

A Common Path to Improve European Climate Risk Stress Testing and Scenarios Analysis

June 2023



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1. Foreword

AFME

In tandem with the global commitment to limit global warming to 1.5 degrees Celsius, the European financial industry has in the past few years increasingly dedicated resources to identify, assess, and manage material risks emerging from climate change and environmental risks. Recent industry progress demonstrates that climate change remains a shared concern for banks and financial authorities and climate risk stress testing is emerging as the established method for banks to assess progress on decarbonization. As such, collective efforts are essential to further understand climate change patterns and improve climate risk stress testing efforts. Through this report, we aim to take stock of the work banks have already undertaken to drive best practice and bridge efforts of banks and policymakers to improve climate risk stress testing methodology and data. Consequently, the Association of Financial Markets in Europe (AFME) and Oliver Wyman urge further collaboration between banks and policymakers to engage on meaningful solutions and use this report as a catalyst to support common approaches to a global challenge.

Efforts to assist the banking community tackle climate change go hand in hand with many other political and regulatory initiatives, including the European Green Deal strategy to move toward climate and environmental resilience by 2030 and carbon neutrality by 2050. This scenario analysis and stress testing at the European level are aligned with the European Central Bank's (ECB) expectations in its guide on climate-related and environmental risks management and disclosure. On an international level, the work is aligned with the Basel committee's principles to effectively manage and supervise climate-related financial risks.

Looking ahead, the European Banking Authority (EBA) will take on several mandates under the Capital Requirements Directive 6 (CRD6) to assess material Environmental, Social, and Governance risks and common methodologies for assessing the effect of economic scenarios on an institution's financial position. Specifically, CRD6 will require the EBA to develop appropriate qualitative and quantitative criteria, including stress testing processes and scenario analyses, to assess the magnitude of ESG risks under various scenarios with different levels of severity.

While these regulatory initiatives are still at an early stage of development, this report's findings and recommendations demonstrate the significant progress banks have made in less than a year since the ECB 2022 climate stress test to integrate the techniques and good practices from that exercise. Our member banks have already taken action to embed the processes and results from the ECB exercise into their own internal risk management practices, with 87% of those surveyed planning to run internal stress tests every year. This highlights the industry's commitment to work together to build on the ECB effort and drive EU and international initiatives underway.



Adam Farkas
CEO
GFMA & AFME

“The European financial industry has increasingly dedicated resources to identify, assess and manage material risks emerging from climate change and environmental risks”



Oliver Wyman

In recent years, climate-related and environmental risks have intensified, making it crucial for financial institutions to accelerate how they address the potential implications of climate change on their operations and the broader economy.

The complex interplay between climate-related and environmental risks and the broader economy calls for deep understanding and proactive management from the banking sector. In response, banking regulators for the European Union and various nations in the region have taken a significant step by introducing climate risk stress testing.

By factoring the climate-related risks into stress testing frameworks, supervisors are playing a pivotal role in addressing the financial implications of climate change with the aim to ensure stability in the banking sector.

Oliver Wyman is proud to collaborate with AFME in assessing the role climate risk stress testing is playing in the European banking industry as this exercise moves from a learning one to reality. We are heartened to see that banks have embraced this action, even beyond what is deemed necessary by supervisors. Banks play a vital role in society and their commitment here is another reminder of how they can have a positive impact in addressing one of the greatest challenges of our time.

That said, we recognize that climate risk stress testing is inherently complex, and the path forward will not be without challenges. Some of these challenges are intrinsic to the scope and uncertainty of the underlying risk, while others are more practical in nature, stemming from the need for better data to better assess climate-related risk. One thing that is certain — addressing these challenges will take time, and progress will be iterative, requiring the private and public sectors to work hand in hand. As we reach this crucial point, only collaboration will allow sustainability goals to move from theory to tangible actions.



Élie Farah
Head of Financial Services, Europe

“It is crucial for financial institutions to accelerate how they address the potential implications that climate change can have on their operations and the broader economy”



Executive Summary

In 2022, the European Central Bank (ECB) took a pioneering step toward addressing the growing intersection between climate concerns and financial stability by conducting the first European climate risk stress test (CRST). This exercise was designed as both a performance evaluation and learning tool to help banks and supervisors bolster their climate risk stress testing in accordance with regulatory expectations and the realities of climate risk. And the ECB exercise did just that.

The first results of the ECB climate risk stress test demonstrated that banks had already made substantial progress toward development of robust climate stress testing capabilities. While that was good news, the consensus among the banking and regulatory communities was that the results of the CRST likely understated the actual risk from climate, as the ECB itself has acknowledged. Among the many reasons why that might be the case, unlike traditional stress tests, scenarios used in the CRST were not designed to be adverse. Additionally, the scope of the exercise covered only about one-third of the total exposures of the largest European banks, according to the ECB.

Despite these limitations, it was clear the CRST would be pivotal in helping to develop climate stress testing moving forward. The Association for Financial Markets in Europe (AFME) and Oliver Wyman decided it would be useful to ask association members which elements of the CRST worked and where there could be improvement. This report analyses the results of a survey AFME conducted among 15 member banks, representing almost €15 trillion in assets. It outlines CRST measures they were pursuing in their own operations and where they were going beyond the CRST.

First, the survey demonstrated that the ECB exercise served its purpose as a valuable learning tool. It alerted the banking sector to the urgent need for better climate risk assessment. While the stress test results did not indicate systemic stress at the macro level, they revealed material effects at the micro level. These findings alerted bankers to potential dynamics and impacts within and across portfolios.

The survey results indicated the need for refining scenarios and improving data availability and parameterization. A resounding 87% of banks participating in this survey have taken the initiative to conduct annual internal climate stress tests rather than stick with the required biannual exercise, demonstrating the seriousness with which they are approaching climate risk.

Going beyond regulation

Banks are gaining valuable insights from their practical use of the CRST, especially when they exceed the standards set by regulators. Initially, the primary focus was on credit risk, but many of the 15 banks we interviewed for this report are also starting to explore whether broader risks may be material.

Several banks have broadened their scenario analyses to include market and operational risk, liquidity risk, counterparty risk, and interest rate risk in the banking book (IRRBB). In terms of portfolio coverage, a key lesson has been the importance of avoiding a one-size-fits-all regulatory approach to climate scenario analysis. In higher-risk sectors, such as oil and gas and mining, more detailed client-level analysis is needed, while simpler top-down approaches might be suitable for lower risk sectors, such as technology, education or renewable energy. Participating institutions are also recognizing the emergence of nature risk as a significant factor that should be evaluated alongside climate risk. Some pioneering banks have already integrated nature risk into their stress test scenarios.

That said, a consensus is developing around the need for better understanding and alignment of climate risks and drivers before they can be incorporated into financial metrics such as credit ratings, capital ratios, and provisions.

“Banks are gaining valuable insights from their practical use of climate risk stress tests”



The central role of scenario design

As the experience and understanding of climate risk stress tests grow, it is becoming clear that effective scenario design is vital. Both industry and regulators need to work together to establish a global view about which scenarios need to be included in the scope of the stress testing. The severity of current scenarios for short-term periods is limited, making them unsuitable for stress testing. They are not calibrated to provide "extreme but plausible" shocks, indicating the need for a more robust set of scenarios.

To illustrate this point, consider the example of a bank with significant exposure to the fossil fuel industry. An extreme but plausible shock for this bank could be a rapid global transition to green energy, potentially instigated by measures such as a complete ban on the sale of fossil-fuel vehicles, leading to a significant devaluation of fossil fuel assets and potential defaults on loans to the sector. This could cause significant credit and market risk for the bank. Conversely, a bank with a large mortgage portfolio may face a different set of risks. An extreme weather-related event, such as a wildfire or flood, could cause widespread property damage leading to a spike in insurance claims and loan defaults. This might even cause significant operational risk for a bank's branch network, or lead to material liquidity outflows as clients deplete their deposits in the aftermath of the event.

In the long-term scenario world, regulatory exercises focusing on dynamic balance sheets are welcomed by participating banks, as this approach ensures that climate risks are modeled consistent with the measures and strategies the industry is taking to meet net-zero targets and commitments. Such an approach provides a more comprehensive understanding of climate risk, placing banks on a firmer footing to navigate the uncertain landscape.

The industry requires a suite of scenarios that involve shorter time horizons to support a broader set of use cases, such as planning and risk management. This would enable greater organizational buy-in and use of output. Climate scenario analysis acts as a critical enabler for business strategy, providing insightful projections that help banks anticipate and plan for potential climate-related risks and opportunities. Understanding these scenarios allows banks to assess their resilience under different environmental conditions, allowing them to adjust their strategic decisions, financial planning, and risk management processes to align with a more sustainable and resilient business model.

Finally, climate risk stress testing is proving to be an important frontier in the banking system. The lessons learned, the dedication to continual improvement, and the industry's commitment to tackling climate change all point toward a future where banks are better prepared to handle the uncertainties of climate change. As they become more resilient, banks can contribute significantly to wider societal efforts to mitigate the worst impacts of a changing climate.

“Climate risk stress testing is proving to be a crucial frontier in the banking system”



Key Observations

While the AFME survey showed progress being made by these member banks, the report recognizes a need for increased collaboration among industry players. Specifically, it calls on financial institutions to work more closely with regulators and global organisations, such as the Network of Central Banks and Supervisors for Greening the Financial System (NGFS), to ensure the stability and safety of their institutions in light of climate change.

The report aims to propose an appropriate scope for internal and external regulatory exercises, the sufficiency of existing analytical tools and data sources, and analytical capabilities banks should develop. It also tackled the question of how climate risk stress testing results should be used by banks and regulators and embedded into bank operations. The other issues analysed include various aspects of the climate risk stress test, including modelled risk types, portfolios in scope, modelling granularity, time horizons, and balance sheet approach.

While banks in general said they tend to adopt climate stress test solutions developed by regulators, the survey then showed many going off on their own to build on the regulator's work, resulting in increased scope and complexity. More than 87% of the participating banks told us that they were taking proactive steps to address climate change by running annually their own internal climate stress tests and scenario analyses. This goes beyond the regulatory exercise required in many jurisdictions. Some banks are also including additional risk types, scenario horizons, narratives, modelling approaches, and data.

While focused initially on credit risk and market risk, banks responding to the survey shared that they have expanded the scenario analysis to operational risk and are exploring the possibility of covering additional risk types in the internal stress test and in the Internal Capital Adequacy Assessment Process (ICAAP), such as business liquidity as well as the interest rate risk in the banking book (IRRBB). This is also evident from the survey, in which approximately one-third of the banks specified the above-mentioned additional risk types as already being part of their internal climate stress test framework.

In terms of portfolio scope and granularity, it is important that supervisors and financial institutions do not take a one-size-fits-all approach to climate scenario analysis, but rather use a diversified approach based on the results of a materiality analysis. Richer client-level analysis is required in higher-risk sectors, while simpler top-down approaches are advisable for lower-risk and/or lower-materiality sectors and portfolios. Our survey shows that over 47% of the participating banks believe that full-credit portfolio coverage using materiality of exposure to determine how to perform a granularity analysis is the most useful approach. The remainder would rather opt for the emission intensive sector-level analysis, according to the non-financial corporations by economic activity (NACE) classification used in European Union. Only a handful of banks think it is reasonable to focus on a few selected sectors for their counterparty-level analysis.

Because of the increasing number of use cases, including capital requirements, client engagement, net-zero work, and external reporting, banks stress the urgent need to adopt a broader range of time horizons, especially when dealing with short- and medium-term narratives. Further horizons would allow for greater buy-in and use of output across organizations.

Regarding long-term time horizons and strategic response modelling, most of the banks agree that regulatory climate exercises should focus on modelling based on a high-level dynamic balance sheet approach, as proposed by ECB for the climate stress test in 2022. Further, 47% of the banks share that maintaining a long-term horizon of 30 years is useful in projecting a transition impact. A high-level dynamic balance sheet approach refers to a simplified modelling of management actions that affect the exposure profile over a timeline longer than the traditional multi-year planning horizon of 3-5 years, including those taken to meet net-zero targets and fulfil commitments. In addition, the inclusion of an idiosyncratic component in the long-term projections, as mandated in the recent climate risk stress test exercise, enables banks to broaden their perspective and integrate sector- and counterparty-specific considerations into long-term modelling.



We also asked the banks whether data sources and analytical tools available to the industry now are sufficient for a full-scale climate risk scenario analysis and whether they address all the needs of the banks in two crucial dimensions — scenarios and data.

The various approaches to parameterizing climate scenarios currently offered by the climate research community and financial industry present a variety of setups in terms of coverage and granularity. Still, the banks stress that most scenarios fail to fully satisfy the needs with respect to variability of narratives (both region- and portfolio-specific), range of time horizons, and adequate severity. Without this range of variables, it is difficult to translate narratives into shocks that generate a statistically significant signal. Also, financial institutions expect inclusion of a broader range of macroeconomic variables, since they can be more easily integrated into the conventional stress test frameworks and existing satellite models.

The NGFS scenarios have been widely adopted as a market standard by the industry and regulators. However, financial institutions are likely to need to go beyond what is currently provided by NGFS. For example, institutions often need a baseline scenario, representing the most likely outcome for planning-related business processes and may need to develop such views outside of the NGFS standardized options. The forthcoming NGFS vintage, which is due to be released later this year, is expected to enhance the scenario sets, and include additional climate risk types such as nature. Integration of nature into the NGFS set is a first important step, and further efforts should be made to coordinate with the work being done by the Taskforce on Nature-Related Financial Disclosures (TNFD). Working with a group like the TNFD is vital given the even greater challenge nature-related disclosure poses. In the meantime, banks are relying on a variety of scenario frameworks, including regulatory short-term scenarios provided by the ECB and institution-specific scenarios based on NGFS or third-party solutions.

It is understood by all the surveyed banks that, in addition to scenarios, data is another crucial resource for climate risk modelling. As was evident from the climate risk stress test last year, the topics of data availability, data quality, and data governance were insufficiently addressed in the past and require more attention and effort in the future. Availability and clear data governance have been highlighted by all participating banks as a main challenges for the integration of climate and sustainability. Such integration is vital to informing strategy and developing transition plans consistent with EU sustainability reporting requirements, including the Corporate Sustainability Reporting Directives (CSRD).

Banks also realize that there is a need for improvement of their analytical capabilities if they are to capture the full impact of climate change and the various scenarios it could present. Significant expertise has been developed for modelling climate aspects of conventional risk types, mainly because those risk types have been included in the latest regulatory climate stress test exercise. Further developments are ongoing. In the credit risk domain, for example, banks are considering embedding climate risk elements in the International Financial Reporting Standard (IFRS) 9 framework. In market risks climate risk modelling, regulatory support and guidance would be highly appreciated to be able to cover a broader scope of products and scenarios — for example, in areas such as commodities and sovereigns. As for operational risks, advanced approaches requiring more extensive data, including on litigation case history and precedents, are being explored.

In terms of how climate risk stress tests are used, banks have expanded on the practices developed for the ECB 2022 exercise to improve upon their modelling capabilities and data-gathering processes, both internally and with clients. We expect this to improve further as ESG data governance is integrated into banks reporting and disclosure frameworks when forthcoming regulation comes into effect. Results from last year's ECB climate stress test have also been integrated into the bank risk management and board-level reporting, as well as into business strategy. In this respect, the exercise was helpful to identify the most vulnerable counterparty sectors and support deep-dive analysis into these areas, as well as to develop climate-connected, know your client origination decision processes. This hasn't been fully embedded yet.

On the other hand, a better understanding of climate risks, transition channels, and drivers as well as a sufficiently high-quality data basis is required before these can be integrated into a bank's risk management, credit ratings, capital requirements and provisions. Once this understanding and a foundation of sufficiently high-quality data are established, integration into IFRS 9 will be next in line for almost half (47%) of the participating institutions.



2. Introduction

2.1 Context & background

Climate risk stress tests help financial institutions assess their vulnerability to climate change and make informed decisions about managing the associated risks effectively. As climate risks are considered “risk drivers” to financial risks and are characterized by a high level of complexity, they are difficult to address with the traditional prudential toolkit that banks are familiar with. They require novel approaches.

Following the ECB’s first CRST, the Association of Financial Markets in Europe (AFME) conducted a survey amongst member banks. The objective of the survey was to compile key-learnings and highlight challenges and areas for improvement. Additionally, AFME, in partnership with Oliver Wyman, has undertaken a detailed review of the industry’s progress since the ECB stress test by conducting extensive interviews of its member firms, plus a survey on key issues, as well as wider industry workshops¹. We also have examined the latest ECB review of the recent exercise, good practices report² and expectations³, alongside participation in an European Banking Authority (EBA) workshop on the future of climate stress tests and engagement with the NGFS⁴. We have also extended our analysis to look at recent non-European CRSTs. In so doing, this paper provides an assessment of how banks and supervisors can work together to establish a robust and stable framework for future CRST exercises.

