



# *Just in Time*

**2022 SSM Climate Risk Stress Test:**

**Scope, Scenarios and Methodology provided by  
ECB to Banks**

**Oct 2021**



# Executive Summary

- In the context of ESG factors recognition and their integration into bank internal and regulatory frameworks, Climate Stress-testing plays a fundamental role
- ECB announced that in 2022 an official bottom-up Climate Stress-Test will be launched
- This document has been created with the purpose of summarizing the main features of ECB Climate Stress-Test planned for 2022, in terms of:
  - Scope and methodology
  - Climate risk scenarios
  - Output reports
- The exercise is organized by ECB in 3 modules (Qualitative Questionnaire, Climate risk metrics and Bottom-up ST) and a proportionality principle is applied
- A specific focus will be provided on Module 3 Bottom-up Stress Test exercise
- The exercise aims to enhance the capacity of both banks and supervisors to assess climate risk and is not intended to bring forward any regulations.



# At a Glance

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# 01

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## Introduction

Overview

Timeline of the Exercise



# Introduction 1/2

## Overview

- In **October 2021** the ECB issued guidance to banks on how to conduct **Climate Stress-Test (CST) exercise** planned for 2022.
- The guidance aimed at providing some useful **insight on the exercise methodological choices**, on the templates and identifying climate-relevant **data availability** and **quality** and **the climate risk vulnerabilities** and the **quantification of the impact on banks**.

### Scope & Methodology

- **Qualitative assessment** of climate risk stress test framework
- Stock-take on (i) business model in light of transition risk and (ii) financed GHG (Green House Emissions)
- **Bottom-up stress test** loss projections (subset of banks)

### Climate Risk Scenarios

- **Transition risks** based on NGFS scenarios:
  - Short-term tail risks (3 years)
  - Long-term transition paths (30 years)
- **Physical risks** for Europe:
  - Flood risk (1 year)
  - Heat & drought risk (1 year)

