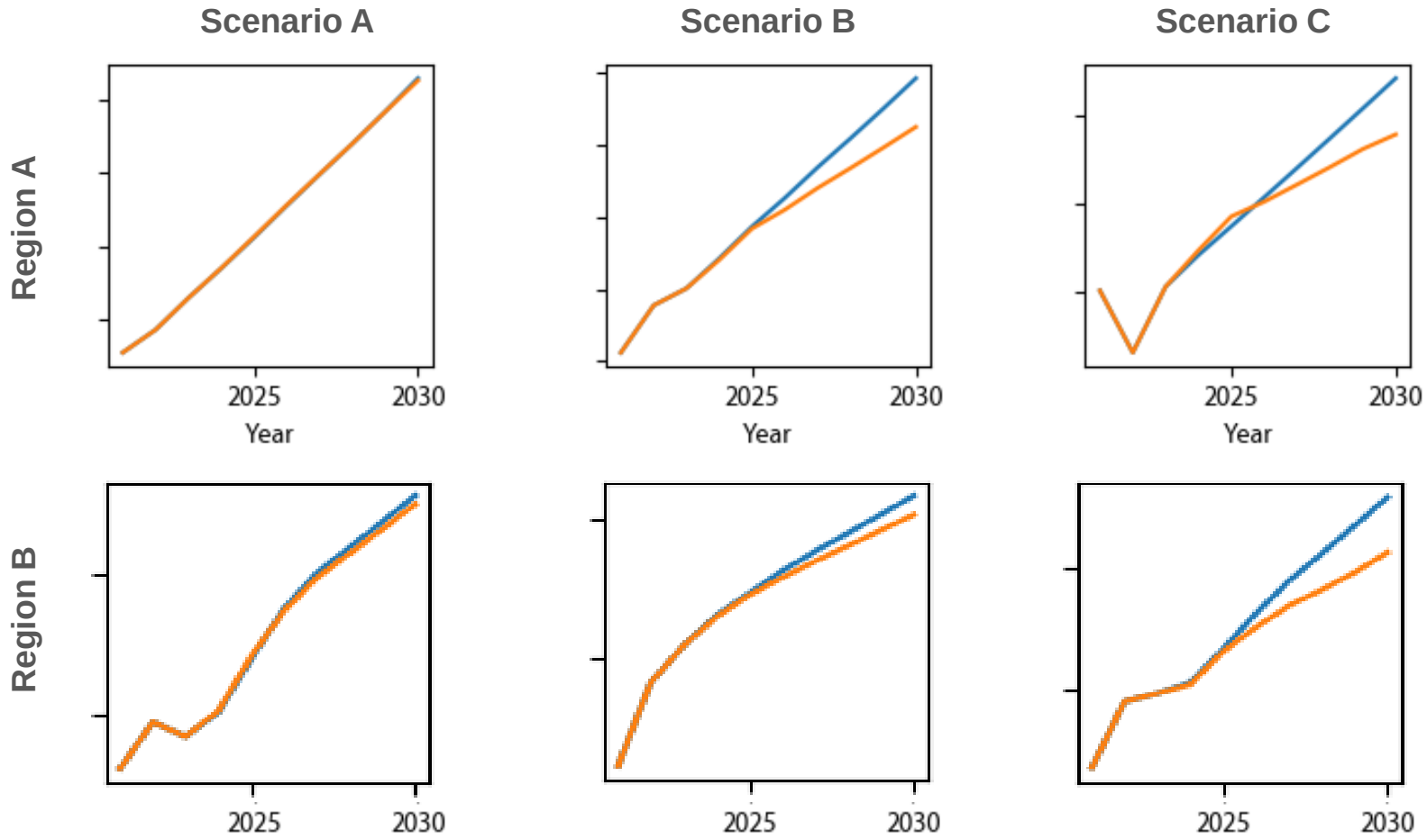
- **Modelling infrastructure** accounting for
  - climate-related shocks,
  - short-term amplification mechanisms
  - cross-sectoral substitution and granular impacts.

- **A meaningful baseline** or reference scenario(s) need(s) will need to be calibrated within the modelling framework.

- **Output results** should be collected for a set of macrofinancial and climate variables.