2.2 Purpose of the report

This paper aims to:

- Review progress of European banks to date on integrating climate risk stress testing into their organisation
- Highlight key areas of concern for participating banks in the ECB exercise and how they compare to those observed in overseas jurisdictions to date
- Support European banks’ initiatives for good practices and alignment with ECB’s expectations
- Stimulate industry-wide reflections on strategic supervisory actions needed for banks to improve their performance in future CRST exercises
- Derive common views from banks and policymakers on the design of banks’ internal and supervisory exercises

In particular, we see challenges in developing risk models that capture relevant climate factors and reflect realistic scenarios. This paper seeks to explore these in depth by providing (1) a comprehensive analysis of methodological challenges limiting the comparability of exercises, (2) instances of convergence in global regulatory climate risk requirements, and (3) recommendations to enhance existing supervisory and regulatory initiatives.

Potential areas of improvement identified mainly require engagement from banks and regulators at the EU level. Regulatory guidance and initiatives by banks must consider cross-border and third-party collaboration to produce relevant and reliable data and support the development of globally consistent scenario assessment models. There will continue to be limits to the extent of methodological, data, and targets alignments.

1 AFME Overview of the Key Learnings by Industry of the 2022 ECB Climate Risk Stress Test (Aug 2022)

2 ECB report on good practices for climate stress testing (ECB, Dec 2022)

3 ECB guide on Supervisory expectations relating to risk management and disclosure (Nov 2020)

4 ECB Results of the 2022 thematic review on climate-related and environmental risks (Nov 2022)



2.3 How to read this report

In our paper, we discuss the most relevant topics for CRSTs, covering regulatory overview and industry outlook in Section 3, followed by the discussion on scoping (in terms of risk types, portfolios, time horizons, and assumptions for portfolio dynamics), current climate risk asset lanscape (in form of data and scenarios) in Section 4 and analytical capabilities necessary for climate risk scenario analysis in Section 5. Use cases of the results of the climate stress tests for internal purposes and for external reporting are described in Section 6. We assess the approaches and limitations of CRST exercises and compare the insights from our members with findings from other sources, such as observations made by the Financial Stability Board (FSB) and the Network for the Greening of the Financial System (NGFS), on recent CRSTs conducted across several jurisdictions. In many cases, we see common challenges with those experienced in the ECB exercise.⁵

“We see challenges in developing risk models that capture relevant climate factors and reflect realistic scenarios... Potential areas of improvement identified mainly require engagement from bank and regulators at the EU level”

⁵ FSB-NGFS report on Climate Scenario Analysis by Jurisdictions | initial findings and lessons (NGFS, 15th Nov 2022)



3. Role of regulatory climate risk stress testing

3.1 Background on regulatory stress tests in Europe

Climate risk stress testing is a relatively new but important supervisory undertaking – only a few exercises have taken place in a handful of regions, although this is gathering pace. Both supervisors and banks are in the early stages of establishing a climate stress testing framework, though there is no doubt that such frameworks will become an established aspect of supervisory expectations in future. In the EU, the most extensive CRST exercise was undertaken by the ECB in 2022. This was a learning exercise to better understand where banks stand on their ability to gather relevant data and model climate risks. This will be explored in other chapters of this report.

Over the past four years, regulatory bodies worldwide have actively conducted regulatory climate stress tests to assess banks' ability to withstand climate-related risks. The ECB representing the EU, the Prudential Regulation Authority (PRA) in the United Kingdom, the Hong Kong Monetary Authority (HKMA), the Australian Prudential Regulatory Authority (APRA), and various regional authorities in Europe and beyond have all undertaken climate stress tests.

While these stress tests share a common objective, there are significant differences in terms of their focus, scope, and scenario design. Notably, the majority of announced climate stress tests do not directly impact capital or evaluate capital adequacy or regulatory capital requirements for financial institutions.

Several supervisors, including the ECB, France, Hong Kong, Singapore, and the UK, have utilized scenarios provided by the NGFS. This commonality ensures consistency across jurisdictions. The time horizon for these exercises typically extends until 2050, with assessments conducted at five-year intervals.

Methodology-wise, some regulators encourage financial institutions to adopt a bottom-up approach, allowing them to analyse and incorporate institution-specific data and climate models into the stress testing exercise. Credit risks were comprehensively covered by all jurisdictions, with certain regulators, such as the ECB and APRA, also giving additional attention to market and operational risks. While most stress tests employed a static balance sheet approach, a dynamic approach was adopted by the ECB, APRA, and the French national regulator, enabling banks to reflect their strategic decisions in response to climate change.

“Over the past four years, regulatory bodies worldwide have actively conducted regulatory climate stress tests to assess banks’ ability to withstand climate-related risks”



Table 1: Climate scenario analysis regulatory requirement comparison

	OSF (Canada)	APRA (Australia)	ACPR (France)	BoE/PRA (United Kingdom)	ECB (EU)	EBA/ECB (EU SREP)	DNB (Netherlands)	MAS (Singapore)	Fed (United States)
Scope	6 large banks	5 largest Aus. banks	9 banks and 15 insurers	7 and 11 largest banks and insurers	113 banks	29 banks	All Banks, insurers and pension funds	150 Singapore FIs	6 largest US banks
Participation	Mandatory	Mandatory	Voluntary	Mandatory	Mandatory	Voluntary	Mandatory	Mandatory	Mandatory
Date^A	Nov 2020	Apr 2021	Jul 2020	Jun 2021	Oct 2021	Dec 2019	Oct 2018	May 2022	Jan 2023
Risks in scope, portfolios covered, and climate risks assessed	<p>Credit Risk Corporate (transition)</p> <p>Market Risk (transition)</p>	<p>Credit Risk Corporate (transition and physical) Mortgage (transition and physical)</p> <p>Market, liquidity, operational (questionnaire)</p>	<p>Credit Risk Corporate (transition and physical) Mortgage (transition and physical)</p> <p>Sovereign/market (transition)</p>	<p>Credit Risk Corporate (transition and physical) Mortgage (transition and physical)</p> <p>Market Risk (transition)</p> <p>Operational (questionnaire)</p>	<p>Credit Risk Corporate (transition and physical) Mortgage (transition and physical)</p> <p>Market Risk (transition)</p> <p>Operational (questionnaire)</p>	<p>Credit Risk Corporate (transition and physical) Mortgage (transition and physical)</p> <p>Market (transition)</p>	<p>Credit Risk Corporate (transition and physical)</p>	<p>Credit Risk Corporate (transition and physical)</p>	<p>Credit Risk CRE (transition and physical) Mortgage (physical) Wholesale (transition)</p>
Time horizon & balance sheet assumption	30 years – Static (transition risk)	30 years – Static and proportional (constrained dynamic)	5 years – Static 25 years (post-2025) – Dynamic	30 years – Static	1 Year – Static (physical risk) 3 years – Static (transition risk) 30 years – Dynamic (transition risk)	30 years – Static	5 years – Static	30 years – Static	1 Year – Static (physical risk) 10 Years – Static (transition risk)
Assessment approach	Both	Bottom-up	Bottom-up	Bottom-up	Bottom-up	Both	Top-down	Both	Bottom-up
Scenarios used	<p>Transition Net Zero 2050 Sub-2C immediate Sub-2C delayed Baseline</p>	<p>Transition & Physical Disorderly transition Business as usual</p>	<p>Transition & Physical Orderly Transition Delayed Transition Disorderly Transition Business as usual</p>	<p>Transition & Physical Early Action (EA) Late Action (LA) No Additional Action (NAA)</p>	<p>Transition (Long Term) Orderly transition Disorderly transition Hot house world</p> <p>Transition (Short Term) Baseline vs Stress Physical Risk Drought and heat scenario Flood risk scenario</p>	<p>Transition & Physical Orderly transition Disorderly transition Hot house world</p>	<p>Transition Technology shock Double shock Confidence shock Policy shock</p>	<p>Transition & Physical Delayed Transition Disorderly Transition No additional policies</p>	<p>Transition risk NGFS Net Zero 2050 NGFS current policies Physical risk SSP2-4.5 (or RCP 4.5) with 100-yr return period SSP5-8.5 (or RCP 8.5) pathways with 200-yr return period</p>

A: Refers to the month the guidance was published

3.2 EU regulatory outlook

Following the ECB's CRST exercise in 2022, the European Commission mandated European supervisory authorities (ESAs), the ECB, and the European Systemic Risk Board (ESRB) to undertake an additional exercise in 2024 to test the resilience of the financial sector against the EU's goal to cut greenhouse gas emissions at least 55% by 2030. This is part of the EU's broader "Fit for 55" exercise.⁶

The Commission has requested supervisory authorities to consider the following scenarios:

- One scenario should focus on climate change-related risks that could materialise in the near term, most likely in the form of asset price corrections triggered by a sudden reassessment of transition or physical risks
- A second scenario could combine climate change-related risks with other stress factors more consistent with scenarios for regular stress testing exercises
- Adverse scenario(s) should be developed by the ESRB's Task Force on Stress Testing to ensure consistency across sectors and synergies with the scenarios used in other stress tests.

The Commission has set out the following requirements in terms of modelling:

- **The exercise should rely, to the extent possible, on available data collected by a regulatory authority, such as the ESAs or ECB, to ensure feasibility and limit the burden on financial institutions**
- **The purpose of this exercise is not to set micro- or macro-prudential requirements for financial institutions**
- **The exercise should not limit itself to estimating capital losses and shortfalls for financial institutions**
- **The results could feed into subsequent supervisory or monitoring programmes of the ESAs and ECB that identify specific vulnerabilities in the financial system, such as concentration or contagion risks**

We expect that, in addition to the outline from the Commission, the EBA and ECB will not only leverage the processes and data-gathering developed in the 2022 exercise, but also use this to assess the progress banks have made to develop their climate risk stress testing capabilities. There is no further indication from the EBA or ECB on how or whether they plan to undertake further bottom-up or top-down CRSTs beyond 2024.

The ESA and EBA are expected to help authorities shape future guidance on bank climate stress testing and scenario analysis. For the EBA, not only are they mandated to perform regular climate stress tests, but they also need to develop guidelines for banks and supervisors to assess the impact of ESG risks under adverse conditions. The EBA is expected to develop this guidance from 2023 based on mandates in Capital Requirements Directive (CRD) VI, although it will depend on the outcome of negotiations.

The EBA's work will include a review of its guidelines on institutions' stress testing to provide guidance for institutions on how to test their resilience to climate change, but also to consider long-term negative impacts of environmental, social and governance factors.⁷ The EBA and the other ESAs will also develop joint guidelines for supervisory ESG stress testing, starting with climate risk. The guidelines are to ensure consistency, long-term considerations, and common standards for assessment methodologies. It is understood that such guidelines will require banks to undertake stress testing every two years and will take the form of minimum standards which banks can build upon according to their own specification and needs.

Finally, the ECB has set a clear supervisory expectation that by the end of 2024 EU banks should meet all remaining supervisory expectations in their guide on climate and environmental risks, including full integration in the Internal Capital Adequacy Assessment Process and stress testing.

⁶ <https://www.consilium.europa.eu/en/policies/green-deal/fit-for-55-the-eu-plan-for-a-green-transition/>

⁷ Refer to draft Article 87a(5)(d)) CRD <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52021PC0663&from=EN>



3.3 Industry view on the future of supervisory climate risk stress testing

Summary of key findings:

- Future CRST exercises should be run at a minimum every two years and leverage the ECB 2022 exercise. They should also consider interaction with other supervisory initiatives and the internal obligations of banks. Future results of regulatory stress tests should also provide transparency on the scoring process.
- It is too soon to integrate CRSTs into solvency stress tests as the methodology and data is insufficiently advanced, but lessons could be drawn from experiences of other jurisdictions, such as the HKMA. The results of the ECB 2022 exercise had many uses for banks internally — especially in terms of understanding and addressing data gaps. 87% of banks will run internal stress tests every year.
- While the ECB good practice guide is a useful starting point, further supervisory guidance on how banks should build their internal stress testing and modelling capabilities would help to drive greater industry consistency.
- Banks support the “Fit for 55” stress test exercise in 2024, but early clarity on the process, methodology and data requirements would be welcome.

In terms of future regulatory stress tests and the forthcoming 2024 stress test, banks emphasized that the new exercise should leverage the ECB 2022 exercise as much as possible, especially in terms of models and data. Banks also urged supervisors to be mindful, when scheduling, of other supervisory initiatives that could potentially take place at the same time and with similar purposes, such as data collection exercises, Internal Capital Adequacy Assessment Process (ICAAP), or regular solvency stress tests. This can potentially be avoided if CRSTs are run every two years. Our survey shows that almost half of the respondents share this view and consider every two years to be an appropriate frequency for running regulatory CRSTs (Figure 1). The burden may also be reduced as banks’ internal capacity, technology, and methodology become more stable alongside more uniform running of bottom-up/top-down regulatory stress tests by the EBA (as mandated in the CRD VI guidelines). The centralized 2024 ESA exercise will be useful in this respect as it will involve other financial sectors and help build more consistency across the industry, although it will be important to provide guidance on supervisory roles early on in the process as well as guidance on the extent to which data will be provided versus banks having to collect it.

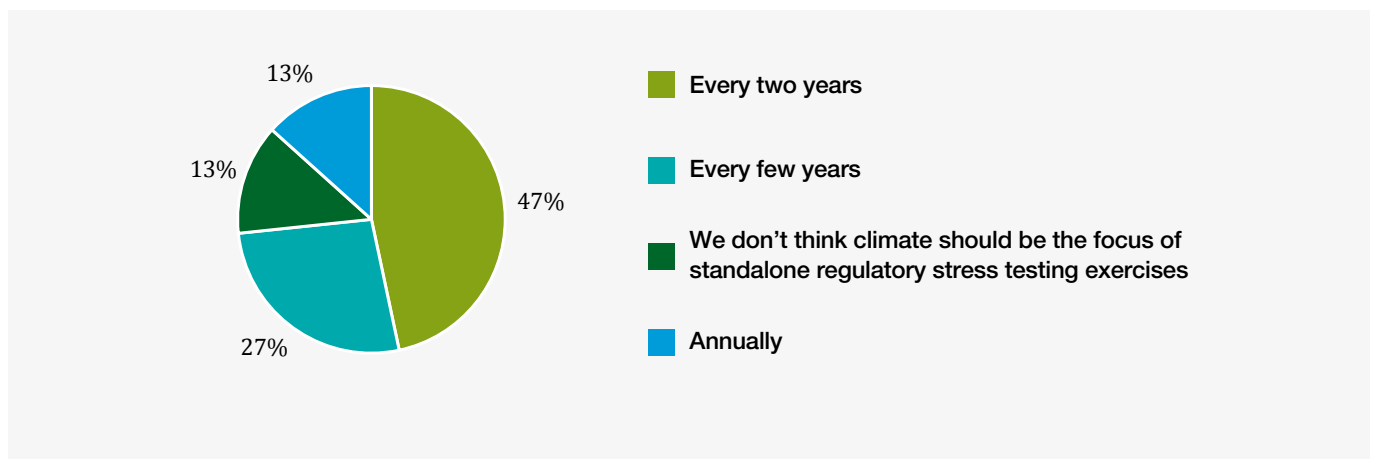


Figure 1: **Overview of survey results: What frequency do you think is appropriate for running regulatory climate stress testing exercises?**



Role of regulatory climate risk stress testing

A further consideration is the integration of the CRST into regular solvency stress tests. Members considered that it would be too soon for the EU to require such integration into the broader EBA-led stress tests, although in the long term there may be a place for this. Around 73% of our respondents stressed that integration of CRST into the solvency stress test is only conceivable after ensuring that any stress test methodology, scenarios, and data are sufficiently developed and tested. It was noted that HKMA's forthcoming exercise will integrate a climate risk exercise with solvency and RWA analysis on a short five-year horizon, although it's unclear if it will have capital implications. Their approach may be something for EU supervisors to review.

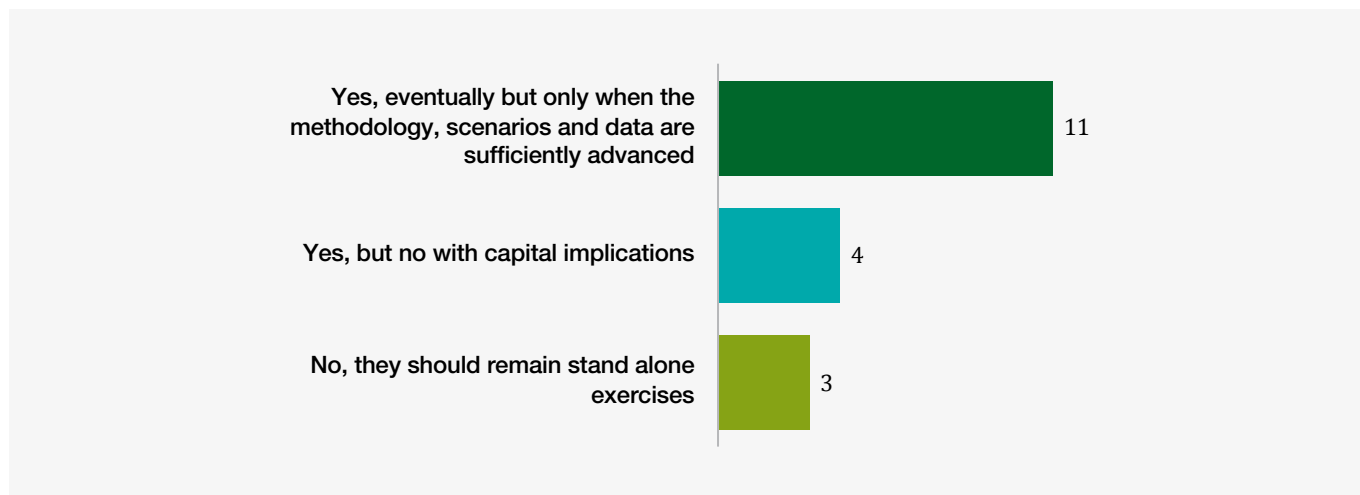


Figure 2: **Overview of survey results: Do you think CRSTs should be integrated into BAU solvency stress tests? (Respondents could make several choices so the percentages do not add up to 100%)**

At present no banks have undertaken a reverse stress test, and, while it is not a priority for most banks, it was noted this could be useful to assess risk sensitivity in future. Nonetheless, there would need to be a capital-risk limitation in place prior to its introduction.