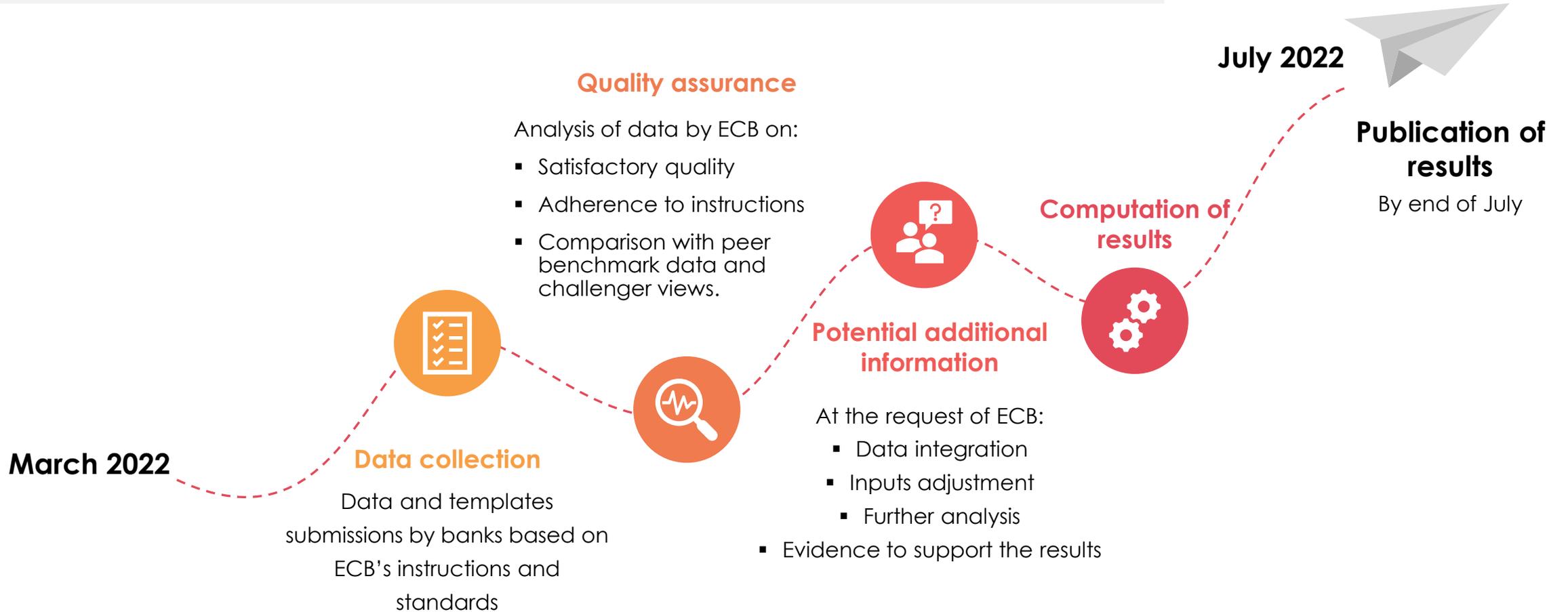
### Output Report

- **Climate risk stress test** capabilities
- **Peer benchmark** of profitability/vulnerability and GHG emissions
- Impact from **credit risk, market risk** and **operational/reputational risk** (only qualitative questionnaire)
- Benchmark vulnerabilities to transitional and physical risks

# Introduction 2/2

## Timeline of the Exercise

The SSM Climate Risk Stress Test Exercise will be conducted from **March 2022** to **July 2022**.



# 02

## Stress Test Methodology

Modules and Proportionality

Module 1: The Qualitative Questionnaire

Module 2: Climate Risk Metrics

Module 3: Overview



# Stress Test Methodology 1/6

## Modules and Proportionality

- ECB provided early disclosure on Stress-Test approach and methodology, specifying that the exercise will require banks to submit their responses related to **3 main modules**
- **Proportionality principal** applied: all banks submit starting points + subset of banks bottom-up projections

1

### Qualitative Questionnaire Module

Composed by **78 questions** used to assess uniformly **banks' internal stress-testing framework**

2

### Module Climate risk metrics

Requires the calculation of two climate metrics to compare banks' **income exposure to transition risk** and their **exposure to carbon-intensive industries**

3

### Bottom-up Stress-Test Module

Introduced to assess both **physical** and **transition** risks from a **market and credit risk** perspective in the short term and **only credit risk** in the long term

- Increased granularity with macro shocks defined at NACE level
- Energy Performance Certificates (EPC) introduced for mortgages and corporate real estate exposures
- Physical risk assessed at infra-country level (equivalent of Italian provinces)



The short-term goal is to assess banks **balance sheet vulnerabilities** towards a «*disorderly transition*» scenario



The long-term goal is to assess banks **strategical choices** against NGFS defined scenarios



For physical risk the short-term goal is to assess banks' exposure towards a **severe heat wave** and **flood risk**

# Stress Test Methodology 2/6

## Module 1: The Qualitative Questionnaire

The first module is a questionnaire composed by 78 (mainly closed-answer) questions grouped in **11 sections** to **assess institutions day-to-day stress test frameworks** and their assumptions regarding next year ECB exercise

- 1 General Climate Risk Stress Test** General questions regarding the existence and use of climate risk stress testing within the institution
- 2 Climate Risk Stress Test Governance and Risk Appetite** Business areas involved in the development, execution, and validation of the climate stress test framework
- 3 Integration Into Institution Business Strategy** Use the climate stress test results by the institution
- 4 Climate Stress Test Methodology** Methodological choices e.g.: transmission channels, portfolios, static vs. dynamic
- 5 Stress Test Scenarios** Scenario choices e.g.: sources of scenarios, horizons, physical risk aspects, transition risk aspects
- 6 Data** Availability and sources of the data in the internal climate stress test frameworks of the banks
- 7 ICAAP** Inclusion of stress test results into the ICAAP
- 8 Future Plans** Steps to enhance the climate stress test framework; interaction with other priorities
- 9 Internal Audit** Internal Audit's involvement in the climate stress test framework
- 10 Parent Company** Applies to EU subsidiaries of non-EU institutions and explores their climate risk stress test framework
- 11 Bottom-up Projections** Methodological choices and challenges to build bottom-up calculations (only for a subset of the banks)

# Stress Test Methodology 3/6

## Module 2: Climate Risk Metrics 1/2

- The second module requires banks to calculate **two climate risk metrics** and to **map corporate counterparties to industry sectors (NACE)** according to their principal activity

The first risk metric provides insights into the **sensitivity of banks' business model to transition risk**

### Interest, Fee and Commission Income from Greenhouse Gas Intensive Industries

- Banks **income** and **expenses** must be **mapped to** a predefined list of **22 NACE sectors** (*Annex 1*)
- For both module 2 and 3 banks are not required to report the information related to a sector if its exposures to this industry constitute less than 0.05% of total assets
- Both **EU and non-EU non-financial corporations** are in scope
- Aggregation is performed per EU country with a residual non-EU bucket
- Need to include as many countries as possible to cover **at least 80%** of gross interest, fee and commission income (**maximum 5 countries**)
- Complete **reporting alignment** with financial reporting framework (**FINREP**)
- Also, **total volumes** generating the income must be **reported per NACE sector**

