

Climate risk mispricing:

Why better assessments matter
in financing for development

By Pamella Eunice Ahairwe (ECDPM), San Bilal (ECDPM),
Anja Đuranović (WU) and Irene Monasterolo (EDHEC)

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Executive summary

Is climate change a financial risk that financial institutions need to worry about? Despite the rapid increase in climate financing and the rise of the dominant discourse on the importance of climate change and environmental, social and corporate governance (ESG) criteria, financial markets do not seem to show much sensitivity to the increasing climate risks. The problem arguably lies in the fact that the markets seem to have difficulties estimating the specific costs of climate change, which, although potentially high, often remain long-term and uncertain. The benefits of adjusting to climate risks also seem harder to quantify for shorter-term investments.

Most international actors that provide development finance seem to have difficulty estimating the specific costs of climate change risks. Climate risks can be low or high, short-term or long-term, and more or less uncertain. Yet, understanding the particular nature of climate risks clearly could help in pricing climate-risk finance and the proper allocation of funding for climate action. In particular, investments in climate adaptation, which are perceived by many financial actors as a costly endeavour, could become financially more attractive if the corresponding reduction in climate risk exposure were not only qualitatively considered, but explicitly priced. This would have serious implications for development finance institutions and their incentive to invest in climate adaptation operations in developing countries most affected by climate change, with a high socio-development impact.

This paper considers why effective climate risk assessment should matter for financial institutions. We present different approaches to measuring climate risk used by some European financial institutions with a public mandate, including a multilateral development bank (MDB) - the European Investment Bank (EIB), development financial institutions (DFIs) - the British International Investment (BII) and the Dutch entrepreneur development bank (FMO), national promotional and development banks - the German Kreditanstalt für Wiederaufbau (KfW) and Italian Cassa di Risparmio di Padova e Rovigo (CRIP); and export credit agencies - the Atradius Dutch State Business (Atradius DSB), and French Bpifrance. These institutions have adopted climate, and often explicit ESG approaches and climate risk assessments. Increasing efforts are also dedicated to further improving their approaches. Yet, they encounter several difficulties and limitations in their attempt to assess climate risks.

Limitations encountered in climate risk assessment that could lead to mispricing include:

1. Underestimation or overestimation of the climate risks
2. Lack of proper methodologies to measure climate risks
3. Assessments are generally done at the macro-level
4. Data on climate risk variables is usually missing
5. Lack of a central database providing data on all climate risk indicators
6. No harmonised industrial standards and a proper regulatory framework

It is essential to overcome the challenge of climate change mispricing (over- and under-estimation) of the risks to ensure that physical and transition risks are precisely predicted. This necessitates that financiers and investors, in general, alter their strategies, incentives and approaches, including by exploiting the opportunities provided by climate risk assessment models and strategies. Development financiers can play a pioneering role in that respect. MDBs like the EIB and DFIs like BII and FMO should not only continue their respective current endeavours to further enhance their overall climate/ESG, and climate-risk assessment approaches. They should also coordinate their efforts to lead the (European) development finance community in better addressing climate change, improve risk assessment approaches and try to explicitly price climate risks. By doing so, they can also leverage private finance actors and have a catalytic demonstration effect on how to better climate risks.

While climate finance has significantly increased for mitigation, it is seriously lagging for adaptation. In particular, in Europe, financial institutions for development have generally failed to invest at scale in climate adaptation, often arguing that they are not enough bankable projects. Improving climate risk approaches, explicitly pricing climate risks, can play a significant role in boosting private and public finance to tackle climate change, including for adaptation.

In terms of physical climate risk, there is a need to adopt proper methodologies to assess the risk from chronic and acute shocks on a highly granular level and connect asset-level physical risks to firms' and investors' financial risks. Such enhanced approaches could usefully draw on. They developed the first comprehensive methodology that logically connects asset-level physical risks to financial risks for firms and financial actors and, more broadly, to systemic risk for the financial system. It does so by translating economic losses on physical assets and sectors from chronic and acute climate physical risks into financial losses and shocks on prices in the market. It allows for a dynamic, asset-level assessment of physical climate risk, considering the cascading losses through the ownership chains of firms and investors.