3.4 Link to internal climate stress tests

87% of banks run internal climate stress tests annually and 6% run them biannually in years when there are no supervisory CRSTs. (Figure 3) Those banks that run internal annual stress tests intend to leverage regulatory stress tests or vice versa. Banks emphasized that regulatory CRSTs, along with reporting and disclosure requirements, are helpful with the development of adequate methodologies to address data-collection and methodology challenges. One bank will also use internal stress tests to reinforce their internal net-zero commitment planning.

Banks would find it helpful to receive further regulatory and supervisory guidance on how to build their internal stress testing methodologies. This should support greater consistency and comparability across the industry in the long term.



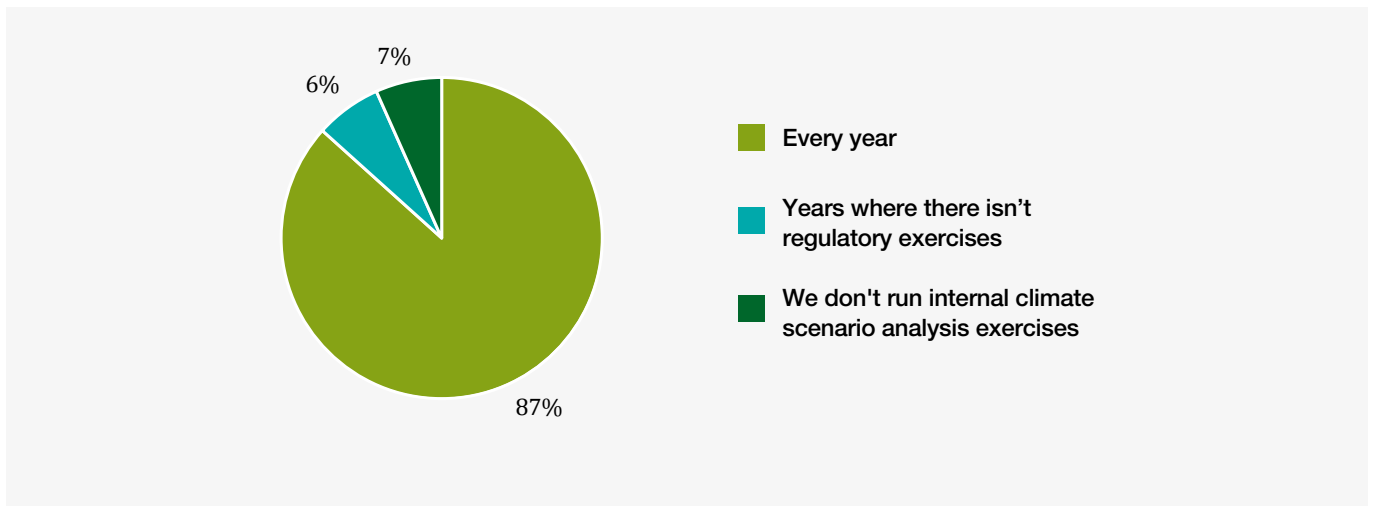


Figure 3: **Overview of survey results: How often do you run internal climate risk stress testing exercises?**

“Banks would find it helpful to receive further regulatory and supervisory guidance on how to build their internal stress testing methodologies”



4. Key questions for developing common industry standards for climate risk stress tests

4.1 Risks

Under the ECB's climate stress test, all banks were requested to submit the first two modules and the starting point for the third module, while some banks were expected to create their own projections for the third module. The third module assessed climate risk through the lens of credit, market, and operational risk. Overall, the most demanding — but most value-added element of the module — was the credit-risk modelling, because it's considered the main transmission channel for climate-related risks. In this respect, 100% of banks responding to the survey confirmed credit risk would continue to be the area on which they focus their resources in future stress testing to improve their understanding and use of the results to manage and mitigate climate-related risks (Figure 5).

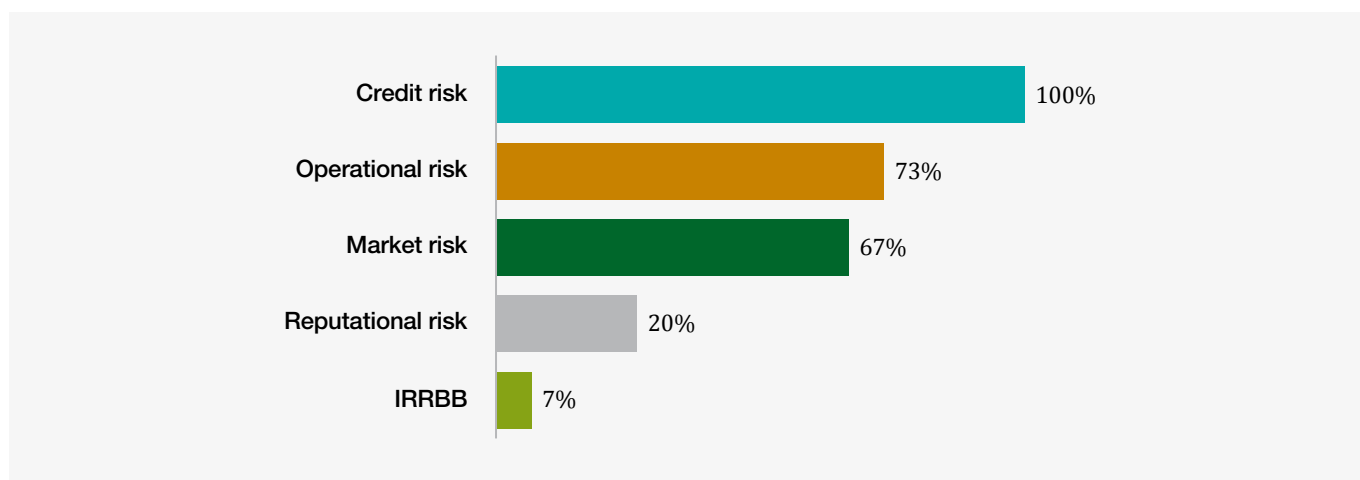


Figure 4: **Overview of survey results: Which risk types do you believe should be included in the next EU supervisory stress test? (Respondents were allowed to make several choices so percentages do not add up to 100%.)**

Even though the scope of both market and operational risks were more limited in the ECB exercise, these are risk categories banks consider important enough to welcome additional guidance from regulators. That's also true for liquidity and funding risks, which did not feature in the 2022 ECB exercise. Subsequently, it has been integrated into the stress test exercises of other jurisdictions — including most notably the Federal Reserve Bank in the United States. European banks are also aware of the importance of liquidity adequacy because of the ECB's effort to integrate climate and environment expectations into its internal liquidity adequacy assessment process. In terms of adaptation measures, supervisors may want to consider applying these more generically to all risk categories to which a climate scenario applies.

Based on the results of our survey, most of the banks said they expect regulatory CRST to be concentrated around three main risk types — credit, market, and operational. Nonetheless, internal stress testing frameworks of at least some of our respondents already include additional risk types, such as liquidity, reputational risk, and interest rate risk in the banking book (IRRBB). (Figure 6) These banks note their internal exercises are still in an early stage of development.



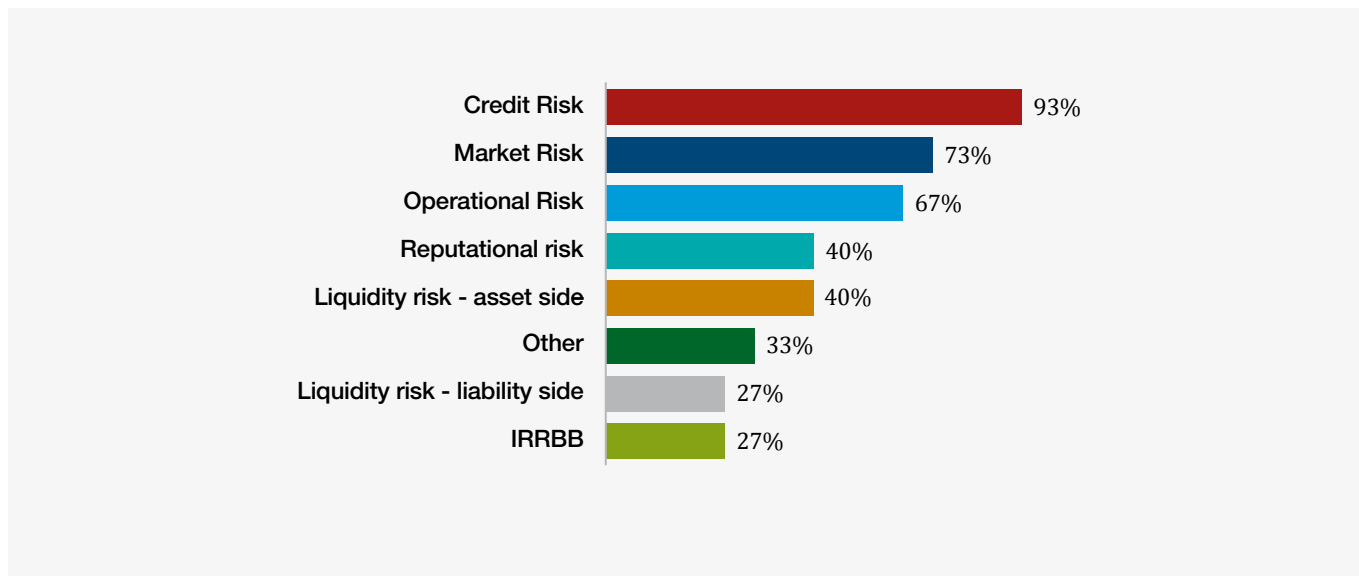


Figure 5: **Overview of survey results: Which risk types are in scope of the internal climate risk stress testing? (Respondents were allowed to make several choices so percentages do not add up to 100%.)**

4.2 Balance sheet coverage

Summary of key findings:

- All banks expect credit risk to remain the key focus of future CRST exercises.
- Market and operational risk will also continue to be a focus for banks, if not supervisors.
- 87% of banks support materiality thresholds based on climate exposure and risk to understand the most impacted portfolios in future exercises.

In our initial survey, after the ECB exercise, 91% of AFME members supported the incorporation of materiality thresholds to avoid undue efforts and focus on the most impacted portfolios. This would also reduce and simplify the data collection process for those portfolios or exposures that fall below the materiality cut-off. This is particularly relevant to credit risk given the extent of portfolios that are subject to the stress testing. The ECB is considering whether a more granular approach is needed for relevant sectors, such as mortgages and high-emitting sectors.

The retail sector also poses challenges, such as understanding the effect of energy overlays. For instance, the NACE level 2 does not identify the energy source. Nonetheless for now, they note that the ECB good practice guide identifies all relevant portfolios.⁸

In recent responses, most banks continue to think that materiality thresholds would be useful to support more meaningful and granular analysis. Those continuing to undertake internal analysis tend to take a focused approach to their portfolios. For instance, one bank is only focused on assessing corporate exposure to transition risk, and in particular mortgage exposures, not physical risk. Another bank noted that some portfolios, such as unsecured retail, are not the priority for the moment. It is focused instead on higher-risk portfolios, such as mortgages and corporate exposure to transition risk.

Most of the survey respondents (87%) consider both exposure and climate “riskiness” to be key factors for defining materiality thresholds (Figure 7).

⁸ ECB report on good practices for climate stress testing (ECB December 2022)



Key questions for developing common industry standards for climate risk stress tests

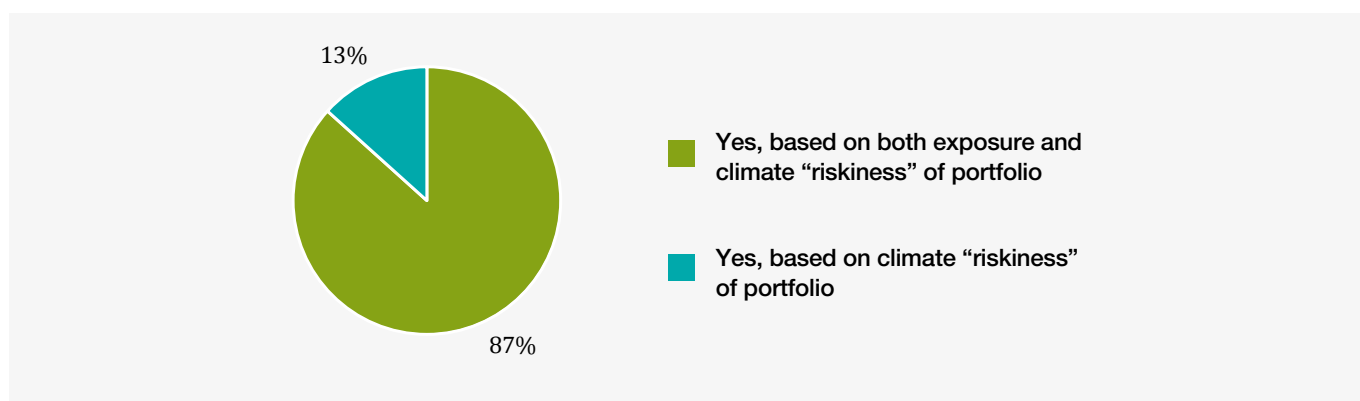


Figure 6: **Overview of survey results: Would it be helpful to introduce materiality thresholds to focus on relevant portfolios for credit risk?**

Not all banks have considered materiality, but if thresholds are considered — even at supervisory level — only the most affected sectors in portfolios should be captured in future exercise guidance, such as how to handle counterparty sectors in a bank's portfolio rather than covering the whole book. In the most recent survey, the banks specified a wide range of portfolios they are currently including in the CRST analysis. Almost all the respondents have selected corporate loans, mortgages, commercial real estate, as well as securities from the trading book. The same portfolios were in focus during the 2022 CRST. Additional products, such as credit cards or project financing, are currently in the stress testing scope of just one-half of the respondents (Figure 8).

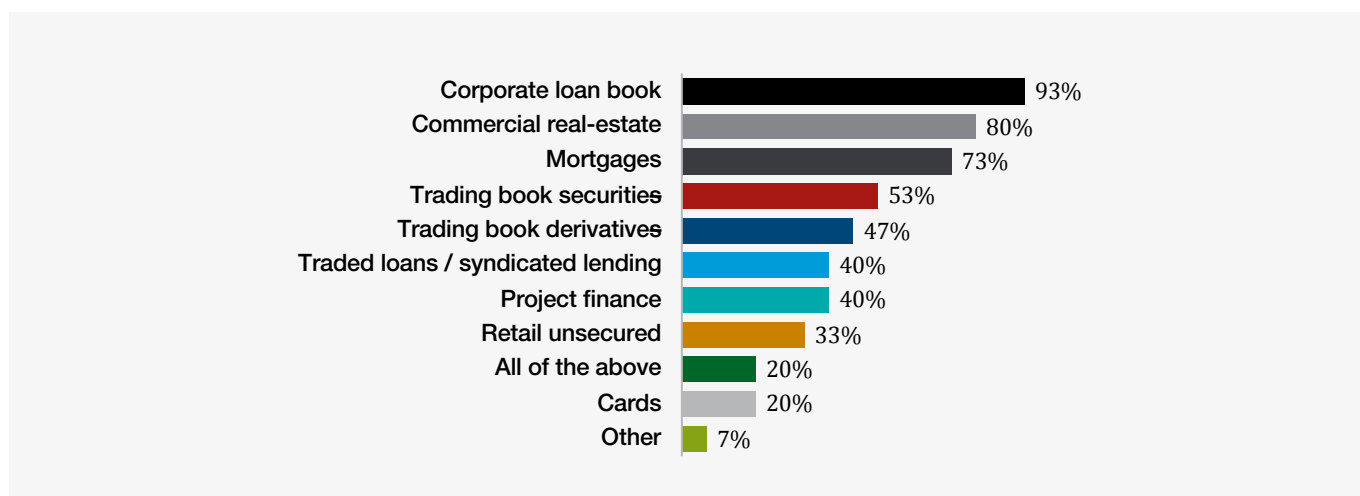


Figure 7: **Overview of survey results: Which portfolios do you include within your internal climate risk stress testing? (Respondents were allowed to make several choices so percentages do not add up to 100%.)**

In terms of setting materiality limits, it is suggested that for transition risk these should be determined based on a bank's targets, such as its net-zero transition planning goals. For physical risk, thresholds could be determined by the risk appetite of the lending institution to certain types of exposures, such as retail mortgages or cryptocurrencies. It is also suggested that the proportionality principle should be applied to the materiality assessment, taking into account differences across industry.