# Stress Test Methodology 4/6

## Module 2: Climate Risk Metrics 2/2

The second metric provides insights into the **banks' exposure to carbon-intensive industries**

### Financed Greenhouse Gas Emissions

- The goal is to calculate a **weighted average GHG intensity metric** related to **non-SME non-financial corporations**
- GHG Scope 1, 2 and 3 emissions must be considered in the calculation
- **Top 15 largest counterparties** in terms of exposures must be considered for each NACE sector in scope. Within each sector a materiality threshold of 1% of total non-SME exposure applies
- To calculate the metric banks must provide for each counterparty:
  - Exposure
  - Scope 1, Scope 2 and Scope 3 GHG emissions (in tCO<sub>2</sub>)
  - Average revenues for the last three years (2018,2019,2020)
- **GHG intensity** is then calculated for each counterparty dividing "Scope X" GHG emissions by average revenues
- **Financed GHG emissions** are then calculated for each category weighting GHG intensities with exposures

# Stress Test Methodology 5/6

## Module 3: Overview 1/2

- The third module involves the calculation of starting points and projections (only for selected banks) related to a **new bottom-up climate stress test exercise** that considers both **transition** and **physical** risk
- **New elements** include **disaggregation by industry for corporates**, by **Energy Performance Certificate for mortgages** and **within-country disaggregation of physical risks**.

1

**Bottom-up stress test methodology** anchored as much as possible to the (simplified) **EBA EU-wide stress test templates**

- Use of **industrial sectors** (at **NACE** rev. 2-digit 2-level) to organize corporate exposures
- In particular, **the focus is on the same 22 sectors as in Module 2** and include other NACE sectors pooled in “Other sectors” category to ensure full coverage
- **Counterparty level analysis encouraged, but not mandatory**

2

- Use of **Energy Performance Certificates (EPCs)** to organize mortgage and corporate real estate exposures
- EPCs are mandatory in the EU for **real estate transactions**
- Of course, heterogeneity exists within and across countries, but it is a key indicator of relative energy efficiency and transition risk

3

- Within **country disaggregation** to assess physical risk heterogeneity: heterogeneity in flood risk at NUTS 3 level
- Focus on **loans secured by real estate, collateral destruction** channel
- Methodology provides guidance on how **insurance coverage** needs to be integrated

# Stress Test Methodology 6/6

## Module 3: Overview 2/2

There are several similarities with “standard” EBA EU-wide stress test and some new features explicitly related to climate risk



### Transition Risk



#### Scenarios

#### Short Term (3 years / 2022-2024)

#### Long Term (30 years / 2030, 2040, 2050)



#### Type of Risk included



#### Changes with EBA stress test

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>▪ Baseline</li> <li>▪ Stress (<i>disorderly transition</i>) with reversion on baseline scenario after projection horizon</li> </ul>   | <ul style="list-style-type: none"> <li>▪ Orderly transition</li> <li>▪ Disorderly transition</li> <li>▪ Hot-house world (<i>Paris target not met</i>)</li> </ul>                 |
| <ul style="list-style-type: none"> <li>▪ Market Risk</li> <li>▪ Credit Risk</li> </ul>   | <ul style="list-style-type: none"> <li>▪ Only Credit Risk</li> </ul>   |
| <ul style="list-style-type: none"> <li>▪ Increased granularity for corporates (<b>NACE sectors</b>)</li> <li>▪ Increased granularity for mortgages (<b>EPC</b>)</li> <li>▪ Projection's calculation following EBA stress test</li> </ul> | <ul style="list-style-type: none"> <li>▪ Simpler set of credit metrics requested (<b>PD, LGD</b>)</li> <li>▪ Introduction of <b>dynamic balance sheet assumptions</b></li> </ul> |



### Physical Risk

- One year time horizon (**2022**)
- **Only EU countries**
- Stress scenarios for **Drought & Heat Risk** applied to **Corporate** & **SME** exposures differentiated per NACE
- Stress scenarios for **Flood Risk** applied to **Mortgages** and **Commercial real Estate** exposures