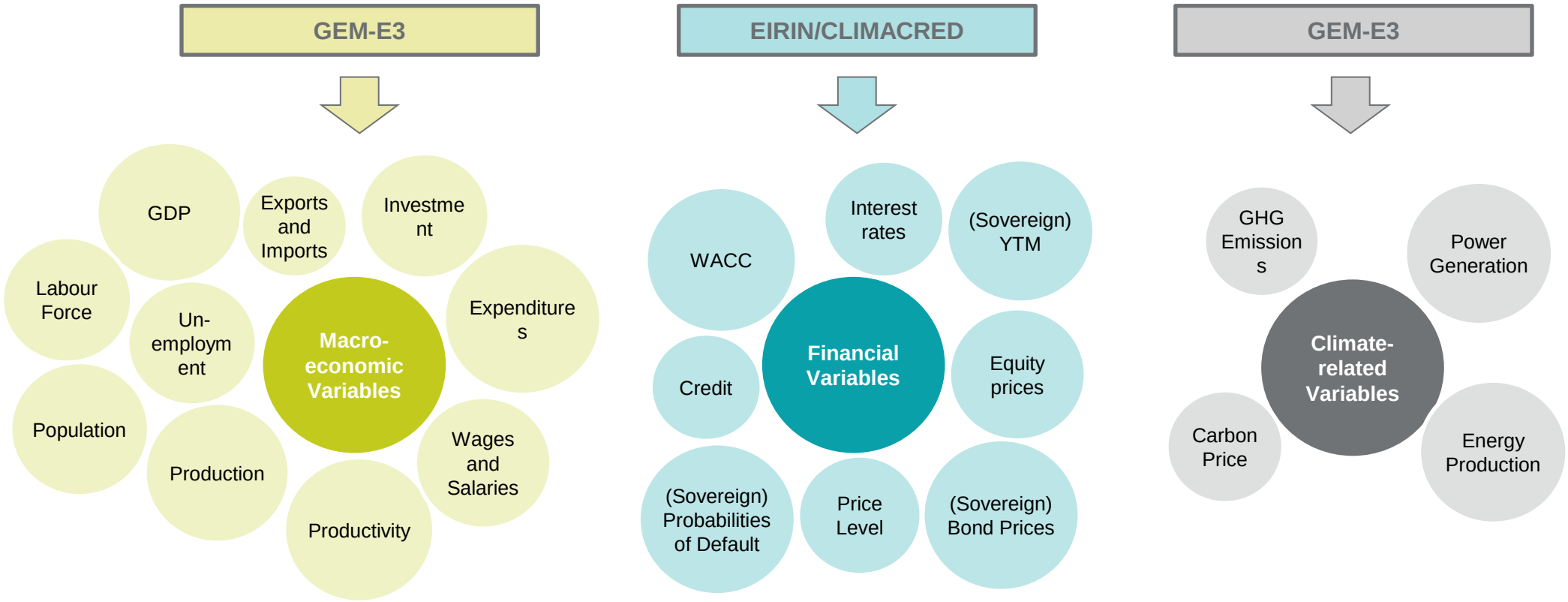
Modelling outputs

The provided data will be scenario pathways that are compared to a shared baseline and cover a time horizon until 2030.



Variables

The modelling output will cover a wide set of variables that are important for both climate stress tests and macroeconomic impact assessment.

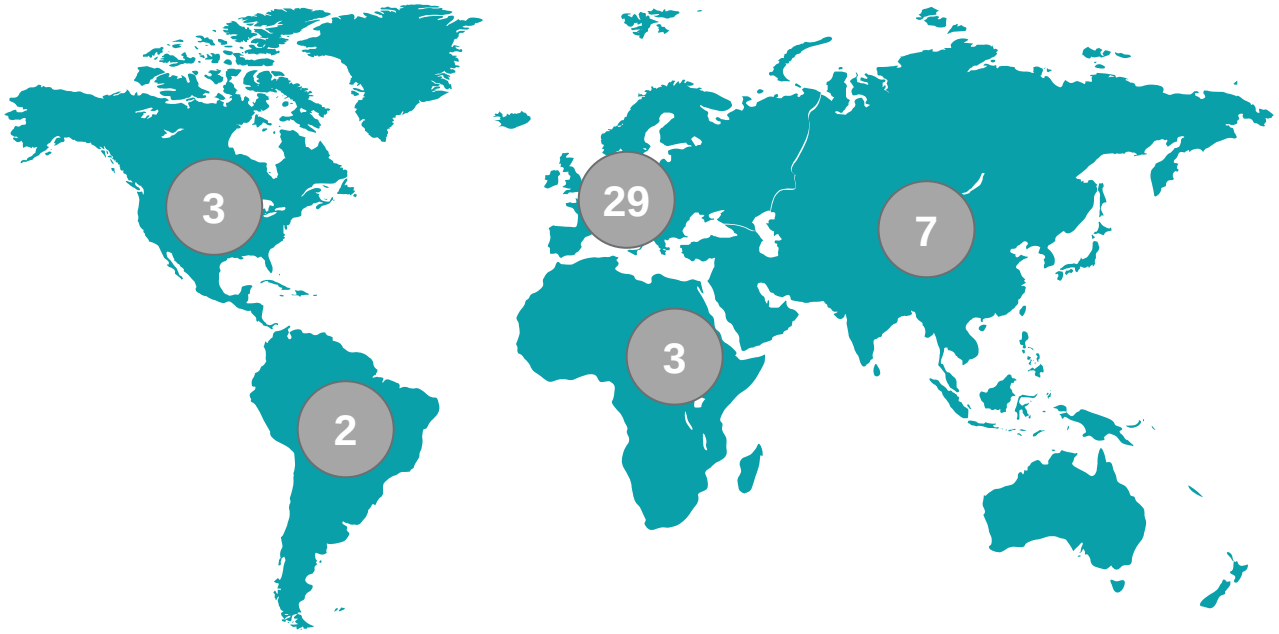


The set of variables is due to be changing through the remaining course of development.

Regions

The chosen models will provide detailed native regional coverage.

So far, the data is produced for 10 overall regions and 44 individual countries:



Regional granularity is due to be changing through the remaining course of development.

Sectoral granularity

Macroeconomic, climate and the majority of financial variables shall be provided in large sectoral granularity.

Advanced Electric Appliances	Advanced Heating and Cooking Appliances	Agriculture	Air transport	Basic pharmaceutical products	Batteries	Biofuels	Biomass	Biomass Solid	CCS coal
Chemical Products	Clean Gas	CO2 Capture	Coal	Coal fired	Computer electronic and optical products	Construction	Consumer Goods Industries	Crude Oil	CSS Bio
CSS Gas	Equipment for CCS power technology	Equipment for PV panels	Equipment for wind power technology	EV Transport Equipment	Fabricated Metal products	Ferrous metals	Gas	Gas Fired	Geothermal
Hydro electric	Hydrogen	Land transport	Market Services	Non Market Services	Non-ferrous metals	Non-metallic minerals	Nuclear	Oil	Oil Fired
Other Equipment Goods	Paper products publishing	Power Supply	PV	R&D	Rubber and plastic products	Transport equipment (excluding EV)	Warehousing	Water transport	Wind

Sectoral granularity is due to be changing through the remaining course of development.

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Survey

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Discussion and Q&A