While most banks supported materiality thresholds, one bank noted that this could be limiting or add confusion to the analysis of climate-related losses. That bank would like to see a continuation of the ECB's approach.



4.3 Time horizons

Summary of key findings:

Time horizons:

- Firms need a suite of scenarios over shorter time horizons (3-5 years) to support a broader set of use cases – such as planning and risk management – and this should be the focus of forthcoming CRST exercises.
- Some banks are recommending that for now, projection of physical risks in future supervisory exercises should be limited to short and medium-term exercises for more practicality.
- In the medium term a 10-year horizon could support the practicality of projections
- While nearly half of members support use of a 30-year time horizon, a key challenge with assessing 30-year transition risk stems from gaps in client data that make it difficult to align with net-zero commitments. Nonetheless, a 30-year horizon for transition risk supports innovation in forward-looking methodologies.
- Banks need better understood transmission channels for physical risks and improved data governance to support long-term projections of physical risks in future exercises.
- Banks are assessing their net-zero commitments within the longer time horizons, but it remains a challenge to define a granular net-zero strategy.
- To support net-zero alignment, banks will need to develop a data governance framework and transition plans consistent with EU sustainability reporting rules, such as the Corporate Sustainability Reporting Directives (CSRD).

The time horizons adopted for stress testing are an essential component of climate scenario analysis, as they provide a context and points of comparison against which to gauge the impact of various risk drivers and assess exposures to climate-related risks. It can be argued that setting the time horizon for climate risk analysis is far more complex than for conventional stress tests, such as solvency stress tests based on macroeconomic shocks. The reason is twofold. Firstly, the assumed materialization of climate-related risks undermines, to a certain extent, the effort to integrate the results of the exercise into bank's risk management, portfolio, and business planning in a meaningful way. Secondly, the time horizons for transition and physical risks are interrelated and in practice create an unusually large set of scenarios that is challenging to handle.

Getting it right is key. While this is intrinsically important for banks, meaningfully integrating climate stress testing into banks' risk and business governance also aligns with external motives such as meeting supervisory expectations. The issue is compounded by the fact that scenarios need clear climate targets and well-understood transmission channels, and easy to communicate assumptions. It is not surprising therefore that most jurisdictions have found it difficult to define relevant time horizons. This chapter explores ways the industry has found to deal with the conundrum of climate-related time horizons and aims at identifying common practices across Europe.



Key questions for developing common industry standards for climate risk stress tests

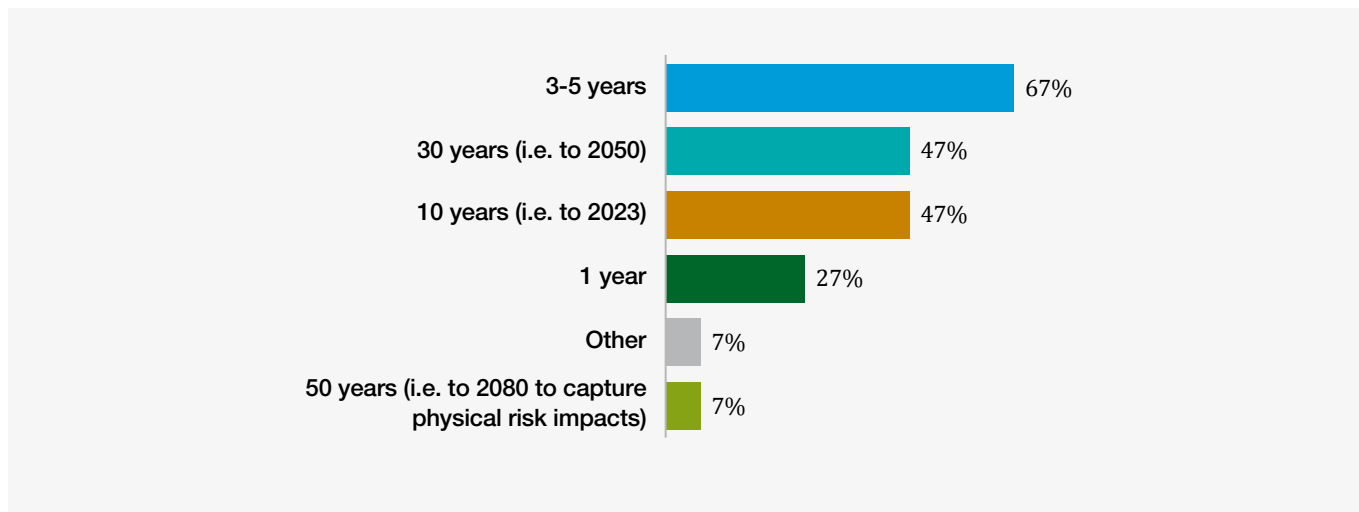


Figure 8: **Overview of survey results: What time horizons should be focused on in the next EU regulatory stress test? (Respondents were allowed to make several choices so percentages do not add up to 100%.)**

ECB Perspective

- In terms of good practice, the ECB recommends that institutions must consider how climate-related risks could occur in short, medium, and long-term scenarios and approach the question using time horizons in excess of the standard three-year scenario for traditional stress tests
- In the case of longer than 20-year horizons, banks are expected to support quantifying long-term climate-related risks and to review results against their climate strategy and risk appetite.
- It is important to better integrate time horizons with capital planning as well as maintain some degree of simplicity in setting the time horizons.

NGFS

- The NGFS, an offshoot of the Paris Summit in 2017, expects banks to engage with their clients on transition planning. The group notes such collaboration will be useful in addressing limits of disclosure and liabilities related to transition planning.

Long-term transition risk

In its 2022 CRST exercise, the ECB's approach to time horizons was aligned with the EU targets for reducing carbon emissions. Most participants faced difficulties in projecting a realistic transition response over a 30-year time horizon that would achieve their commitments to net-zero emissions by 2050. This challenge stems from (1) limited capability to acquire forward-looking data on counterparties' emissions and transition plans, (2) complexity in determining whether such plans align with a bank's net-zero commitments, and (3) limited understanding of implications of the bank's business strategy. In other words, the capacity of banks to provide plausible long-term responses to climate risks depends on whether and how their clients' transition plans align to their own internal objectives.

Although members generally consider transition response projection under a 30-year horizon as relevant (Figure 9), a few banks that are either planning to or have undertaken CRST exercises mentioned that introducing a medium-term horizon of 10 years would enhance the practicality of the projection. This could leverage their efforts to adjust their materiality assessment methodology and business strategy in a more realistic manner. At least one bank stated that it is best to focus on defining shorter intervals — such as five years — to develop meaningful long-term transition responses that align with net-zero commitments in place.



Key questions for developing common industry standards for climate risk stress tests

AFME members all confirmed they have net-zero commitments and are building out their roadmaps to achieve these, starting with the most affected sectors. Still, it's fair to say bank transition plans remain at an early stage of development, with specific targets yet to be fully integrated.

This is also reflected in recent CDP-Oliver Wyman findings that showed most financial institutions report that at least some of their clients align with a 1.5°C world. Yet only a few companies have both a 1.5°C ambition and have made progress to develop a transition plan.⁹ Hence, a key challenge is the limited availability of counterparties' transition plans in banks' ability to establish their own transition plans as well as their net-zero commitments. Given this interdependence, we would urge caution among supervisors in enforcing this as part of SREP in CRD VI. Finally, despite a 30-year projection presenting a challenge, banks acknowledge that the long-term projection is relevant to consider as it encourages innovation in forward-looking methodologies.

Short-term transition risk

Short-term transition risk is still a key area of development for banks as it supports banks' internal capital planning and risk management. As a result, the outputs of short-term scenarios will be easier to apply across the organisation. A major contribution to this will be the publication of the next release of the NGFS scenarios in Q3 which should provide short-term scenarios.

Based on the industry's experience with the ECB exercise, three-year, short-term projections were deemed not fully realistic and too short for transition risk. In this respect, it is important that short-term time horizons for transition risk remain consistent with timelines for climate transition objectives — which tend to be about five years.

Physical risk

EU regulators

- The EBA will provide meaningful guidance in future exercises on both physical and transition scenarios, with a particular attention to long-term horizons.

NGFS

- The NGFS is planning to include a section on physical-risk scenarios and time horizons in its next scenario iteration, later this year. The ECB is leading the workstream.

HKMA

- The latest Hong Kong Monetary Authority's CRST exercise maintains a short-term horizon of five years for physical risk scenarios and will provide a more strategic long-term horizon
- HKMA also bases its approach to climate stress testing on past events and then increasing the frequency of their occurrence

Those banks that have assessed physical risk in both internal and supervisory exercises have stressed some limitations — namely, on long-term physical risks as well as inadequate understanding of the magnitude of various transmission channels between physical risks and financial impacts. Data gaps are also a major challenge for most members and therefore require greater attention. In addition, at least one bank recommends that projection of physical risks should be limited to short and medium-term scenarios for more practicality.

Exploring the severity and plausibility of climate-related physical risks and their impact on bank assets must remain the focus at this stage with the support of further efforts from regulatory bodies and academia. Members also suggested that EU supervisors could review approaches taken by other jurisdictions to time horizons and related data usage, especially when it comes to assumptions under short-term acute physical scenarios.

⁹ Stepping up: Strengthening Europe's corporate climate transition (CDP-Oliver Wyman, February 2023)



4.4 Balance sheet evolution

Summary of key findings:

- Members recommend the use of a dynamic balance sheet to assess the medium- and long-term severity and plausibility of climate-related shocks. However, this will require more adjustments to capture more quantitative elements.
- On the other hand, a static balance sheet approach is deemed more appropriate for short-term scenarios.

The relevance and importance of scenarios varies depending on the balance sheet approach. While the use of a static balance sheet requires fewer assumptions and enables straightforward interpretations of results, a dynamic balance sheet with accommodations for longer time horizons is preferable in both a short and long-term, climate-related risk assessment context. The dynamic option can cope better with the non-linear pattern of climate change and produces more plausible climate scenarios, realistic results and interpretations, and effective responses to climate risks.

EU regulators:

- For now, EU regulators plan to continue to require banks to apply a dynamic balance sheet approach.

UK:

- The Bank of England's Climate Biennial Exploratory Scenario (CBES) exercise required banks to assess risks on a 30-year horizon using a static balance sheet. Banks that participated noted a static balance sheet may have led to overestimates of some risks, while missing risk transmission channels and drivers led to underestimates elsewhere and would change this in future exercises.

HKMA

- The HKMA plans to introduce a new approach, using a static balance sheet with a sectoral mix that will then evolve.

To do this, it is necessary to provide as much granular information as possible — especially when it comes to macroeconomic variables — while still standardizing approaches and parameters. That said, it is difficult to obtain a purely quantitative dynamic balance sheet to cover an industry as there will always be qualitative elements that must be considered. More adjustments are encouraged.

In response to these challenges, some adopted a hybrid balance sheet approach, which considered the main portfolio dynamics including back-to-performing, recoveries, and write-off situations while excluding the volatility and idiosyncrasies of new origination loans. This allowed the overall portfolio perimeter to remain unchanged, even as the portfolio composition in terms of such characteristics as industry distribution and Energy Performance Certificate (EPC) of collateralized portfolio morphed over the scenario horizon. This also improved the interpretability of results by better isolating climate risk effects and sterilizing new volumes.



4.5 Scenarios

Summary of key findings:

- While NGFS scenarios have established a global baseline, there is room for improvement: For instance, some financial institutions do not believe they are calibrated to provide “extreme but plausible” shocks, which are needed for stress test purposes. Until this is available in 2024/2025, banks are relying either on regulatory short-term scenarios provided by ECB last year or the more advanced banks are developing institution specific ones.
- Nature risk is “next risk in the queue” and it is important that this is analysed in an integrated way with climate and reflects the work of the TNFD, recognising that there is still much progress to be made with nature related financial disclosure.
- Scenario providers and regulators should focus on how nature-related risks affect climate risks and provide physical and transition scenarios that explain how nature-related risks reinforce climate risks in a short-, medium- and long-term horizons.
- More detailed integration of macroeconomic variables is needed.
- 53% of banks intend to consider nature-related risks in scenarios in the next two years, but this depends on the development of relevant scenarios which are underway in the NGFS, as well as the work of the TNFD.

In terms of assessing climate risks, supervisors have focused on scenario analysis because of the lack of historical data and the different potential ways in which these risks could arise on a non-linear path. As such, there are features to consider regarding the design of scenarios developed to date and ways in which they could be made easier to apply in practice and integrate with other variables alongside physical or transition events. Indeed, based on AFME’s last member survey in July 2022, 80% of members would welcome more specifications around the scenarios for future exercises. For instance, it was noted this could involve reflecting transition paths per sector associated with well-identified technical solutions and associated investment costs alongside European level target energy mix and transition policies. More work is also needed to support integration with relevant macro variables. In turn, this should support greater reliability and even more quantifiable outcomes.

Another consideration is comparability of the outcomes — for instance, by establishing a common understanding of severe but plausible scenarios. This will be important on an EU level in the near term and on an international level long term. When it comes to loss of nature risks, work is ongoing as part of the Taskforce for Nature-Related Financial Disclosure (TNFD), and it is within the remit of the NGFS future initiatives.

NGFS scenarios as a global baseline

Regulatory Outlook

Work of the NGFS

- The NGFS is now well-established as the leading international body driving climate scenario design. Since 2017, the organization has published three iterations of hypothetical scenarios to assess a range of physical and transition risks that could emerge in different futures. They were widely adopted by its members such as ECB and US Federal Reserve. Most recently, the Federal Reserve has deployed the scenarios in its CRST exercise. Moreover, the ECB is chairing the NGFS forum on new scenarios and spearheading work on creating a global baseline for banks with the NGFS.
- In 2023 the NGFS will update and improve the scenarios, adding more short-term scenarios to allow better alignment with banks’ capital planning. The NGFS is also looking into a region and parameter expansion. To that end, the NGFS is working on providing methodologies the industry can use to generate their own scenarios and clarify what is and isn’t considered in the scenarios.



Key questions for developing common industry standards for climate risk stress tests

AFME members especially rely on the NGFS long-term scenarios in tandem with several other scenario models, including those from the International Energy Agency, independent research company Enerdata, the National Institute of Economic and Social Research's Global Economic Model (NiGEM) macroeconomic model, and the REgional macroeconomic Model of INvestment and Development (REMIND). Some banks have created multiple scenario models from these global options. Nonetheless, there are a number of areas for improvement, also highlighted by our survey respondents, which should be addressed in future publications by the NGFS:

- Lack of short-term scenarios
- Insufficient regional granularity
- Insufficient range of scenario variables, in particular macro-variables
- Limited ability to -capture acute physical risks
- Provision of annual data as opposed to providing it every five years
- Limited granularity at sectoral level within scenarios

According to the regulatory outlook, it is highly expected that some of these limitations will be addressed in future publications.

Adaptation of scenarios at the EU level

Irrespective of the progress made on NGFS scenarios, there will be a continued need for both regional supervisors and banks themselves to supplement these scenarios to suit their needs. Even at the EU level as part of the ECB stress test, several specifications that were needed to feed into their stress testing framework were not readily available and several variables still needed attention in terms of calculation/deduction. These included assumptions of Euro area variables (GDP, inflation, interest rates), and assumptions for some specific variables at a country level (business investment, household investment, household consumption, employment, core inflation).