Key policy recommendations for financial institutions that could lead to better assessment and improved climate risk pricing include:

1. Develop a reliable database to provide information on climate-related risks
2. Improve the transparency of the risk assessment methodologies
3. Develop harmonised climate risk assessment methodologies
4. Support the establishment of project-level climate risk assessment
5. Exploit the potential of insurance companies
6. Address the information asymmetry and knowledge gaps
7. Enforce climate-related regulation at all levels
8. Embody climate risk assessment in overall sustainable investment strategy and use concessional financing to cover high climate risks
9. Explicitly price climate risks and net returns from climate adaptation.

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1. Introduction: Does climate risk matter for investment?

"...Climate change is not a financial risk that we need to worry about..." said Stuart Kirk, who has since resigned from his role as the head of responsible investments at HSBC Global Asset Management ([FT Live 2022](#); [Pellegrino 2022](#)). His controversial remarks made during [his recent presentation](#) on "Why investors need not worry about climate risk" underline a more fundamental dilemma among private and, at times, public financiers ([FT Live 2022](#); [Kirk 2022](#)). While it acknowledges the long-term effects of climate change and the genuine importance of tackling it, the investment community seem to doubt whether and how they should consider climate risks in their investment decisions, especially those whose time horizon is generally short.

Despite the rapid increase in climate financing and the rise of the dominant discourse on the importance of climate change and environmental, social and corporate governance (ESG) criteria, financial markets do not seem to show much sensitivity to the increasing climate risks. As observed by Stuart Kirk, *"...the [higher the] number of times the phrase climate catastrophe is mentioned around the world, the higher and higher and higher risk assets go – in tandem. The more we are doomed, the higher prices go. How is that possible?..."* ([Kirk 2022](#)). Stuart explains the possibility of this scenario by stressing three likely explanations: either climate risk is negligible, climate risk is already included in prices, or investors are wrong. Indeed, most institutions engaged in financing for development consider climate risks as part of the environment and social

risk assessment. While ESG could be important if it were based on more sound and transparent criteria, it is no remedy for proper climate risk assessment.

The problem arguably lies in the fact that the markets seem to have difficulties in estimating the specific costs of climate change, which, although high, remain long-term and uncertain ([UCL 2021](#)). The benefits of adjusting to climate risks also seem harder to quantify for shorter-term investments. Moreover, the lack of sufficiently accurate, consistent, comparable, granular and easily accessible data and the lack of reliable, user-friendly and cost-effective methodologies often prevent precise projections of both physical and transition risks (Basel Committee on Banking Supervision 2020). This hindrance is even more prevalent in developing countries that are more exposed to physical risk. The impact of climate change on economic activities may, for instance, be hard to quantify, and data on chronic risks is usually missing ([Ferazzi, Kalantzis and Zwart 2021](#)).

Whether they can be quantified or not, climate risks are real and continue to cost countries materially. According to the findings by the German reinsurance giant - Munich Re, natural disasters caused global losses of about US\$280 billion (€247 billion) in 2021, and less than half of these losses (US\$120 billion) were insured ([Financial Times 2022a](#), [Munich Re 2022](#)). Combined with the COVID-19 pandemic and the war in Ukraine, the materialisation of climate risks is at the source of higher insurance prices and the current squeeze in the insurance and reinsurance sector ([Financial Times 2022e](#)). The costs associated with climate risks are real for the financial sector at large and financial stability. According to the Bank of England, the failure of British financial institutions and insurers to properly account for climate risk could see their annual profits shrink by 10% to 15% ([Financial Times 2022h](#)).

