



## Risk Advisory

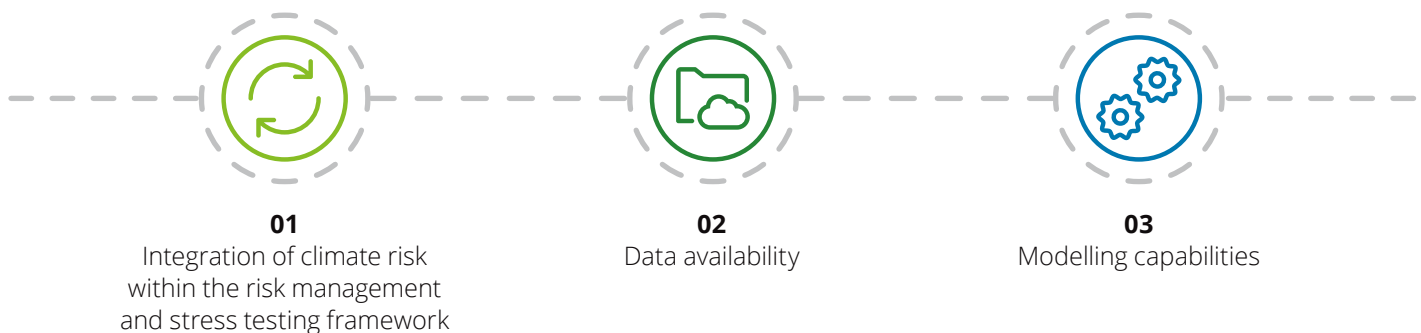
Lessons learned from the  
ECB climate risk stress test

# Three lessons learned from the ECB climate risk stress test

## The ECB climate risk stress test

The European Central Bank (ECB) published the results of the 2022 ECB climate risk stress test in July 2022. The climate risk stress test was performed by 104 significant banks in the first half of 2022. The stress test is part of an effort by the ECB to make banks aware of the risks they face from climate change. The ECB views the stress test as a learning exercise for themselves as well as for the banks. They used the stress test to assess the climate risk stress testing capabilities of banks. The ECB highlighted that the results of the climate risk stress test will not have direct capital implications, however it will feed into the Supervisory Review and Evaluation Process (SREP) in a qualitative way.

The results of the climate risk stress test show that banks made some progress on improving their climate risk stress testing capabilities, however still a considerable amount of effort is required to properly incorporate climate risk into their current stress testing framework and internal models. The climate risk stress test highlighted three main areas of concern for the ECB:



This blog explores the above challenges and provides recommendations how to overcome those, enabling banks to improve their climate risk stress testing capabilities.

### Background

The climate risk stress test was performed by 104 significant banks in the first half of 2022 and consisted of three modules<sup>1</sup>:

1. A qualitative assessment of the climate risk stress test framework.
2. A quantitative assessment of the vulnerability to carbon-intensive sectors via two metrics: i) the income from carbon-intensive sectors in order to measure the sensitivity of a bank's business model to transition risk; and ii) the financed greenhouse gas emissions in order to measure the bank's exposure to carbon-intensive industries.
3. Module 3 included the bottom-up stress projections for two different transition risk scenarios (i.e. a short term 3 years and a long term 30 years scenario) and two physical risk scenarios (i.e. a drought & heat risk scenario and a flood risk scenario).

1. The ECB published more information about the [methodology](#) and [scenarios](#) in October 2021 and January 2022, respectively.