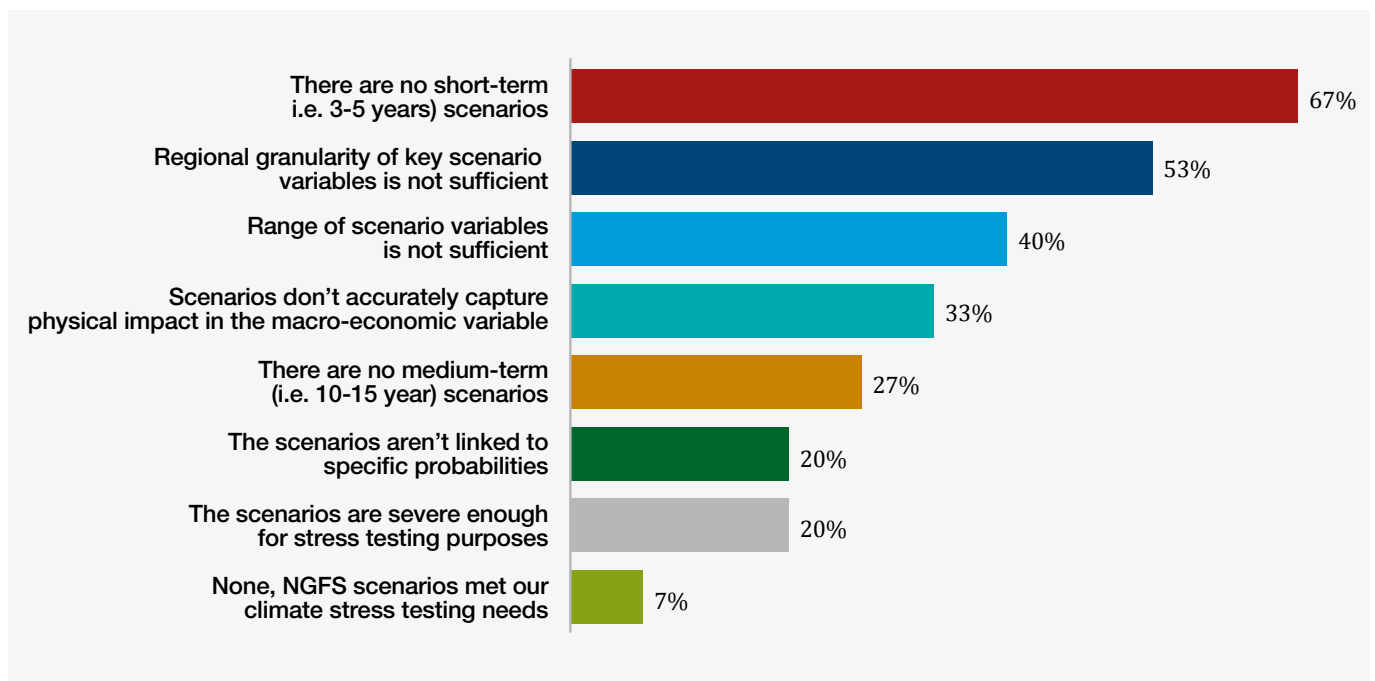


Figure 9: **Overview of survey results: Which of these do you see as material challenges and limitation of using the current NGFS scenario set for stress testing (Respondents could make several choices so the percentages do not add up to 100%)**



Key questions for developing common industry standards for climate risk stress tests

Since this exercise banks have also put in considerable effort to improve their internal scenario design. For instance, banks have used the ECB model as a baseline and added third party vendor models which are relevant to their most exposed portfolios to create more consistent macro scenarios and better understand the transmission mechanisms. Where banks have not built in-house scenarios, they currently follow regulatory mandates within ICAAP and the NGFS scenarios. Nonetheless, applying models from external vendors has proven challenging when developing comprehensive scenarios and applying the economic factors consistently. In addition, it was difficult to make a direct link between climate impacts at sovereign-level and impacts in the entire book.

For the short-term scenarios banks have largely developed in-house scenarios, for example looking at the impact of CO2 tax and using localised data vendors to assess flooding risk as part of an acute physical risk scenario. Generally, up until now short-and medium-term scenarios under physical risk are more meaningful in terms of capturing the uncertainties of occurrence and magnitude of physical impacts. If banks are expected to consider longer term physical risk scenarios, then more guidance will be needed on the projections.

For future EU exercises, AFME members would support the development of climate scenarios which incorporate macroeconomic variables in a more detailed and consistent way. For instance, in terms of macroeconomic variables, sovereign spread should be considered and defined at a more granular level to reflect country-level results. In this respect, granular scenarios for additional geographies especially in the “Rest of the World” category would also be helpful. Moreover, it will be necessary to understand the interplay between physical and transition risk scenarios. While banks are looking for support in the aforementioned areas, it is recognized that neither the NGFS nor the EU will be able to cover every variable or situation that will work for every bank business model or scope of portfolios. Thus, the development of scenarios will have to be a concerted effort in which banks continue to leverage supervisory scenario guidance, public and privately available data sources in specific areas like electric vehicles, and their own internal data.

Finally, while EU supervisors and banks are advanced in their adaptation of scenarios over the long term, it will be useful to ensure some level of global comparability especially regarding severe but plausible scenarios.

The impact of nature

Since financial supervisors and regulators embarked on getting a better understanding of climate-related risks, stemming from the work of the Taskforce on Climate-Related Financial Disclosure (TCFD), a further area of perceived risk has emerged regarding the impact of nature loss on climate, covering areas such as deforestation, freshwater preservation, and biodiversity loss. As a result of this, the Taskforce for Nature-Related Financial Disclosure (TNFD) was established to produce a framework for integrating the needs of nature into transition planning. The TNFD identifies that nature loss and climate change have “mutually reinforcing” relationships, given that events like deforestation increase greenhouse gas emissions.¹¹ Nature therefore plays a role in climate risk and will have material implications for financial assets. This was emphasized by Frank Elderson, a member of the ECB executive board, in his recent keynote speech citing the data of UN Environment Programme that shows that natural ecosystems and their vital services are currently suffering unprecedented decline. Three-quarters of land surface and 66% of ocean ecosystems have been damaged, degraded or modified, according to United Nations Environment Programme, while one million of the eight million existing species are in danger of extinction. This, in turn, affects more than half of the global gross domestic product, with business models that rely on nature.¹² In this sense, nature degradation is emerging as a material source of financial risk.

Elderson went on to note that nature-related risk is not fully integrated in the risk management practices of the vast majority of financial institutions. Yet nature degradation is perhaps one of the fastest-growing threats to global economic and financial stability. No industry can expect to meet decarbonization targets without addressing the adverse effects on climate change and financial institution portfolios of the loss of these natural assets. The recent AFME report on biodiversity loss acknowledges this same mutually reinforcing relationship and the need to address it.¹³

¹¹ The TNFD Nature-related Risk & Opportunity Management and Disclosure Framework (1st Beta Version, March 2022)

¹² Keynote Speech – Urgent and vitally important: 2023 as a key milestone in stepping up the management of climate and environmental risks (Frank Elderson, 27 March 2023)

¹³ Into The Wild: Why nature may be the next frontier for capital markets (November 2022, AFME)



Key questions for developing common industry standards for climate risk stress tests

Over time, and in line with the development of nature related disclosure and scenarios, nature-related risks should be integrated in the context of climate stress testing. In this respect it will be helpful to develop physical and transition scenarios that explain how nature-related risks elevate climate risks over short-, medium- and long-term horizons. Given nature is a relatively new consideration in the effort to control climate change, finding necessary data, methodology and scenario assumptions remain significant challenges for financial institutions and scenario providers alike. Based on the AFME survey, most respondents (53%) intend to include nature and biodiversity in their internal stress testing frameworks within the next two years. Around 7% have already integrated these risks holistically into their scenarios.

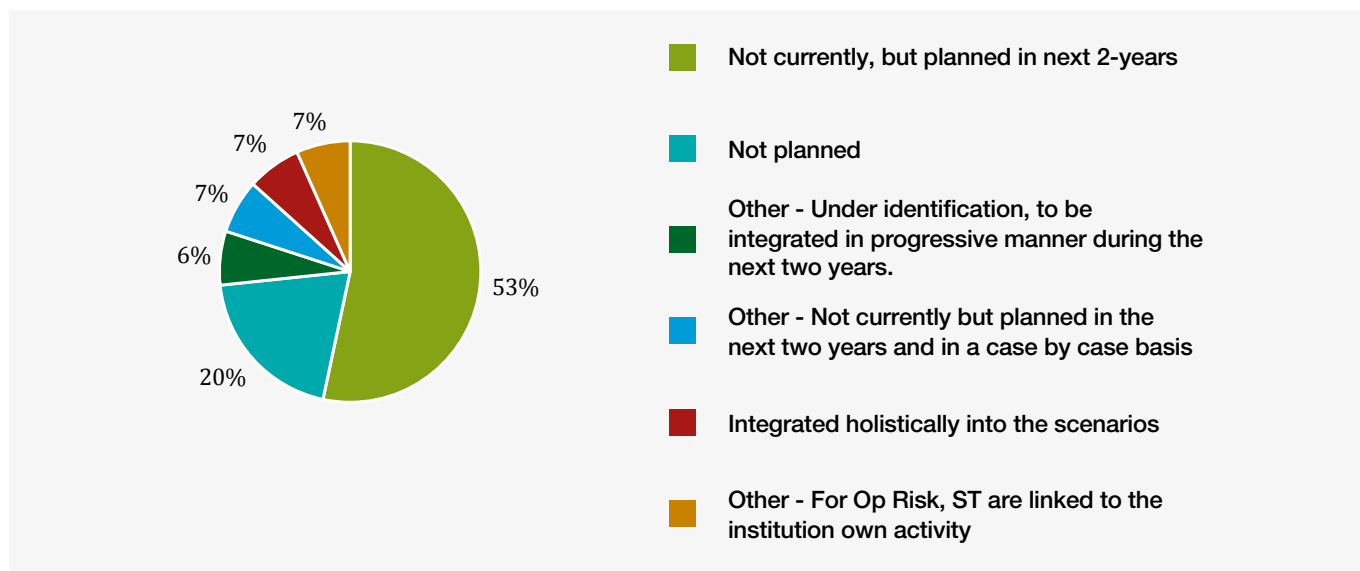


Figure 10: **Overview of survey results: How are environmental risk drivers, other than climate, considered so far? These include deforestation, freshwater preservation, and biodiversity loss.**

While nature-related risks are an important consideration closely interlinked with climate-related risks, the majority of banks are only in the early stages of considering them. One bank noted it had started to undertake an early materiality assessment of biodiversity risk at sectoral level, though they are still refining the process of data collection and collaboration with external providers. Banks also expect future NGFS scenarios to address nature as part of their scope. Overall, it is recognized that it would be useful to model and simulate impacts on nature, especially biodiversity.

From an EU perspective, it's understood the EBA will consider incorporating a nature-related element into the physical risk scenarios as part of the "Fit for 55" stress test in 2024. Nature is also part of the ECB's long-term plan, where they are similarly considering the physical risk scenarios. Despite the focus on physical risk, banks highlighted there could also be a reputational angle to explore as well.



4.1.1 Data

Summary of key findings:

- Sourcing of proxy data is still a major challenge, and further regulatory guidance on this would be welcome, building on insights already provided in the ECB good practice guide.
- Banks rely largely on external vendors to fill data gaps.
- Regulatory (i.e. CRSD) and industry data initiatives, slated to go live in the next five years, will lead to enhanced information to support stress testing exercises and improve their reliability. The increase in available data because of mandated disclosure should enhance risk and credit management at banks, giving them better visibility into their corporate customers and counterparties.
- Banks identified low data quality and lack of data as the biggest challenges to physical and transition risk modelling.

Intrinsically linked to the improvement of scenario design and the useful application of these is the ability of banks to source data, whether that be through their own internal data governance, third-party vendors, or publicly available sources. One of the ECB's key objectives in its 2022 CRST exercise was to understand what data banks had available or needed to source to undertake the climate stress test. This aspect of the exercise was not only a major challenge for banks, but also an important opportunity for banks to develop processes for collecting data across their organizations, and where necessary third parties, and deploying it effectively to understand the material risks to which they are exposed. In our initial survey of banks after the exercise, many areas of data collection and analysis were identified for further work, some of which are addressed in other chapters. However, the primary areas on which banks have focused efforts to improve data management include:

- Methodology and use of proxies
- Integration of ESG data governance across the internal infrastructure of banks to ensure efficient collection and management of internal and external data
- Scope and granularity of sectoral analysis (NACE codes)¹⁴

In addition to this, there are many regulatory data initiatives underway that will support bank efforts, including CSRD disclosures which will help banks understand their counterparties' emissions and significantly improve data availability and comparability. Banks will further be subject to enhanced Pillar III disclosure of climate related risks, which the EU has already embedded within the forthcoming CRR3 regulation. The Basel Committee on Banking Supervision (BCBS) will also produce a revision to the Pillar III framework later this year to develop high-quality and globally consistent climate-related disclosure. In addition to this, international efforts are needed, especially in emerging economies. The work of the International Sustainability Standards Board (ISSB) will be critical to this. Fundamental to these initiatives will be the need to ensure coherence and avoid duplication.

¹⁴ Our findings are covered under credit risk (cf page 33).



Key questions for developing common industry standards for climate risk stress tests

Data sourcing and use of proxies

For the ECB CRST exercise, two-thirds of banks used external data providers to support the exercise, mostly for missing data on counterparties and Energy Performance Certificate (EPC) proxies. Indeed, banks noted that the most challenging data points for credit risk data to input were EPCs followed by greenhouse gas emissions. Those that had data in-house noted much of the information and data had already been collected from data vendors to support existing climate-related work. Other information was sought from publicly available data — for instance, online corporate financial statements. All banks applied proxies for counterparty emissions and EPCs. Since this exercise, banks have continued to supplement their data collection and proxy methodology. Some of the effort has been a benefit to business. For instance, one bank enhanced its loan origination process to onboard relevant ESG data during the credit decision making process. In our survey, the banks also shared their views on the way they are planning to address or are already addressing the gaps in data coverage. A large majority of respondents had opted to rely on external data providers for climate (100%) and physical risk data (87%). Also, usage of simple proxies — such as by region, sector, and size — was employed by 93% of our respondents.

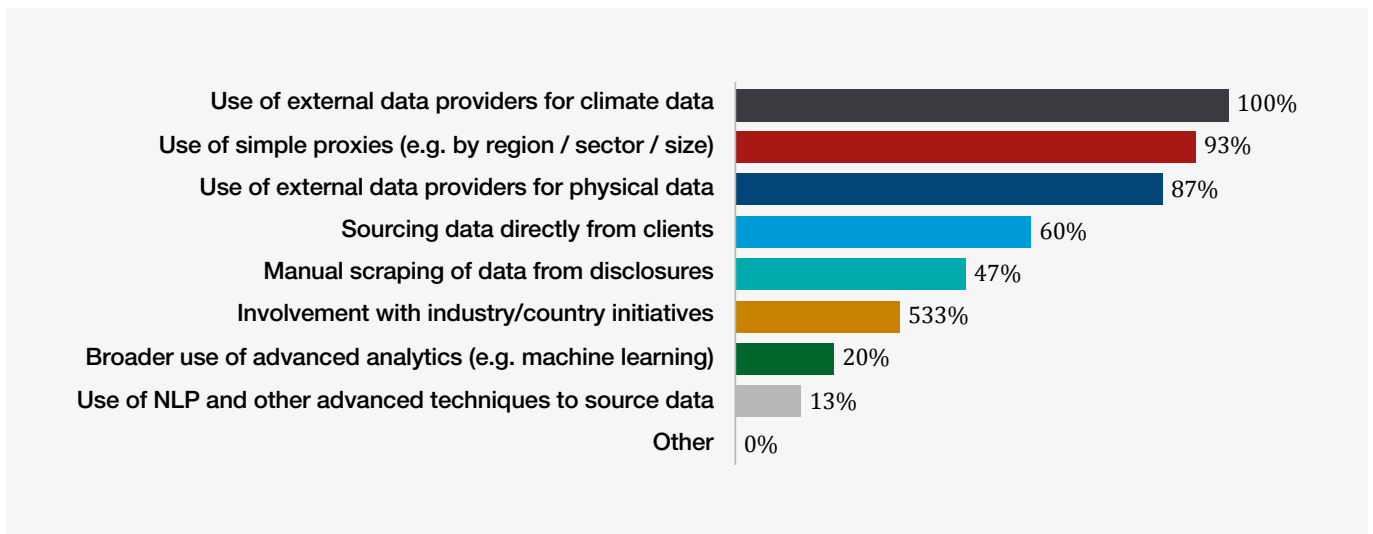


Figure 11: **Overview of survey results: How are you looking to address gaps in data coverage? (Respondents were allowed to make several choices so percentages do not add up to 100%.)**

As noted, CSRD¹⁵ will play a crucial role in supporting the data requirements for effective modelling of climate scenarios, however this will not be comprehensive and there will be a lot of necessary information outside of the CSRD scope for which commercial providers should be considered. For instance, CSRD will only apply to large corporations and public-interest undertakings with an average number of employees in excess of 500 and small and midsize enterprises (SMEs) listed on EU-regulated markets (not including micro-undertakings) and from 2025 to other large companies that are not currently subject to the NFRD (exceeding at least two of the three following criteria: 250 employees on average; EUR 40 million in turnover; balance sheet total of EUR 20 million). Not all counterparties are likely to fall under the CSRD disclosure requirements, though, especially for accessing sustainability-related information from entities or financial products out of the scope of the EU regulatory framework, meaning banks will still need to improve data sourcing in the interim through private initiatives among other sources.

15 DIRECTIVE (EU) 2022/2464 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL - CSRD (Official Journal of the European Union, 16 December 2022)



Key questions for developing common industry standards for climate risk stress tests

Regarding proxy data, banks have made progress in developing proxy approaches, but regulatory guidance would be appreciated. An area identified by both the ECB and banks as crucial to develop is EPC data collection. Banks that were surveyed after the ECB exercise noted around 65-90% of EPCs were proxied. The CRST exercise highlighted a lack of common definitions for EPCs, resulting in wide variations in the national application of EPCs, as well as variations in the availability of public EPCs at the national level. Banks noted that they are in the process of developing proxies to leverage EPC data collection and refining their methodology, based on the ECB good practice guide as well as developing new conservative methodologies to address uncertainties. It was also noted that, alongside EPCs, proxies for CO2 emissions and location data were challenging. This has since led banks to develop an internal model to retrieve proxies in the absence of actual data. While machine learning could be relevant for this it is not yet being applied.