# 03

## Module 3 Bottom-up Exercise

Short Term Transition Risk - Credit Risk

Short Term Transition Risk - Market Risk

Long Term Transition Risk - Only Credit Risk

Physical Risk - Drought and Heat Risk

Physical Risk - Flood Risk



# Module 3 Bottom-up Exercise 1/5

## Short Term Transition Risk - Credit Risk

This exercise assesses potential vulnerabilities of the banks' current balance sheets to **3 years baseline** and **stress** (disorderly) **transition scenarios**

### SCOPE

The **credit risk exposures** in scope are an institution's mortgage and corporate exposures:

- **The mortgage portfolio** encompasses the **IRB asset class Retail** – Secured by real estate property – **non-SME portfolio** and the **STA asset class Secured by mortgages on immovable property – non-SME**
- **Corporate exposures** are split into **three portfolios**:
  - not secured by real estate property
  - secured by real estate where the collateral is within the scope of the Energy Performance Certificate
  - secured by real estate where the collateral is not within the scope of the EPC

### SCENARIOS

- The stress test scenario takes the **NGFS disorderly transition scenario** as a starting point, assuming the disorderly transition takes place as of 2022: carbon prices increase by about USD 100 during 2022-2024
- ECB provides banks with shocks, among others, to:
  - **GDP** and **Gross value added** disaggregated by sectoral level and country level
  - **Housing prices** disaggregated by EPC levelfor all EU countries, which will be complemented by information on selected non-EU countries  
A full list of scenario variables is provided in [Annex 2](#)

### METHODOLOGY

- Generally, the methodology follows the 2021 EBA stress test methodology with an important and significant news: the exposures must be **broken down by NACE sector and EPC labels**
- Assume **a static balance sheet** and **RWA projections are not computed**

# Module 3 Bottom-up Exercise 2/5

## Short Term Transition Risk - Market Risk

This exercise assesses potential vulnerabilities of the banks' current balance sheets to **3 years baseline** and **stress** (disorderly) **transition scenarios**

### SCOPE

The scope is much simpler and smaller compared to EBA stress test and consist of:

- **All corporate bonds** in trading book (FVPL)
- **All stocks** in the trading book (FVPL)
- **Hedges Derivatives** directly connected to the bonds/equities in scope
- **Non-financial corporate bond** positions under full or partial fair value measurement which are held with a trading intent, i.e., positions at FVPL

### SCENARIOS

ECB provides banks with shocks to:

- **Equity prices** disaggregated by industrial sector
- **Bond prices** disaggregated by industrial sector and by credit rating
- **Risk free interest rates**

Exchange rates remain fixed at their 31 December 2021 values over the full scenario horizon.

A full list of scenario variables is provided in [Annex 2](#).

### METHODOLOGY

- Generally, the methodology follows the 2021 EBA stress test methodology with an important and significant news: the exposures must be **broken down by NACE sector**. The industrial sector of the bond or stock should be determined by the ultimate parent company.

# Module 3 Bottom-up Exercise 3/5

## Long Term Transition Risk - Only Credit Risk

This exercise assesses potential vulnerabilities of the banks' current balance sheets to **30 years orderly, disorderly and hot-house** transition scenarios

### SCOPE

The credit risk exposures in scope are the same considered for the short-term transition risk analysis

Banks must concentrate their efforts on **their primary country of loan activity**, as determined under the short-term transition analysis

### SCENARIOS

The exercise considers **three long-term scenarios**, each scenario spanning a horizon from the present up to 2050:

- The first scenario assumes an **orderly transition** to achieve the carbon emission goals by 2050
- The second scenario assumes **CO2 emissions do not decrease quickly enough** until 2030 which triggers a disorderly transition in the following years to achieve the emission targets by 2050
- Finally, the third scenario **assumes CO2 emissions are not reduced** and the economy is confronted with the materialization of increasing physical risks which lead, among other things, to losses in GDP

In line with the short-term scenario, the ECB provides banks with shocks of relevant variables such as GDP and Energy prices (*Annex 3*)

### METHODOLOGY

- **PD and LGD projections** without stage transition, impairments and expected loss provisions are computed
- For long-term projections covering almost 30 years, a static balance sheet is not appropriate: **banks are asked to project how their balance sheet will change in each of the three scenarios until 2050**
- **Dynamic balance sheet hypothesis** criteria are grouped into two categories:
  - **Bank-specific strategy**: banks can **integrate their strategic approach in their reallocation decisions**
  - **Business environment**: banks can **consider sectoral developments** (i.e. the evolution of the value added by NACE code) or **the path of GHG emissions** for portfolios secured by immovable properties (i.e. reallocation across EPC levels)
- Banks should specify whether their change in exposure is due to reallocation or balance sheet growth, based on the nominal GDP growth provided in the scenarios