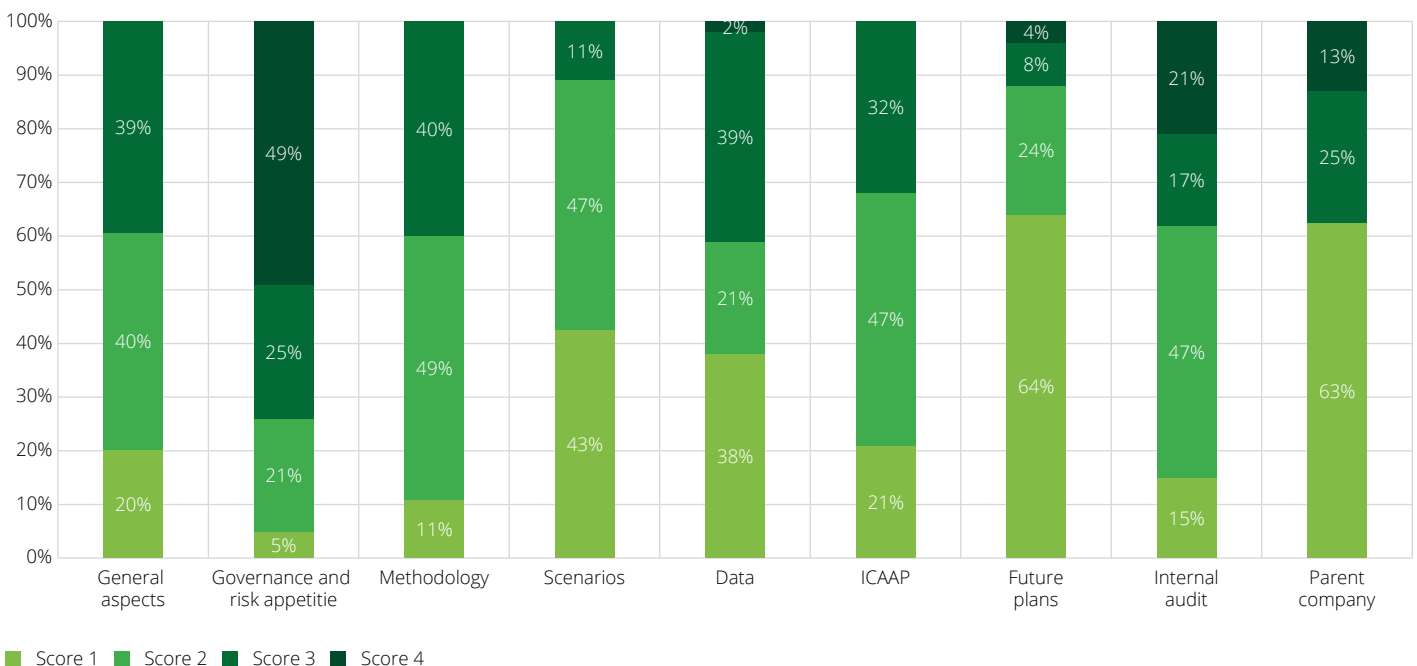
## Integration of climate risk within the risk management and stress testing framework

ECB’s first area of concern is the integration of climate risk in the regular risk management framework and stress testing framework. Table 1 presents the five most important challenges and recommendations on this topic. Chart 1 provides detailed information about the preparedness across nine key components of the climate risk stress-testing framework by displaying individual scores (scores are ranging from 1-4 where score 1 is the best and score 4 is the worst).

Observation	Our recommendation
<p><b>1</b> <b>Climate risk in ICAAP</b></p> <ul style="list-style-type: none"> <li>Approximately 40% of the in-scope banks included climate risk into their regular Internal Capital Adequacy Assessment Process (ICAAP) and stress testing framework.</li> <li>More than half of the banks who do not have a well-integrated climate risk stress testing framework yet, indicate that 1 to 3 years is required to embed climate risk.</li> </ul>	<p>Embed climate risk in the regular ICAAP:</p> <ul style="list-style-type: none"> <li>Analyse the impact of climate risk through the risk identification and risk materiality assessment process. Determine the transmission channels and assess the effect of climate risk on the existing risk types</li> <li>Use the results of the materiality assessment to determine how climate risk should be included in the economic perspective (e.g., include climate risk factors in models, effect on default correlations)</li> <li>Enhance the methodology applied in the ECB climate risk stress test and incorporate this in the bank’s regular stress testing framework.</li> </ul>
<p><b>2</b> <b>Climate risk stress testing &amp; business strategy</b></p> <ul style="list-style-type: none"> <li>Less than half of the banks with a climate risk stress testing framework in place use the outcomes of the climate risk stress test in the business strategy setting and the loan origination process.</li> </ul>	<ul style="list-style-type: none"> <li>Insights obtained after execution of a climate risk stress test should be used to inform the business strategy setting. An example can be to take into account underperformance of carbon-intensive portfolios in different climate scenarios in the business strategy setting.</li> <li>Results of a climate risk stress test should feed into the loan origination process. This can impact for example targeting specific portfolios and/or adjusting pricing strategies.</li> </ul>