Banks will continue to assess and refine their own approaches, and this is also a priority area for the ECB, which has already provided some useful indications of what banks should consider — especially in relation to EPC proxies. The ECB has indicated it will continue to provide guidance on data sharing and how to enhance proxies, particularly for Scope 1 and 2 emissions. In time, auditing of CSRD might also be considered necessary. Banks would welcome this guidance — particularly on how to develop internal proxies involving building information, their geolocations, and size.

ESG data governance

The ECB CRST exercise demonstrated to banks the need to centralise both incorporation of data into their systems and data quality review, so the data can be correctly used to assess quantitatively and then integrated into their credit risk management, among other areas. In the recent survey, low data quality and lack of data were called the biggest challenges to physical and transition risk modelling.

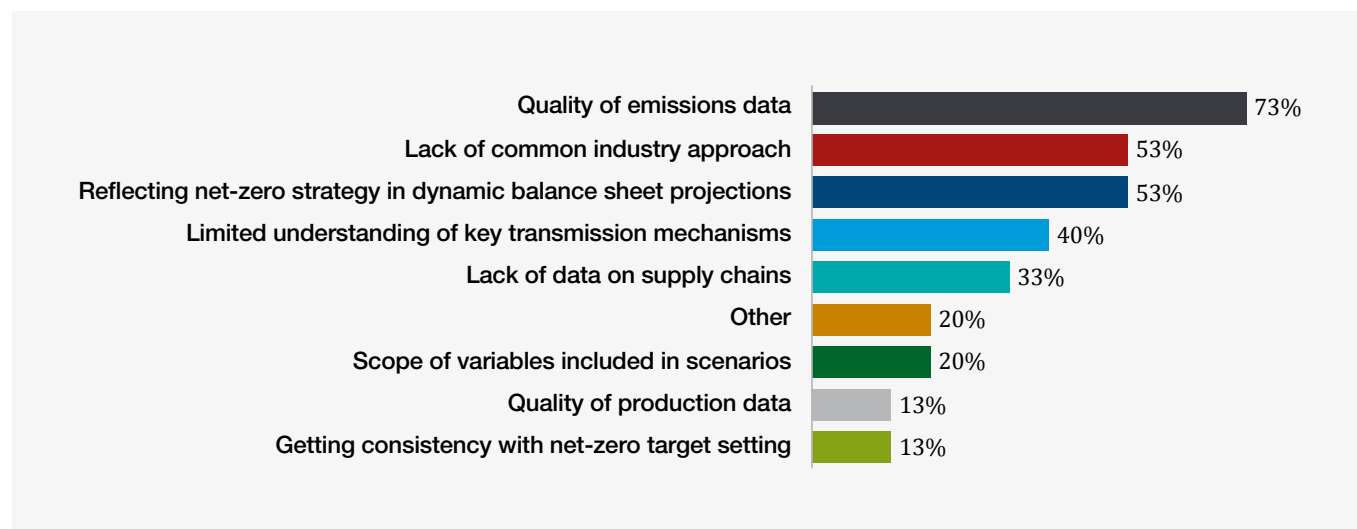


Figure 12: **Overview of survey results: What are the biggest challenges to transition risk modelling currently? Select top-3. (Respondents were allowed to make several choices so percentages do not add up to 100%.)**



Key questions for developing common industry standards for climate risk stress tests

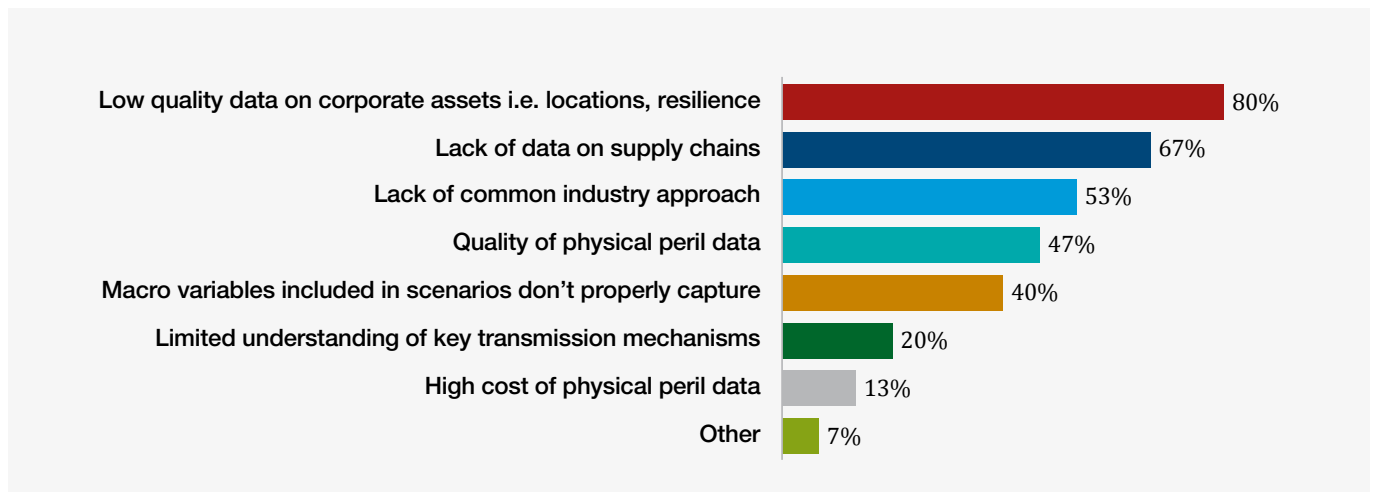


Figure 13: **Overview of survey results: What are the biggest challenges to corporate physical risk modelling currently? Select top three. (Respondents were allowed to make several choices so percentages do not add up to 100%.)**

This is still a work in progress for some firms – one noted that while governance is in place for EPC data which is managed at country level, there is no embedded governance structure internal model to measure the appropriateness of external/ publicly available data related to emission intensity.

All banks agree that it is useful to integrate disclosure requirements into their internal CRST frameworks. Some noted that they have established a clear ESG data governance, investing time and resources to develop adequate data collection models in compliance with relevant EU ESG frameworks. The same banks are now planning to integrate forthcoming CSRD requirements, including disclosures on greenhouse gas emissions linked to Scope 1, 2 and 3 as part of their internal strategy. This will be helpful in retrieving relevant historical data — such as data on energy use and CO2 emissions — from counterparties, which will also support adequate guidelines to assess double materiality.

“All banks agree that it is useful to integrate disclosure requirements into their internal CRST frameworks”



5. Analytical capabilities banks will need to deliver on climate risk stress tests

5.1 Credit risk

Summary of key findings:

- The main challenge associated with credit risk is trying to determine relevant metrics and materiality thresholds, as well as the lack of clarity on transmission channels.
- Banks support materiality thresholds to understand better the most affected credit risk portfolios.
- Since the ECB exercise, more banks now consider the International Financial Reporting Standard (IFRS) 9 model relevant and useful in scenario analyses to project short-term, future losses over one to three years (and possibly up to 10).
- It's important that regulators and firms don't take "one size fits all" approaches to climate scenario analysis. While richer client-level analysis is required in higher-risk sectors, simpler top-down approaches should be used for lower risk sectors.
- Mapping or reconciliation between regulatory (NACE) and market standards like the Global Industry Classification Standard should be undertaken on a regular basis.
- More than two-thirds of banks (67%) consider that climate risks should only be considered in Pillar II versus 33% considering these could potentially be covered in Pillar I in the long term once the risks are better understood.
- Some banks are considering a Pillar II overlay to account for climate-related losses.
- Integration of insurance coverage will require further work as it is not yet incorporated by all banks and further guidance is required.

Assessing credit risk is a fundamental practice for CRSTs, as the largest proportion of bank balance sheet assets represent corporate lending activities. In the context of CRST exercises, most jurisdictions assessed physical and transition risks to measure exposures of immovable and movable property collateral to the impacts of extreme weather events, and understand the effects of transition policies on credit quality and deriving exposures. However, the assessment of credit risk was mainly challenged by the absence of approaches used to determine relevant metrics and materiality thresholds, and by the lack of clarity of transmission channels for scenario assumptions under physical risk. It will therefore be necessary to develop more comprehensive scenario assumptions and practical credit risk parameters.

In our interviews with members, we already identified several good practices being deployed:

- Developing internal guidance on the second-order effect of insurance risk in its internal modelling, such as conducting research to identify climate insurance policies in various countries and relevant insights at the sovereign level. This would include looking at National Compensation Schemes (NCSs) and their alignment with ECB suggestions for best practices. Based on this, banks need to develop a more sophisticated approach, focusing on high-level assumptions on climate impacts before and after mitigation
- Establishing mechanisms for translating climate risks into macroeconomic scenarios
- Focusing on high-risk portfolios such as real estate and high-risk corporate sectors
- Collaboration with external model vendors to develop comprehensive scenarios and consistent application of economic factors



Analytical capabilities banks will need to deliver on climate risk stress tests

Transmission channels

Understanding the transmission of climate risks within credit risk still poses a considerable challenge for banks, especially when it comes to scenario selection and assessing transition risk. It is noted that transmission channels are still missing in some portfolios, such as unsecured retail, adding to the difficulty in assessing its climate related materiality.

IFRS 9 breakdown

In the survey conducted after the ECB stress test, members noted that the International Financial Reporting Standard (IFRS) 9 breakdown in the templates was burdensome and very granular. They suggested potentially removing it from future exercises. Banks note how challenging it is to use, particularly for long-term projection, as the model is most effective in calculations of two-year horizon losses. That said, members' views are evolving, and an increasing number of banks consider the IFRS 9 model relevant and useful to project short-term future losses over one to three and potentially up to 10 years. Some banks are already including climate and environment risk in IFRS 9 data (Figure 18) and seeing how to supplement, while other banks plan to explore this. Long-term development of the IFRS 9 model is needed to embed climate and environmental features, and further guidance would be welcome.

Sectoral-level analysis

As part of the ECB CRST exercise, banks were required to split their corporate exposures between 22 industries according to a pre-defined list of NACE sectors. While this exercise was a learning exercise, with the broad scope enabling the ECB to understand how well banks could undertake such an analysis and what sectors might be relevant, on reflection banks considered the scope of 22 NACE codes to be too broad and insufficiently granular in some areas. It is noted that many sectors are not sensitive to climate risk and therefore a wide range of NACE codes simply led to far greater additional reporting with limited added value or insight. Instead, banks would recommend focusing on the highest-emitting, most-exposed industries. By prioritizing these and industries benefiting from large credit portfolios, banks would be able to capture the most material risks.

More granular data will support scenario projection and is crucial to identify transmission channels. An additional improvement to support data consistency and an easier alignment across bank-internal systems would be a mapping or reconciliation between regulatory (NACE) and market standards, including the Global Industry Classification Standards (GICS) and the Bloomberg Industry Classification Standards (BICS), on a regular basis.

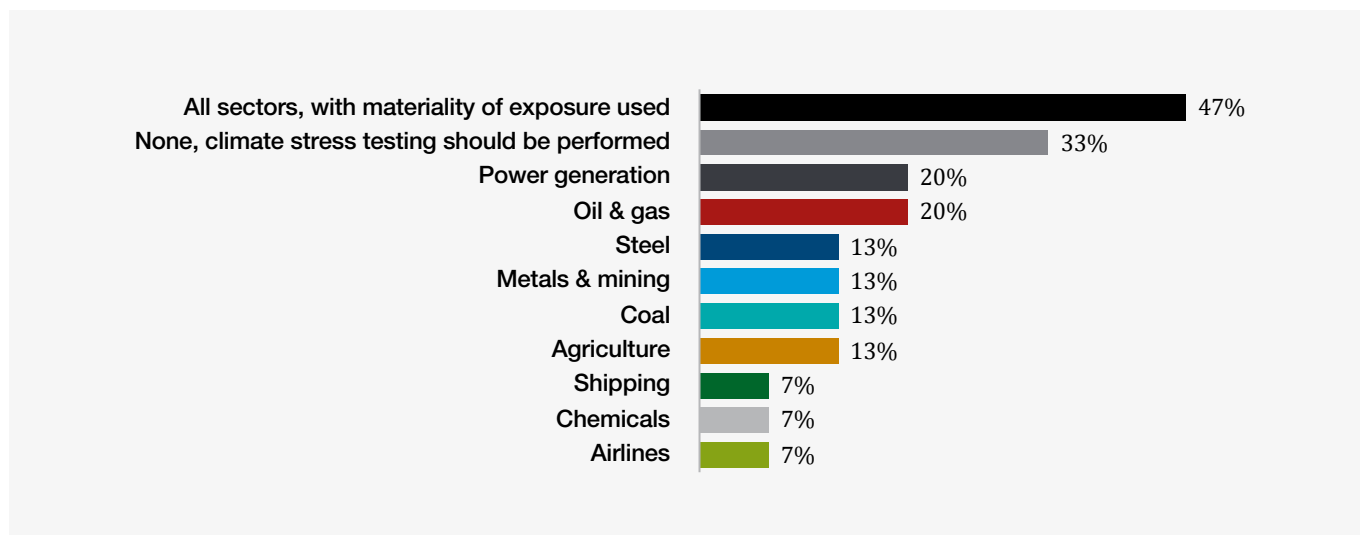


Figure 14: **Overview of survey results: Which sectors do you believe that counterparty-level analysis is useful? (Respondents were allowed to make several choices so percentages do not add up to 100%.)**



Analytical capabilities banks will need to deliver on climate risk stress tests

One further consideration related to counterparty analysis is whether CRST exercises could include counterparty specific analysis. Unlike the ECB exercise, a key design difference in the Bank of England’s Climate Biennial Exploratory Scenario (CBES) exercise was the requirement for participants to make granular assessments of their largest counterparties net-zero transition plans. While UK banks found assessing counterparty transition plans as complex as EU banks, it is worth noting that the exercise potentially led to more direct engagement with their most affected clients. Six out of 10 UK banks surveyed strongly agreed that the exercise enhanced their management of climate-related risks, including the engagement of counterparties on their vulnerability to climate change.¹⁶ Consequently, one bank has enhanced its internal capability to retrieve emissions data from counterparties, focusing on high-emitting sectors, such as the automotive industry. In contrast, most EU banks noted they were yet to engage directly with specific clients following the ECB CRST exercise (Figure 18).

Pillar II overlays

All banks surveyed considered it too early to embed climate risks into Pillar I, there are mixed views on Pillar II treatment such as applying an overlay. One bank noted that the inclusion of climate and environment data in IFRS 9 might be enough for banks and insurers to capture actual climate-related losses. Other banks are considering mechanisms for translating climate risk into macroeconomic scenarios to avoid double counting liabilities.

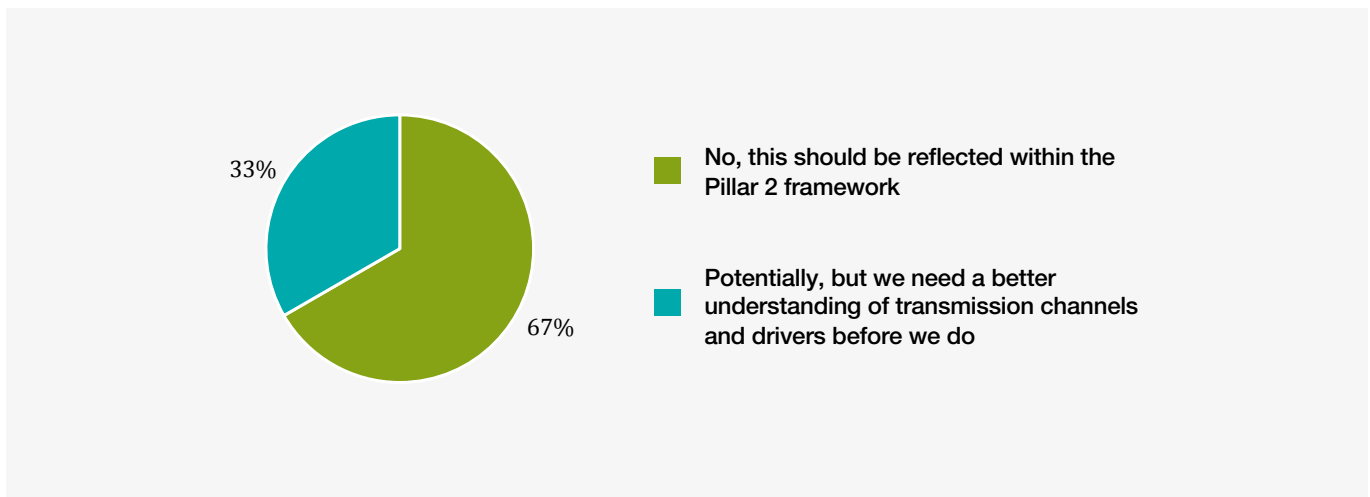


Figure 15: **Overview of survey results: Do you think climate risk should be included within the Pillar I capital framework?**

Insurance coverage

A further area of work is the need for guidance on how to integrate insurance coverage in climate stress tests, particularly for real estate portfolios and to capture physical risk, as a potential important mitigant. One bank has developed an advanced approach to account for insurance coverage by conducting detailed research to identify climate insurance policies in various countries. After gathering relevant insights at region level, banks looked at National Compensation Schemes (NCSs) to integrate to the climate stress test as an additional mitigant, which are aligned with the ECB good practice guide. Based on this approach, the bank came up with more sophisticated high-level assumptions on climate impacts before and after mitigation. Another bank has also developed guidance on second-order effect in their internal model but notes it would still be useful to have guidance on how and when to consider insurance coverage. Because of the difficulty integrating models, some banks have not yet taken insurance into account when gathering data.