# Module 3 Bottom-up Exercise 4/5

## Physical Risk - Drought and Heat Risk

- This exercise assesses potential vulnerabilities of the banks' current balance sheets to 1 year baseline and stress physical scenarios
- Focus on Credit Risk

### SCOPE

- Within the scope of the exercise are exposures in the STA and IRB exposure classes **Corporates**, not secured by real estate
- It includes the exposure classes Retail as well – **SME** in the STA and IRB credit risk regimes. Unlike in the transition risk exercises, **only EU counterparties** are in scope for drought and heat risk

### SCENARIOS

- In the drought and heat scenario, the entire EU is hit by a heatwave in 2022 which hampers economic activity and results in output losses for vulnerable industries
- Banks are provided with **the value-added losses** at the sectoral level for each EU country using the NACE sectors

### METHODOLOGY

- Assume **a static balance sheet**

# Module 3 Bottom-up Exercise 5/5

## Physical Risk - Flood Risk

- This exercise assesses potential vulnerabilities of the banks' current balance sheets to 1 year baseline and stress physical scenarios
- Focus on Credit Risk

### SCOPE

- **In scope are all STA and IRB credit exposures with EU counterparties that are secured by real estate.** This means only loans with real estate collateral are in scope. This includes **Corporates – Secured by real estate and Mortgages**

### SCENARIOS

- In the flood scenario, the EU is hit by a severe flood which causes damage in a certain fraction of the areas at risk. For the purpose of this stress test, the ECB provides banks with a flood risk map to calibrate a flood risk scenario
- The map disaggregates regions **at the NUTS 3 level into no risk, low risk, medium risk and high-risk areas.** For each NUTS 3 region the ECB **provides real estate price shocks** that banks need to apply to the collateral value of the properties in that region

### METHODOLOGY

- Assume **a static balance sheet**
- Inclusion of second-round effects in bank's projections are not expected

# 04

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## Annex

Annex 1 – List of Industries

Annex 2 - Provisional Set of Scenario Variables -  
Variables: Short-term Transition Risk

Annex 3 - Provisional Set of Scenario Variables -  
Variables: Long-term Transition Risk



# Annex 1/6

## Annex 1 – List of Industries 1/2

NACE Industrial Sectors	NACE Industrial Sector Description
A01	Crop and animal production, hunting and related service activities
A02-A03	Forestry and logging; Fishing and aquaculture
B	Mining and quarrying
C10-C12	Manufacture of food products, beverages and tobacco products
C13-C18	Manufacture of textiles; Manufacture of wearing apparel; Manufacture of leather and related products; Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials; Manufacture of paper and paper products; Printing and reproduction of recorded media
C19	Manufacture of coke and refined petroleum products
C20	Manufacture of chemicals and chemical products
C21-C22	Manufacture of basic pharmaceutical products and pharmaceutical preparations; Manufacture of rubber and plastic products
C23	Manufacture of other non-metallic mineral products
C24-C25	Manufacture of basic metals; Manufacture of fabricated metal products, except machinery and equipment
C26-C28	Manufacture of computer, electronic and optical products; Manufacture of electrical equipment; Manufacture of machinery and equipment not elsewhere classified

# Annex 2/6

## Annex 1 – List of Industries 2/2

NACE Industrial Sectors	NACE Industrial Sector Description
C29-C30	Manufacture of motor vehicles, trailers and semi-trailers; Manufacture of other transport equipment
C31-C33	Manufacture of furniture; Other manufacturing; Repair and installation of machinery and equipment
D	Electricity, gas, steam and air conditioning supply
E36-E39	Water collection, treatment and supply; Sewerage; Waste collection, treatment and disposal activities; Materials recovery; Remediation activities and other waste management services
F	Construction
G45-47	Wholesale and retail trade and repair of motor vehicles and motorcycles; Wholesale trade, except of motor vehicles and motorcycles; Retail trade, except of motor vehicles and motorcycles
H49	Land transport and transport via pipelines
H50	Water transport
H51	Air transport
H52-H53	Warehousing and support activities for transportation; Postal and courier activities
L	Real estate activities