Observation	Our recommendation
<p><b>3 Climate risk in credit risk models</b></p> <ul style="list-style-type: none"> <li>Only a limited percentage of the banks started to include climate risk factors in credit risk stress testing models, partly due to challenges banks are facing with climate risk modelling (e.g., data limitations).</li> </ul>	<ul style="list-style-type: none"> <li>Start sandboxing to explore new modelling approaches to include climate factors in credit risk models, despite of challenges present in climate risk modelling.</li> <li>Efforts with respect to data collection are required as well (see the next sections).</li> </ul>
<p><b>4 Insights in counterparties' transition plans</b></p> <ul style="list-style-type: none"> <li>The extent to which transition risks can materialize in the future is partly dependent on the presence and effectiveness of transition plans of the counterparties of banks.</li> <li>Currently banks have insufficient insights in the transition plans of counterparties.</li> </ul>	<ul style="list-style-type: none"> <li>Embed the collection and assessment of counterparties' transition plans in the loan origination and monitoring process in order to obtain insights in the ability to mitigate transition risk.</li> <li>The requirement to collect and assess counterparties' transition plans can be included in the running projects (e.g., EU Taxonomy and Pillar 3 ESG disclosures) to improve the loan origination and monitoring process.</li> </ul>
<p><b>5 Bank's sustainability strategy &amp; risk appetite</b></p> <ul style="list-style-type: none"> <li>Although it is common for banks to include sustainability related aspects in their strategy and to support the green transition, only one third of the banks provided information, at firm level, on key indicators of climate change related risk.</li> <li>Even a smaller percentage of the banks (5%) provided information on key indicators of climate change related risk at a more granular, sector level.</li> </ul>	<ul style="list-style-type: none"> <li>The effective implementation of a sustainability strategy requires a cascade of the strategy into the full organization.</li> <li>The risk appetite framework should include key risk indicators, at firm level as well as on sector and/or portfolio level, in order to effectively measure and steer on climate change related risk and to support the green transition.</li> <li>Start with translating the sustainability strategy to what it means in terms of impact on the different portfolios. Determine which key risk indicators would be most suitable to measure the required change in the portfolios.</li> </ul>

**Table 1** – Challenges and recommendations around the integration of climate risk within the risk management and stress testing framework



Legend: Score 1 (lightest green), Score 2 (medium green), Score 3 (darker green), Score 4 (darkest green)

Sources: Bank submissions and ECB calculations

**Chart 1** – Preparedness across key components of climate risk stress testing frameworks (percentage share of participating banks)