¹⁶ Cf page 21 <https://www.cgfi.ac.uk/wp-content/uploads/2023/03/CBES-Reports-Survey-Report.pdf>



5.2 Market Risk

Summary of key findings:

- The ECB exercise did not sufficiently cover market risk. Nonetheless, banks expect it to be important in the development of meaningful scenarios for short-term shocks and for market risk stress testing.
- Banks themselves are putting considerable resources into market risk scenario analysis and would appreciate more supervisory guidance and support as they develop trading book scenarios. The ECB and EBA should consider developing a separate approach to climate impacts on market risk which focuses specifically on more realistic short-term shocks.
- The scope of market risk exercises should be adapted and broadened in the future to include commodities, sovereigns, and counterparty credit risk.

In reflecting on the ECB CRST exercise, it is broadly acknowledged by both banks and the ECB that the exercise was simplistic and provided little meaningful analysis. In terms of scope, for instance, it only covered equities and bonds issued by non-financial corporations. Nonetheless, the ECB is one of the very few jurisdictions that has sought to analyse market risk, even though the credit risk was prioritised. Banks would be supportive of the ECB developing a more sophisticated approach to market risk analysis that they can leverage internally. Indeed, even in the absence of a regulatory approach being developed, some banks plan to improve and run internal analysis of climate impacts on market risk over the next year.

A more effective approach for climate stress testing of market risks

When assessing for market risk, all members agreed that the most meaningful type of shock would be a short-term one with of up to a five-year horizon. A long-term one would be irrelevant, given the constantly evolving nature of the trading book and the ability of banks to hedge such risks. Indeed, it has been suggested that future climate risk analysis of the trading book should follow a similar approach to normal solvency testing through a separate exercise. Banks also suggested increasing the shock granularity — similar to an STE quarterly exercise—to allow for an easier mapping of sector and risk factors and use of more severe scenarios.

Regarding the scope of the scenarios and portfolios, banks would support this being broadened. For instance, it would be useful to integrate commodities and counterparty risk, including a counterparty default scenario. It would also be of interest to assess investment portfolios of banks with sovereign debts and related debts to assess the country-level impact and sensitivity.

Finally, as noted in previous chapters, the mapping of trading book exposures was very challenging in the ECB stress test, and even what was done was not granular enough to perform a meaningful analysis. For instance, there was a lack of differentiation between renewable and non-renewable energy sources. Future exercises using NACE codes should be more specific.



5.3 Operational risk

Summary of key findings:

- Banks are taking different approaches to developing an understanding of climate risk on operational and reputational risks, although operational and reputational risk are generally considered to be linked to business risk. Data on litigation cases will be important to better understand the impact of climate risks on operational risk, for instance, banks could build a database of climate-related litigation cases as per the CFRF guide or alternatively build scenario analysis which uses both a time series of litigation and a “what-if” analysis on risk events.
- Assessing operational risk is impacted by some banks’ resources.

Similar to market risk, the ECB has not produced further guidance on operational risk since its CRST exercise last year. This is because the exercise was limited in scope and qualitative in approach. Despite this, some banks have still reflected in the interim on the nature of operational risk and how it may be impacted by climate risks.

Generally, banks consider operational and reputational risks as connected to business risk. However, banks take different approaches to operational and reputational risks, and some see them as a second-level risk. One bank even noted it put reputational risk under credit risk as part of the loan origination process. Another bank approached reputational risk from a greenwashing perspective. It was also noted by survey respondents that reputational risk is more difficult to address as it depends on the overall perception of business environment. For instance, the importance of reputational risk can rise and fall based on the legal framework and litigious nature of the country in which a bank operates.

Development of advanced approaches to climate risk stress testing of operational risks

In terms of how banks are looking to analyse operational risk, some banks are supportive of a more advanced approach using modelling, even though the ECB opted not to in the CRST exercise. Indeed, one bank has already undertaken this analysis by hypothetically applying the effects of the Climate Risk Financial Forum (CFRF) litigation cases on their own book to gauge the operational risk.¹⁷ The same bank has also engaged its climate risk management team and compliance team to create an overview of potential litigation cases that could arise from climate risks, such as greenwashing cases and their potential impacts. Other banks concur that it would be useful to assess the magnitude of the risk from climate-related financial litigation based on the CFRF case studies and cases brought in other jurisdictions.

But doing this is not easy. Climate litigation must be assessed on a case-by-case basis. It also could take years to create a litigation data set which is statistically robust and fully representative of potential future damaging events. An alternative method could be to use a scenario analysis approach, including both a time series of litigation and a “what-if” analysis of risk events.

Given limited resources, not all banks have committed to focusing on operational and reputational risk, concluding that the framework provided by the ECB was sufficient.

¹⁷ <https://www.fca.org.uk/publication/corporate/cfrf-guide-2022-scenario-analysis-working-group-climate-litigation-risk-chapter.pdf>



5.4 Liquidity and funding risk

Summary of key findings:

- Although the ECB and other EU regulators have not cited any plans to consider liquidity and funding in future stress tests, this is a risk driver which some banks are at an early stage of evaluating as part of their internal analysis.
- Liquidity and funding climate risks are also linked to operational and reputational risk and should be considered alongside them.

Future incorporation of liquidity and funding into the climate risk stress test framework

Banks that are considering incorporating climate-related liquidity and funding risks into the European stress test context are all at early stages of tackling the challenge through internal exercises (Figure 3). It is recommended that such risks should be treated separately from supervisory-run CRSTs as they are different from other risk types related to the ICAAP. Liquidity risks are more likely focused on a short-term time horizon, given that deposits would be one of the main transmission channels for both physical and transition risks. In terms of scenarios, physical risk scenarios should be based on acute weather events, whereas transition risk scenarios must focus on potential policy changes related to reducing CO2 emissions that have implications for a bank's business model or the business models of its corporate customers. A majority of the banks surveyed highlighted the close link between liquidity and funding risks and reputational/liability risk.

It was also observed that the operational and reputational elements could likely feed into both liquidity and net interest income and therefore would be relevant to consider alongside other material financial risk types (except market risk) in future internal climate risk assessment.

CASE STUDY: Considerations for liquidity risk in the Federal Reserve's CRST exercise

Other regions are currently exploring liquidity risk as well as other risk types not included in the typical stress test. In a recent report reviewing the Federal Reserve's approach to the 2023 climate risk stress testing¹⁸, the Federal Reserve Bank of New York provided evidence about how climate risk affects liquidity and key considerations that account for the impact.

In this context, bank's deposit withdrawals were studied as a channel through which banks and communities might experience the impact of climate on liquidity. It is assumed that substantial climate shocks would impair the operation of banks in specific geographical locations by causing large withdrawals by households — either because of depositor panic or need after a climate-related catastrophe like a severe storm, flooding, or fire. This can destabilize bank funding and reduce the supply of financing for corporates. Such crises will carry both operational and reputational implications for geolocated banks.

The New York Fed recognizes that climate-related liquidity risk assessment is still in its infancy and argues that more research is required to quantify the effects of physical climate risks on deposits and loans.

For assessment of transition risks, it is crucial to look at the effect of a potential carbon tax on funding costs for banks that are significantly exposed to depositors in oil-producing regions. This would be helpful to explore how carbon reduction policies can raise liability risks associated with fossil fuels funding.

Finally, the New York Fed stressed that it is useful to study the extent to which climate-related liquidity risks might be correlated across banks, giving regulators and the industry a perspective on how it might affect a nation's or region's financial stability.

¹⁸ Climate Stress Testing (Federal Reserve Bank of New York, April 2023)



6. How climate risk stress testing output can be used by banks and regulators

6.1 Overarching considerations for embedding climate risk stress testing

Climate risk stress testing has become increasingly important as financial institutions are starting to consider or are already incorporating the CRST outputs in both their risk management frameworks and their business strategies. The integration of climate risk stress testing outputs has wide-ranging implications for banks and regulators, touching upon various aspects of their operations and decision-making processes. These include risk appetite frameworks, capital requirements, provisioning calculations, client engagement, loan pricing, credit decisioning, net-zero commitments, strategic planning, and the development of new financial products and services. As climate change continues to pose significant challenges to the financial sector, it is crucial for banks and regulators to effectively utilise climate risk stress testing outputs to address these risks proactively. Through continuous improvements in stress testing methodologies and the integration of outputs in various aspects of their operations, banks and regulators can contribute to building a more resilient and sustainable financial system capable of weathering the impacts of climate change. In the following we will be exploring the current status of the main challenges, good practices, integration prerequisite, and timeframes observed.

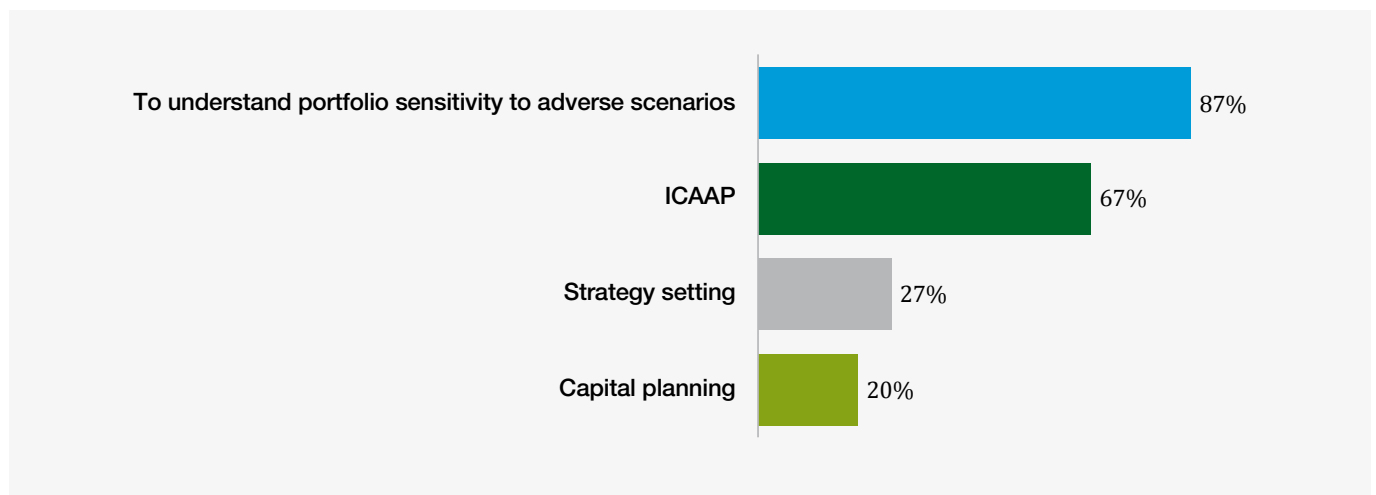


Figure 16: **Overview of survey results: How do you use results of supervisory climate risk stress tests internally? (Respondents were allowed to make several choices so percentages do not add up to 100%.)**



How climate risk stress testing output can be used by banks and regulators

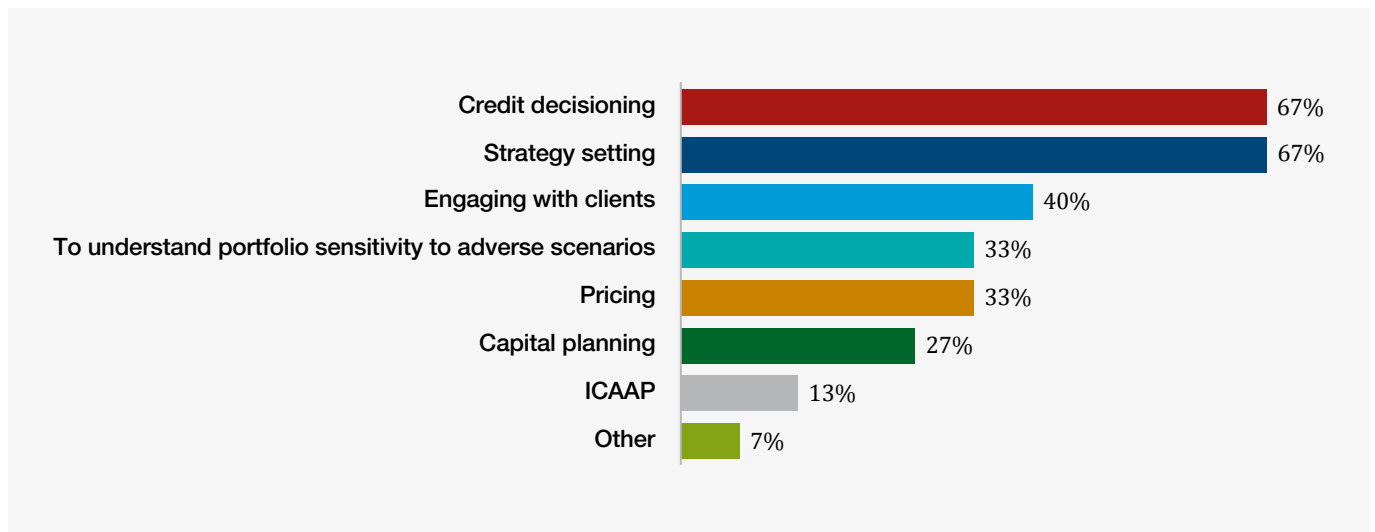


Figure 17: **Overview of survey results: Are there any use cases which you don't currently use climate risk stress testing output for currently, but intend to within the next two years? Select as many as applicable. (Respondents were allowed to make several choices so percentages do not add up to 100%.)**

6.2 Risk appetite

Incorporating climate risk stress testing output into banks' Internal Capital Adequacy Assessment Process (ICAAP) and Pillar II risk appetite frameworks is essential to ensure banks maintain adequate capital buffers to withstand climate-related risks. This involves:

- Aligning the risk appetite with the identified vulnerabilities from climate stress testing to ensure that the bank's risk tolerance is consistent with its exposure to climate risks.
- Setting appropriate risk limits and capital buffers that take into account the potential impact of climate risks on the bank's financial performance and stability.
- Regularly reviewing and updating the risk appetite framework in light of evolving climate risks and stress testing results, to maintain a dynamic and responsive approach to risk management.
- Enhancing communication and reporting on climate risk appetite to internal and external stakeholders, to promote transparency and accountability.

The integration of climate risk stress test results in the ICAAP is one of the first building blocks in the integration of climate-related risk drivers in risk management. While it is more advanced in the credit risk area, banks are increasing the scope over further risk types, e.g. market, operational risk and are including further risk types in the scenario analysis (Figure 3). One frequent observation made when looking into reputational and business/strategic risk, where climate-related risk drivers are deemed to be material is that no overall quantitative calculation is available, and we observe institutions including qualitative and expert judgment when deriving buffers and risk appetite setting.



6.3 Capital requirements and integration in Pillar I parameters

Climate risk stress testing results can be used to inform the development of more risk-sensitive capital requirements under Pillar I. Already reflected in the BCBS FAQs on climate risk, there is an appetite for integrating these results into banks' regulatory capital calculations. Regulators can then promote a more forward-looking approach to capital adequacy that reflects the potential impact of climate risks on banks' balance sheets. Possible ways of integrating the climate risk stress test results may involve:

- Adjusting risk-weighted assets (RWAs) based on the results of climate risk stress tests to better capture the potential impact of climate risks on asset values and credit risk.
- Introducing new capital buffers, whenever this risk turns out to be material in the considered time horizon, specifically designed to address climate risks. This would provide additional capital resources to banks in the event of climate-related shocks.
- Encouraging banks to develop internal models that incorporate climate risks into their capital calculations, to promote a more granular and accurate assessment of these risks.
- Periodically reviewing and updating the Pillar I regulatory framework to ensure that it remains responsive to evolving climate risks and stress testing methodologies.

While a global approach to the handling of climate-related risk drivers in the regulatory regime is welcomed, especially by international banks, the effort is highly controversial. More than two-thirds of our survey, as well as many others in the financial community and among European regulatory authorities, argue that the climate scenarios should be treated as sensitivity analyses informing the Pillar II steering capabilities. They are currently not reconcilable with the existing Pillar I framework. Regulatory guidelines are expected, which could provide more guidance to financial institutions and align with an increasingly global approach.