When financiers underestimate or fail to take into account climate change risks, they may wrongly approximate the net present value of their assets and investments. Their investment strategies may become sub-optimal from a financial perspective, and their overall risk exposure much higher than expected. One implication of neglecting the financial risks associated with climate change risks is that it may reduce the incentive of financial institutions to address climate change in their investment decisions and strategy. Aware of this impediment, regulatory and supervisory authorities are increasingly expecting financial institutions to incorporate climate risk in their risk management practices ([FSB 2022](#)). The European Central Bank has issued a Guide on climate-related and environmental risks, which, although not binding, should serve as a basis for “supervisory dialogue” ([ECB 2020](#)). But it is revealing that, although the situation has improved, the European Central Bank (ECB) concluded in its most recent assessment that European banks tend to underestimate their risk exposure to climate change: “most institutions still need to make significant efforts to transparently disclose their exposures to climate-related and environmental risks and further improve their disclosure practice”: about three-quarters of the banks do not disclose whether climate risks impact their overall risk profile, and almost 60% do not describe how transition and physical risks could affect their strategy ([ECB 2022](#), [Financial Times 2022f](#)).

Recognising the challenges for the financial system and the regulatory authorities, the Basel Committee on Banking Supervision has recently issued a list of 18 principles for the effective management and supervision of climate-related financial risks ([Coelho and Restoy 2022](#), [Basel Committee on Banking Supervision 2022](#)). As recognised by many financiers, a supervisory and regulatory push, including on a mandatory basis, might be key to changing the attitude of financial institutions towards climate risks and better integrating them in their approaches and investment decisions. Yet, financiers also express concerns about the ability to properly assess climate risks, with “[t]he American Bankers Association express[ing] concern about the extent to which banks were being asked to quantify climate-related risks, given how uncertain the outlook was” ([Financial Times 2022g](#)).

Another consequence of underestimating climate risks is that investments related to climate change, and in particular climate adaptation, may wrongly be perceived as non-financially viable. Indeed, many financiers tend to consider climate adaptation as a cost, neglecting the fact that considering climate change adaptation options may reduce the climate risk exposure of their investment. Yet, investing in climate-resilient seeds may ensure the profitability of future harvests in periods of droughts. In that respect, climate adaptation investments may have the feature of an insurance premium against climate change risks. Ignore the risks, and the premium appears as an additional cost only. This appears to be one of the reasons at the core of the development finance institutions (DFIs) common perception that climate adaptation non-sovereign operations are often not bankable, as discussed in this paper, and therefore invest little in adaptation (to the noticeable exception of British International Investment among European DFIs).

Paradoxically, a lack of proper climate-risk assessment may also lead to overestimating potential physical risks, in particular in developing countries, where accurate information is generally more scarce and less accessible, and which are often perceived as less able to cope with climate change and intrinsically riskier. This may tend to reduce the incentive to invest in these countries, including in climate adaptation projects and programmes.

Overcoming the challenge of climate change mispricing (overestimation and underestimation of the risks) to ensure that physical and transition risks are precisely predicted necessitates that financiers and investors alter their strategies, incentives and approaches, including by exploiting the opportunities provided by climate risk assessment models and strategies. This is particularly important for development financiers. While climate finance has significantly increased for mitigation, it is seriously lagging behind for adaptation. In particular, in Europe, financial institutions for development have generally failed to invest at scale in climate adaptation, often arguing they are not enough bankable projects.

This paper, therefore, looks at how improving climate risk assessment and approaches can help address the problem of mispricing and be the basis for better investment decisions, including those related to climate adaptation by DFIs. Section 2 considers why climate risk assessment should matter in providing development finance. Section 3 presents examples of how different European public financial institutions for development and trade promotion currently approach climate-risk assessment and the limitations they encounter in the process. Section 4 discusses a methodological alternative that partly addresses the limitations that they tend to encounter, while Section 5 provides policy recommendations for improved and more effective climate risk assessment.