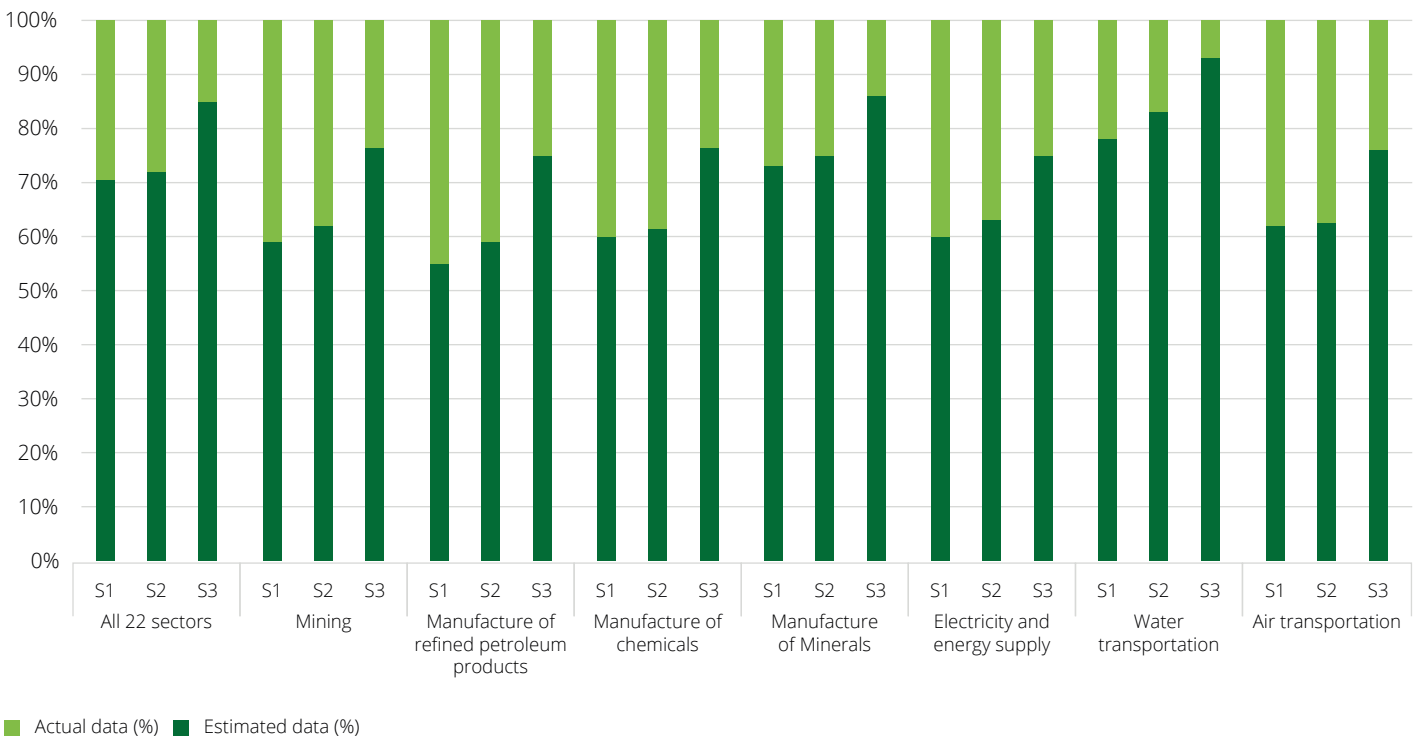
## Data availability

ECB's second area of concern is the availability of climate risk related data. For example, banks face challenges collecting data with respect to Energy Performance Certificates (EPC), collateral locations, and the Scope 1, 2 and 3 emissions. Table 2 presents the three most important challenges and recommendations on this topic. Chart 2 provides detailed information on the actual counterparty data vs proxies for reporting of Scope 1, 2 and 3 emission data.

Observation	Our recommendation
<p><b>1 Availability climate data</b></p> <ul style="list-style-type: none"> <li>The ECB highlighted that having accurate data is key in developing a solid stress testing framework. The climate risk stress test illustrated that banks should further improve their climate risk data capabilities. Data limitations are mentioned as banks' main reason for not having a climate risk stress testing framework in place.</li> <li>However, also more than 50% of the banks with a climate risk stress-testing framework in place indicate that corporate counterparty information (e.g., climate strategies and targets) and granular location data (e.g., location headquarters and production facilities) are not available.</li> </ul>	<ul style="list-style-type: none"> <li>Develop an approach to structurally embed climate risk data in the organization, including the data governance, the definition of data requirements, the data sourcing process and the data quality procedures.</li> <li>The first step is to prepare a climate risk data catalogue with data elements required for climate risk management and disclosures purposes beyond stress testing including relevant regulations (e.g., EBA Loan origination and monitoring, EU taxonomy, Pillar III ESG disclosures).</li> <li>A second step is to understand the data gaps and draft a roadmap in order to collect the required data elements. The data collection efforts can be prioritized based on high impacted portfolios following from the materiality assessment. For the data collection process, the use of public available sources on a national level should be considered. Given that not all data elements can be sourced from publicly available database, the collection of data elements from counterparties (e.g., Scope 1, 2 and 3 emissions) should also be incorporated in the loan origination and monitoring process.</li> <li>Finally, a robust process for the quality assurance of the collected climate risk data should be designed.</li> </ul>

	Observation	Our recommendation
2	<p><b>Applying proxies</b> Banks used proxies for determining the EPC and the Scope 1, 2 and 3 emissions of counterparties.</p> <ul style="list-style-type: none"> <li>With respect to EPCs, 65% of the banks used proxies to map collateral to an EPC bucket. In addition, banks were not able to map 17% of their reported collateral to an EPC bucket. The proxies were in some cases insufficiently described, due to the fact that banks used a significant number of assumptions.</li> <li>With respect to Scope 1, 2 and 3 emissions, banks relied on average for 70% on proxy-based emission data given that many counterparties do not disclose emission data. This percentage is even higher for Scope 3 emissions.</li> </ul>	<ul style="list-style-type: none"> <li>Besides improving the data collection process on a structural basis, the methodology for applying proxies should be enhanced and better documented.</li> <li>The proxy techniques should be described in a document including the reasoning for applying the specific assumption. In addition, the use of multiple data sources can be considered in order to arrive at a more accurate estimation of the EPC rating or emission data.</li> <li>The ECB expects that banks become less dependent on proxies in the future. Upcoming regulatory requirements (e.g., EU disclosure rules on emissions) can support this.</li> </ul>
3	<p><b>Data quality</b></p> <ul style="list-style-type: none"> <li>Banks made use of external data sources for climate risk data. The quality and appropriateness of these external data sources are not sufficiently assessed by those banks.</li> <li>The ECB indicated that data quality procedures were not always applied to data obtained internally. This can lead to inaccurate modelling outcomes.</li> </ul>	<ul style="list-style-type: none"> <li>Ensure that the assessment of internal as well as external data is embedded in a data quality analysis process. This includes an assessment of the data provided by an external source.</li> <li>The traditional data quality framework may require adjustments, given that climate risk data is a new type of data and another type of data quality rules should be applied. The framework should include at least topics as data completeness, data quality, methodology soundness (in case of proxies), controls, testing (reconciliation including qualitative and quantitative aspects) and the governance.</li> </ul>