6.4 Provisioning

Integrating climate risk stress testing mechanics into IFRS 9 provisioning calculations can help banks better anticipate and prepare for potential loan losses arising from climate-related events. This involves incorporating climate risk scenarios into the expected credit loss calculation, which will allow banks to set aside more accurate provisions for future credit losses associated with climate risks. This involves:

- Incorporating climate risk scenarios and risk drivers in forward-looking information mechanics
- Ensuring that climate risk factors are appropriately reflected in the lifetime credit risk parameters of ECL (Expected Credit Loss) models
- Regularly reviewing and updating ECL models to account for new information on climate risks, as well as advances in climate risk modelling and stress testing methodologies
- Enhancing disclosure of climate risk-related provisions to provide investors and other stakeholders with a clearer understanding of a bank's exposure to climate risks and its potential impact on financial performance

The lifetime perspective in IFRS 9 becomes appealing when thinking of CRST integration. Our survey shows that almost half of our respondents would consider inclusion of climate risks in the IFRS 9 ECL modelling only after the methodological clarity is achieved (Figure 18). This would lead to IFRS 9 being the next in line after ICAAP integration. This result is representative to the latest survey performed by ECB on novel risks¹⁹.

But there are still a handful of unanswered questions around global standards. For instance, with IFRS 9, regulators need to deal with ensuring an unbiased view, no effect double counting, and the procyclicality of the IFRS 9 framework.

¹⁹ <https://www.bankingsupervision.europa.eu/press/blog/2023/html/ssm.blog230526-29af0452d6.en.html>



How climate risk stress testing output can be used by banks and regulators

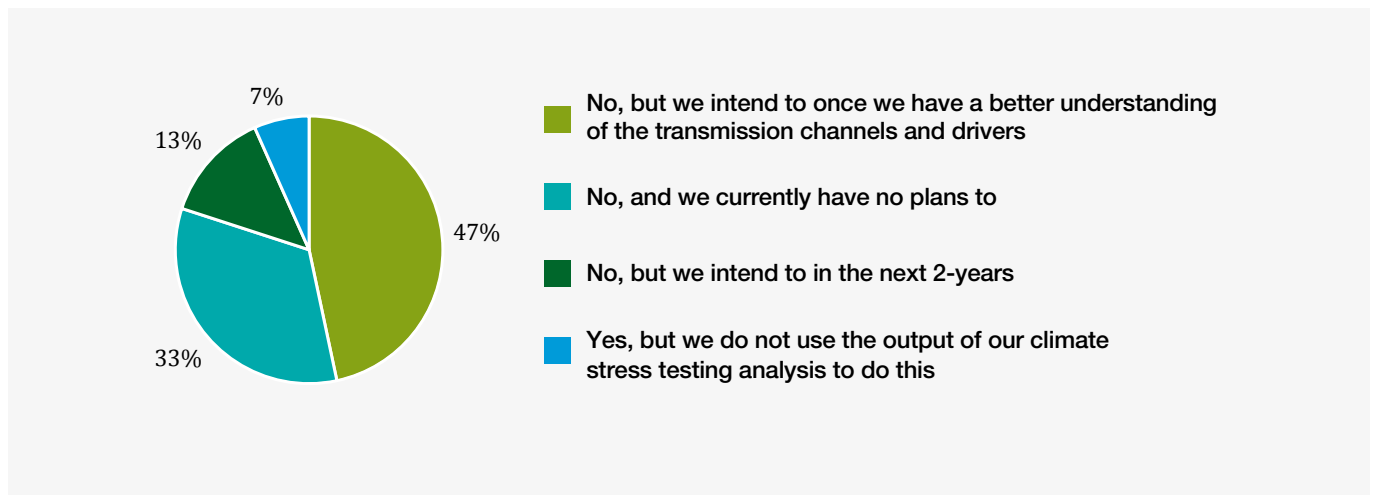


Figure 18: **Overview of survey results: Do you consider climate risk with your IFRS9 expected loss modelling?**

6.5 Client engagement

Banks can use climate risk stress testing results to support the business, particularly regarding providing a better understanding and clear guidance on portfolio sensitivity. By discussing the implications of climate risks and the results of scenario analysis, banks can:

- Help clients identify potential vulnerabilities in their operations and supply chains, and support them in developing strategies to mitigate these risks
- Encourage clients to adopt best practices in climate risk management, including setting science-based emissions reduction targets and improving the resilience of their operations to climate-related disruptions
- Monitor and report on clients' progress in implementing their transition plans, to ensure continued alignment with banks' own climate risk management objectives and regulatory requirements

This kind of conversation with business is considered relevant by more than a third of our member banks. Banking supervisors are interested in client engagement, especially since it could help drive the climate transition. It also helps banks resolve data challenges, especially when reporting requirements, such as the CSRD disclosures, come into play.



6.6 Credit decisioning

Incorporating climate risk stress testing output into loan pricing and credit decisioning processes can help banks more accurately price climate risks and make better-informed lending decisions, banks can:

- Ensure they appropriately price loans and allocate capital to clients based on their exposure to climate-related risks, rewarding clients with lower risk profiles and encouraging risk mitigation efforts, through new products, for example.
- Develop more sophisticated credit risk assessment methodologies that take into account various climate risk scenarios, providing a more comprehensive view of clients' risk exposure
- Monitor the evolution of climate risks in their loan portfolios, enabling them to adjust their credit strategies and risk management practices as needed
- Enhance the transparency of their loan pricing and credit decisioning processes, providing clients and investors with a clearer understanding of the bank's approach to managing climate risks

Risk-based pricing is the backbone of responsible loan book management and incorporating climate risk drivers over the lifetime of the financial instrument is meaningful. Data availability remains one of the primary challenges. There is a tradeoff of including climate risk drivers automatically in pricing methodology that leads to disadvantages, especially for the first movers. When incorporating the outside-in-view in pricing, not only is a new component introduced, but new methodology also needs to be developed. With so many uncertainties, it is understandable why the integration is moving cautiously. According to the survey, around 33% of the participating banks are planning to integrate climate risk components into pricing over the next two years.

6.7 Supporting net-zero commitments and integration in strategy

Climate risk stress testing results can be used to inform bank strategies and support their commitments to achieving net-zero emissions. A meaningful scenario framework that includes a detailed view into portfolio commitments with timeline specifics is crucial for the integration of dynamic balance sheet assessment in the long-term scenario analysis. By understanding the potential impact of climate risks on their operations and clients, banks can:

- Develop strategies in accordance with their net-zero commitments and support the long-term planning with scenario analysis
- Reduce their own emissions by setting ambitious reduction targets, improving the energy efficiency of their operations, and supporting the adoption of low-carbon technologies by their employees and clients
- Incorporate climate risk considerations into their governance structures and decision-making processes, ensuring that climate risks are adequately addressed at all levels of the organization

This ying-yang connection of climate risk stress testing and the net-zero commitment setting is one of the commonly mentioned topics in the conversations with the member banks. Around 27% of the institutions are already utilizing scenario analysis in strategy setting and over 67% are planning to do so in the next two years. Some institutions used the ECB stress test in 2022 for workshop-based discussions with the business lines and have continued these since. Ultimately, the ECB stress test results can help inform bank transition plans so banks must take every opportunity to disseminate data throughout business lines to improve plans and the results from subsequent stress tests.



6.8 Other

Additional uses of climate risk stress testing and scenario analysis include:

- Informing the development of new financial products, such as green bonds or sustainable loans, which help banks and their clients transition to a low-carbon economy. By understanding the climate risks associated with different sectors and geographies, banks can tailor their product offerings to better address these risks and support sustainable development;
- Enhancing disclosure of climate risks by banks, as required by regulatory bodies and investors, to improve transparency and promote better risk management. Climate risk stress testing results can provide valuable insights into banks' exposures to climate risks, which can be used to inform their reporting under frameworks, such as the CSRD; and
- Supporting banks in developing their own climate-related risk assessments to improve their understanding of potential vulnerabilities and strengthen their risk management processes. By regularly conducting and updating these analyses, banks can stay abreast of the latest developments in climate risk modelling and ensure their risk management frameworks remain robust and responsive to changing conditions.



Conclusion

This report and the results of the survey of members demonstrate the considerable progress made by banks in the year since the ECB 2022 exercise to build up their stress testing capability in the field of climate risk. While climate risk stress testing and scenario analysis are still in a learning phase, a consensus between regulators, supervisors, and banks supports stress testing as the best approach to understanding how climate risks are likely to evolve and impact bank balance sheets. Establishing a harmonized data framework, which reflects both the impact on banks and their clients, will be central to producing a more reliable understanding of the transmission of climate risks. Completion of this kind of framework is expected within the next few years.

In collating this report, AFME and Oliver Wyman used both data and interview insights from EU and international banks and also the EU supervisory and regulatory community to assess the common challenges and how to tackle them. This demonstrates the willingness of all parties to work together to improve the process.

At present, the EU is one of the leading regulators in terms of its ambition for developing and prioritizing the assessment of climate risks through stress testing. But international regulators in other jurisdictions have also recognized the importance of climate risks and are moving quickly to develop their own capacity to run this kind of stress tests. It will therefore be extremely important for the global community to come together to leverage the best practices and lessons emerging from the work to help drive compatibility and comparability. Climate risks present a global challenge and threat and we must work together to mitigate and eliminate them.

“At present, the EU is one of the leading regulators in terms of its ambition for developing and prioritizing the assessment of climate risks through stress testing”



Annex: Summary of key recommendations

- **Future regulatory CRST exercises should run at a minimum every 2 years and leverage off the experience of the ECB 2022 exercise.** Half of the survey respondents share this view, considering bi-annual to be an appropriate frequency for running regulatory CRST.
- **Banks support the 'Fit for 55' exercise in 2024 but early clarity on the process and data requirements would be welcome.**
- **Future regulatory stress tests should consider interaction with other supervisory initiatives and banks internal obligations.** 87% of banks surveyed already plan to run internal stress tests every year. While it is too early to integrate regulatory stress tests into normal solvency stress testing, lessons could be drawn from other jurisdictions' experiences. Around 73% of our respondents stressed that integration of CRST into the solvency stress test is only thinkable after ensuring that the methodology, scenarios, and data for are sufficiently advanced.
- **Future regulatory CRST exercises should continue to concentrate around three main risk types – (credit, market, and operational) – even though some survey respondents already include additional risk types, such as liquidity, reputational risk, or IRRBB.**
- **While NGFS scenarios provide a good global baseline for banks, there will continue to be a need for banks to integrate their own data and relevant scenarios to support meaningful and quantifiable scenario analysis. Banks are already moving forward on this.** Most banks mainly require shorter-term scenarios, more regional granularity of key variables, and a wider range of scenario variables in future scenario model versions.
- **Scenario providers and regulators should focus on how nature-related risks can aggravate climate risks and provide physical and transition scenarios that demonstrate the interconnection over short-, medium- and long-term horizons.** More than half (53%) of the participating banks intend to consider nature and related risks into scenarios over the next two years, but this is dependent upon the development of relevant scenarios that is underway in the NGFS. It is important this is analysed in an integrated way with climate and reflects the work of the TNFD, recognizing that there is still much progress to be made with nature-related disclosure.
- **Future regulatory CRST exercises should focus on short-term horizons of 3-5 years.** While challenging, almost half of members support also **maintaining a 30-year long-term horizon** and introducing **medium-term horizon of 10 years.**
- **A dynamic approach for long-term transition risk is preferable but challenging, on the other hand a static balance sheet approach is deemed more appropriate for short-term scenarios.**
- **Sourcing of proxy data is still a major challenge and further regulatory guidance on this would be welcome.** Additionally, **CSRD will also help to address data gaps, though banks will still need to rely on external data providers and use their own initiatives to source client-level data.** A large majority of respondents have opted so far to rely on external data providers for climate (100%) and physical risk data (87%). Also, usage of simple proxies, such as by region, by sector, and by size, is employed by 93% of respondents.



- **Regarding credit risk assessment, future CRST exercises should consider a smaller scope of NACE codes, focusing on the most exposed sectors and highest emitters as well as a more granular breakdown.** In this sense, 87% of banks support the introduction of materiality thresholds based on exposure and climate “riskiness” to identify the most vulnerable portfolios in future exercises.
- **The IFRS9 model is relevant and should be maintained in future regulatory CRST exercises.** Most respondents find the model particularly useful to project short-term losses—those three-to five years out and possibly up to 10 years.
- **For market risk assessment, stress testing climate risk could be done as a separate exercise, and the scope of market risk exercises should be broadened in the future to include commodities, sovereigns, and counterparty risk.**
- **For operational risk, policymakers should explore litigation cases to better understand the impact of climate risks in future regulatory CRST exercises.** Whether they do or not, banks are taking different approaches to on the impact of climate on operational and reputational risks.
- Although the ECB and other EU regulators have not cited any plans to consider liquidity and funding in future stress tests, they are important risk drivers for banks, and some are already considering doing some testing. **Some support the analysis of short-term liquidity and funding on the liability side and recommend linking both risks to operational and reputational risk.**
- **For now, regulators should only consider climate risks in Pillar II provisions.** This is supported by two-thirds of participating banks. The other third said they would consider a Pillar I coverage over the long term once the risks are better understood. **Most respondents still use supervisory climate risk stress testing results primarily to understand portfolio sensitivity and as part of their ICAAP,** rather than capital planning, business strategy setting, and credit decisioning among other possible purposes.



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We advocate for deep and integrated European capital markets which serve the needs of companies and investors, supporting economic growth and benefiting society.

We aim to act as a bridge between market participants and policy makers across Europe, drawing on our strong and long-standing relationships, our technical knowledge and fact-based work.

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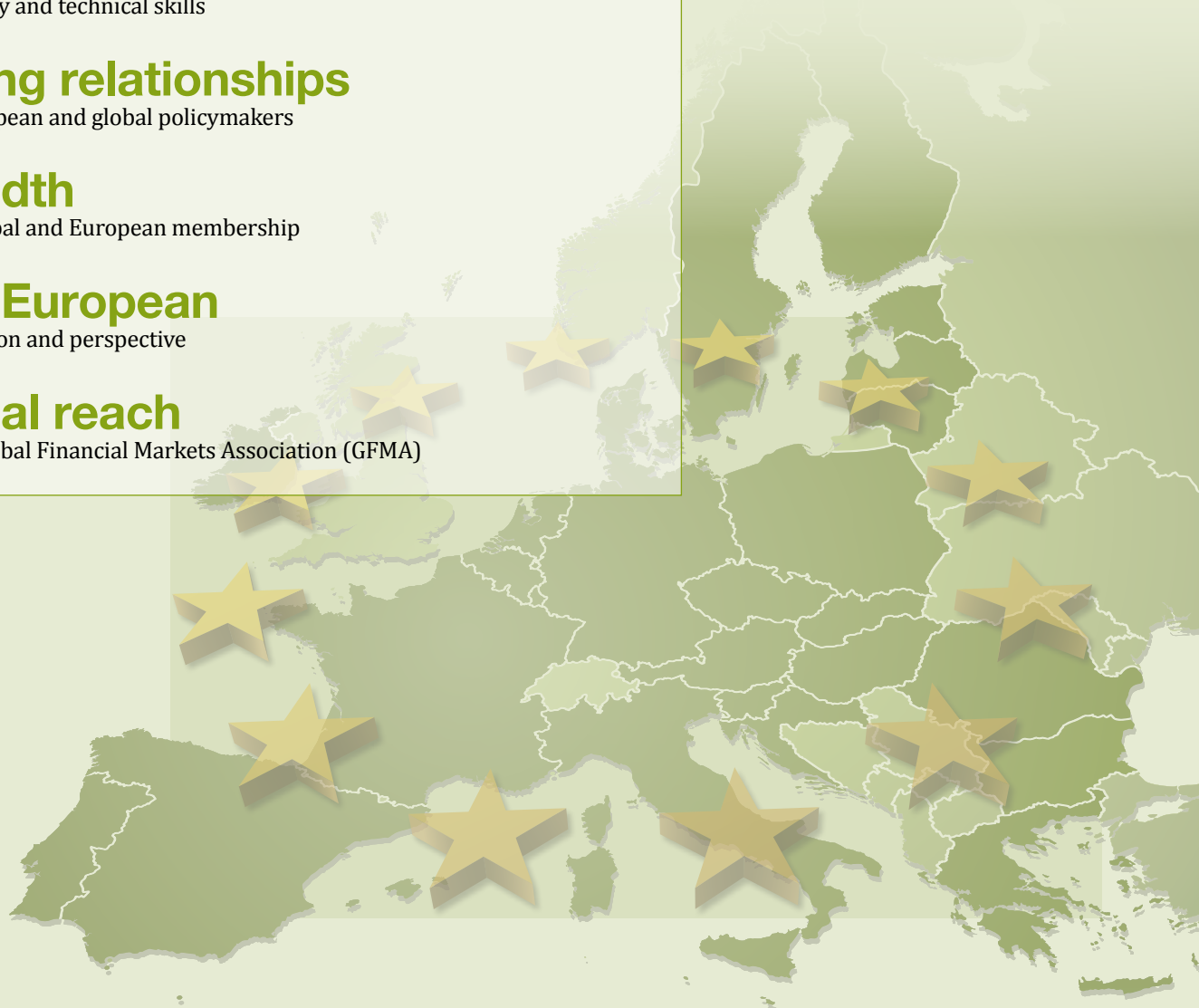
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