2. Climate risk assessment: Why it is needed for effective financial risk management

Climate risk assessment (CRA) helps investors and financial institutions identify, measure and manage financial and non-financial losses that might occur due to climate change and its induced consequences, as discussed in Box 1. While climate risk is often neglected by traditional risk management practices, International Financial Institutions (IFIs) that labour to account for it understand better its impact on their balance sheets ([DNB 2020](#)). It also helps them efficiently allocate their capital and invest in projects that are less likely to exacerbate climate change and its effects or contribute to mitigating and adapting to climate change.

Climate risks can either be immediate or can occur in the short, medium and long term. Regardless of when they take place, they affect socio-economic development and expose investors to the possibility of incurring losses. A proper climate risk assessment is thus a key part of an integral approach to a comprehensive process of climate risks management, as illustrated in Figure 1.

Box 1: Climate risk assessment: transitional risks and physical risks

Climate risk assessment (CRA) is understood differently by different institutions. Particularly, the GIZ defines CRA comprehensively as the assessment of risks, the extent to which these risks impact people, assets, settlements, (critical) infrastructure, value chains and ecosystems; and the identification of suitable solutions to address them ([GIZ 2021](#)). For the purposes of this policy paper, we define CRA as the systematic process of identifying the potential negative consequences of climate change, the degree of their impacts on individuals, projects and structures, and the opportunities to manage and address these impacts.

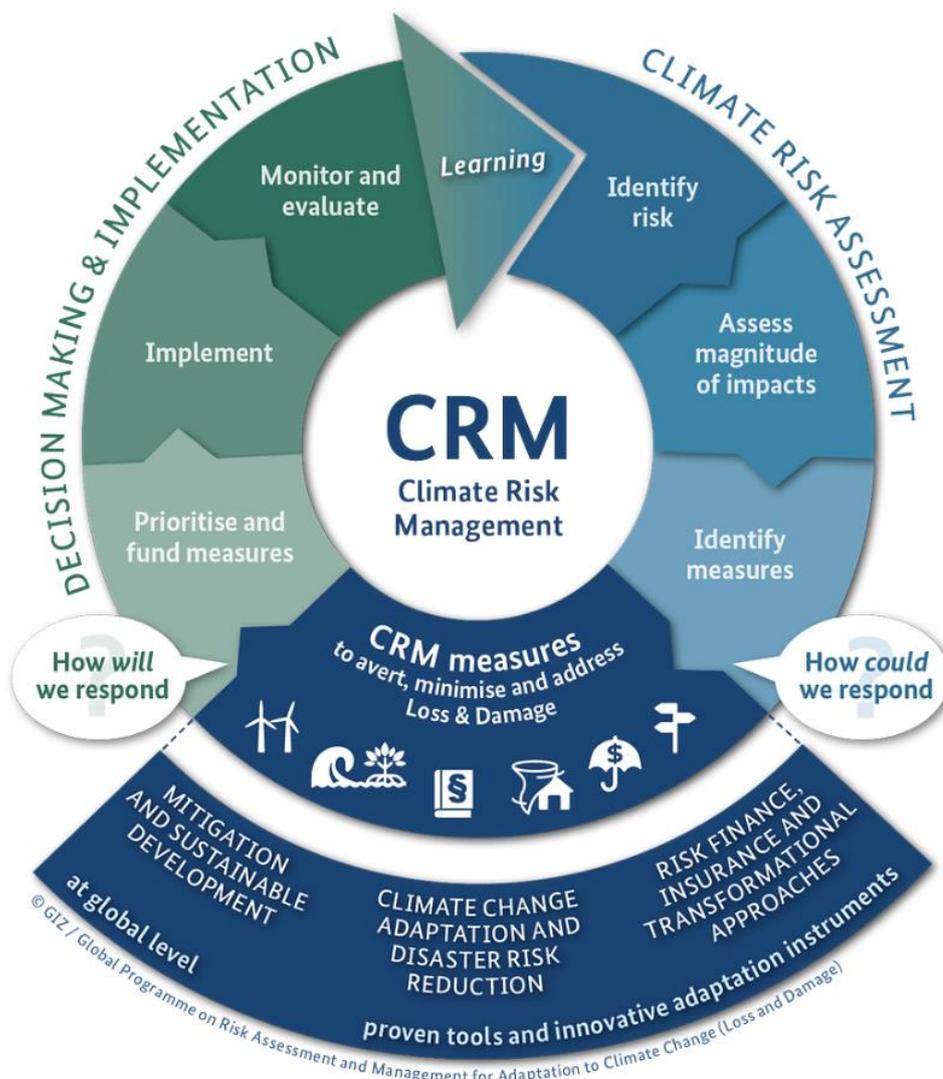
Climate risks are traditionally divided into two main categories: transitional risks and physical risks.