**Table 2** – Challenges and recommendations around data availability



Sources: Bank submissions and ECB calculations

**Chart 2** – Relative use of actual counterparty data vs proxies for reporting of Scope 1, 2 and 3 emission data (percentage share)



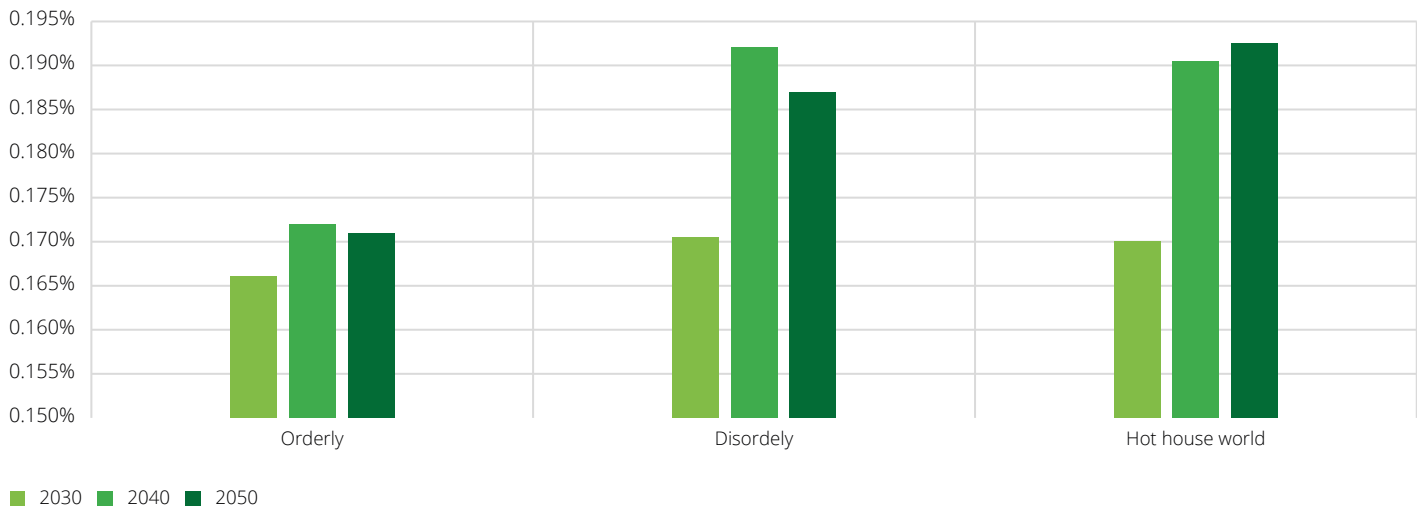
## Modelling capabilities

ECB’s third area of concern are banks’ climate risk modelling capabilities. The ECB indicated that the climate risk modelling capabilities are still in an early stage and that the climate modelling approach of only around 10% of the banks can be considered as advanced. This is partly caused by the following challenges banks faced with climate risk modelling. Table 3 presents the three most important challenges and recommendations on this topic. Chart 3 provides information on projected losses projected for three transition scenarios.