# Annex 3/6

## Annex 2 - Provisional Set of Scenario Variables - Variables: Short-term Transition Risk 1/2

Variable	Level of Country Disaggregation	Level of Sector Disaggregation
Carbon price	By EU countries + United Kingdom + United States + China + Japan + Regional Blocks (or row)	Aggregate
Output: GDP (and gross value added)	By EU countries + United Kingdom + United States + China + Japan + Regional Blocks (or row)	By sector (see annex A.5)
Inflation	By EU countries + United Kingdom + United States + China + Japan + Regional Blocks (or row)	Aggregate
Unemployment rate	By EU countries + United Kingdom + United States + China + Japan + Regional Blocks (or row)	Aggregate
Residential real estate prices	By EU countries + United Kingdom + United States + China + Japan + Regional Blocks (or row)	Distinguished by energy performance certificate class
Commercial real estate prices	By EU countries + United Kingdom + United States + China + Japan + Regional Blocks (or row)	Distinguished by energy performance certificate class
Government expenditure	By EU countries + United Kingdom + United States + China + Japan + Regional Blocks (or row)	Aggregate
Household income	By EU countries + United Kingdom + United States + China + Japan + Regional Blocks (or row)	TBD
Exchange rates	N/a	Aggregate

# Annex 4/6

## Annex 2 - Provisional Set of Scenario Variables - Variables: Short-term Transition Risk 2/2

Variable	Level of Country Disaggregation	Level of Sector Disaggregation
Short-term interest rates	By euro area + non-euro area EU countries + United Kingdom + United States + China + Japan + Regional Blocks (or row)	Aggregate
Government bond yields	By EU countries + United Kingdom + United States + China + Japan + Regional Blocks (or row)	Aggregate
Corporate bond yields or spreads	Global	By sector (see annex A.5)
Equity indices	Global	By sector (see annex A.5)
Commodity prices	TBD	Aggregate

# Annex 5/6

## Annex 3 - Provisional Set of Scenario Variables - Variables: Long-term Transition Risk 1/2

Variable	Level of Country Disaggregation	Level of Sector Disaggregation
Emission pathways	By EU countries + United Kingdom + United States + China + Japan + Regional Blocks (or row)	Possible breakdown depending on NGFS availability
Temperature pathways	Global	N/a
Carbon price	By EU countries + United Kingdom + United States + China + Japan + Regional Blocks (or row)	Aggregate
Energy prices	By EU countries + United Kingdom + United States + China + Japan + Regional Blocks (or row)	By energy source
Energy mix	By EU countries + United Kingdom + United States + China + Japan + Regional Blocks (or row)	By energy source
Output: GDP (and gross value added)	By EU countries + United Kingdom + United States + China + Japan + Regional Blocks (or row)	By sector (as specified in annex A.5)
Inflation	By EU countries + United Kingdom + United States + China + Japan + Regional Blocks (or row)	Aggregate
Unemployment rate	By EU countries + United Kingdom + United States + China + Japan + Regional Blocks (or row)	Aggregate
Residential real estate prices	By EU countries + United Kingdom + United States + China + Japan + Regional Blocks (or row)	Distinguished by energy performance certificate class

# Annex 6/6

## Annex 3 - Provisional Set of Scenario Variables - Variables: Long-term Transition Risk 2/2

Variable	Level of Country Disaggregation	Level of Sector Disaggregation
Commercial real estate prices	By EU countries + United Kingdom + United States + China +Japan + Regional Blocks (or row)	Distinguished by energy performance certificate class
Government expenditure	By EU countries + United Kingdom + United States + China +Japan + Regional Blocks (or row)	Aggregate
Household income	By EU countries + United Kingdom + United States + China +Japan + Regional Blocks (or row)	Aggregate
Exchange rates	N/a	Aggregate
Short-term interest rates	Euro area	Aggregate
Government bond yields	By EU countries + United Kingdom + United States + China +Japan + Regional Blocks (or row)	Aggregate
Corporate bond yields or spreads	Global	By sector (see annex A.5)
Equity indices	Global	By sector (see annex A.5)
Commodity prices	Global	Aggregate
Government expenditure	By EU countries + United Kingdom + United States + China +Japan + Regional Blocks (or row)	Aggregate
Household income	By EU countries + United Kingdom + United States + China +Japan + Regional Blocks (or row)	Aggregate

# Sources and Literature

[01] **ECB.** [\*Climate risk stress test - SSM stress test 2022\*](#). ECB, October 2021.

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# Company Profile

**Iason** is an international firm that consults Financial Institutions on Risk Management. Iason integrates deep industry knowledge with specialised expertise in Market, Liquidity, Funding, Credit and Counterparty Risk, in Organisational Set-Up and in Strategic Planning.

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