Transitional risks are “the risks related to the process of adjustment toward a low-carbon economy” ([Basel Committee on Banking Supervision 2021](#)). Transitional risks are associated with climate mitigation and are inflated in high-income countries (HICs) ([IPCC 2020](#)). They come about as countries shift or fail to shift to or prepare for a low-carbon future economy. Climate transitional risks are also perceived as risks that occur due to the late implementation of climate policies and regulations in relation to the set climate targets, which makes it hard for investors to precisely estimate them ([Gourdel et al. 2022](#)). Transitional risks can weaken financial institutions by increasing their liability and affecting their credit rating.

Physical risks, on the other hand, are linked with climate adaptation. They arise from the impacts of climate change and climate-related hazards on assets, projects and productivity and are usually high in low-income countries (LICs). Physical risks are “the economic costs and financial losses resulting from the increasing severity and frequency of: extreme climate change-related weather events (or extreme weather events) such as heatwaves, landslides, floods, wildfires and storms (i.e. acute physical risks); longer-term gradual shifts of the climate such as changes in precipitation, extreme weather variability, ocean acidification, and rising sea levels and average temperatures (i.e. chronic physical risks or chronic risks); and indirect effects of climate change such as loss of ecosystem services (e.g. desertification, water shortage, degradation of soil quality or marine ecology)” ([Basel Committee on Banking Supervision 2021](#)).

While it may be comparatively easier to measure the transitional risks, it is harder to assess. The physical risks, given the difficulties that exist in accessing required data, as discussed in Section 3.