	Observation	Our recommendation
1	<p><b>Dynamic balance sheet and portfolio allocation</b></p> <ul style="list-style-type: none"> <li>Banks were allowed to apply a dynamic balance sheet assumption as part of the 30 years transition risk scenarios, in order to adapt the strategy and portfolio of banks to the changing climate and economic environment.</li> <li>However, only 22% of the banks considered a dynamic balance sheet for modelling transition risk. Most banks did not differentiate enough in the projections of loan losses and balance sheet allocation (e.g., decrease in allocation to carbon-intensive industries over time) between the three climate scenarios (i.e., orderly transition, disorderly transition and hot house world).</li> <li>It was challenging in these long term projections to estimate the share of ‘green loans’ that will replace existing ‘grey loans’ that expire in a given year, also taking into account the evolvement of a given climate scenario. The strategic options of banks to steer the balance sheet and reducing exposure to carbon-intensive industries, are generally not explored by banks.</li> </ul>	<ul style="list-style-type: none"> <li>Differentiate the portfolio allocation in the long term projections, resulting in a higher difference in loan losses between the different climate scenarios.</li> <li>Discuss with sector experts possible developments of their portfolios under the different climate scenarios. A bank’s sustainability strategy that is translated to estimates of required carbon reduction over time, and preferably also per sector, will accelerate this portfolio allocation process. Describe the portfolio allocation process followed and the rationale for the applied assumptions.</li> </ul>
2	<p><b>Developing climate risk stress testing models</b></p> <ul style="list-style-type: none"> <li>Banks found it challenging to link output of long term climate scenarios to Probability of Default (PD) and Loss Given Default (LGD). This could be caused by banks primarily adjusting existing credit risk models instead of developing new models to capture the</li> </ul>	<ul style="list-style-type: none"> <li>Establish a methodology or model that can fully capture climate risk, allowing for a differentiation of the impact of climate risk between sectors, on a long term horizon of for example 30 years. A widely used framework for modelling transition risk is the UNEP FI framework, where the carbon related costs are a key risk driver. Deloitte extended this UNEP FI</li> </ul>

Observation	Our recommendation
<p>effects of climate risk. Existing capital credit risk models (i.e., with a 1 year horizon) are better suited to capture effects on a short term horizon instead of a long term 30 years horizon.</p> <ul style="list-style-type: none"> <li>• Current credit risk models are less suited for differentiation between the climate risk impact per sector, as well as the ability to capture first order effects (e.g., carbon price) and second order effects (e.g., GDP).</li> </ul>	<p>framework, using carbon elasticities for supply and demand on a granular level to fully capture the climate risk effect in order to estimate the effect on the credit risk parameters for corporates. This methodology also provides better insights in the required portfolio reallocations over time.</p> <ul style="list-style-type: none"> <li>• Capturing physical climate risk is becoming more important given the changing climate. Starting point can be the analysis of flood risk (one of the physical risks in the Netherlands with the highest impact). Analyse the overlap from flood maps with the collateral in your portfolio and combine that with a damage function in order to estimate an impact on your collateral.</li> <li>• Finally, it is important to critically assess the model risk and the underlying assumptions to iterative develop accurate models over time.</li> </ul>
<p><b>3 Underestimation of climate risk impact</b></p> <p>Banks used a considerable amount of proxies for the EPC and Scope 1, 2 and 3 emissions, therefore the modelling results are subject to uncertainty. The credit and market losses for the 41 participating banks that executed the climate risk stress test in full amounted to around EUR 70 billion. This amount is likely to be underestimated, given the following four reasons:</p> <ol style="list-style-type: none"> <li>the climate scenarios were not adverse, contrary to the scenarios used in regular stress tests,</li> <li>the data and modelling capabilities are still in a preliminary stage, therefore climate risk may not be fully captured in the models,</li> <li>the climate risk stress test is a learning exercise without supervisory overlays (e.g., floors) and</li> <li>only around one third of the balance sheet of the 41 participating banks was in scope of the exercise.</li> </ol>	<ul style="list-style-type: none"> <li>• Start drafting a roadmap to improve the data and modelling capabilities with respect to climate risk.</li> <li>• Execution of this roadmap will result in a reduction of the underestimation of climate risk impact. Also include the development of methodologies for parts of the balance sheet which were out of scope for the ECB climate risk stress test.</li> </ul>

**Table 3** – Challenges and recommendations around modelling capabilities



Sources: Bank submissions and ECB calculations

**Chart 3** – Projected loan losses under the orderly scenario are lower than under a disorderly transition scenario as well as under the hot house world scenario (% performing exposures in each decade)



Right now is the time to act: banks should fully embed climate in the regular risk management and stress testing framework, improve the data collection process and further develop the climate risk modelling capabilities. Please feel free to reach out and we can discuss how to overcome your organization specific challenges.

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