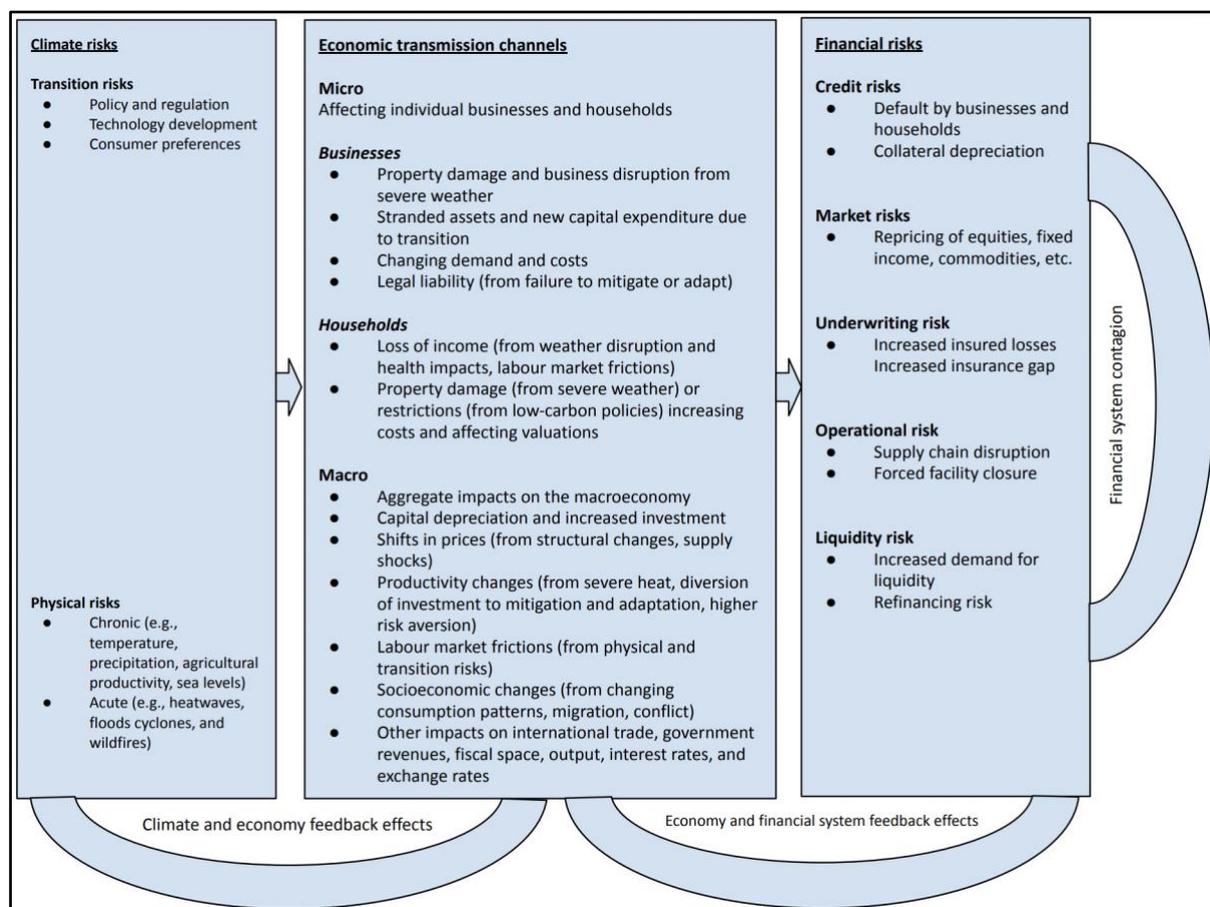
Figure 1: The climate risk management process



Source: [BMZ](#)

Physical and transitional risks alike affect businesses and households at the micro level and economies at the macro level, as presented in Figure 2, which increases the overall financial risk exposure of financing institutions ([AfDB 2021](#)). On the one hand, physical risks can cause the destruction of physical plants, and decrease the productivity and the value of financial contracts of firms which in turn negatively affects the portfolio value of financial actors ([Gourdel et al. 2022](#)). On the other hand, as firms rise to the low-carbon challenge, they face higher costs from the adoption of climate-friendly technologies, and this can result in heightened operating costs and lower profit margins.

Figure 2: Transmission of climate risks to financial risks



Source: Adapted from AfDB (2021)

Despite the clear financial impact of climate risks, most banks and other financial institutions have not been able to disclose physical and transition risks that pose threats to their business model. Within the European Union (EU), some developments have been made to improve the assessment of transition risks, the European Central Bank (ECB) survey reveals that most banks have a blind spot towards physical risk and as a result still have a less advanced approach towards measuring the latter (ECB 2021). Understanding physical risks is paramount for European financial institutions that invest, including outside Europe, in developing countries that are already experiencing the consequences of climate change.

When financial institutions decipher the climate imperils they face while investing in different projects and countries, they mitigate and manage their overall financial and non-financial risks better. Quantitative analyses that have been done so far, but mostly for developed countries, show that the costs of climate change that are usually overlooked are of high magnitude. More than half of the syndicated loans of the US major banks are exposed to climate

transition risk ([Ceres 2020](#); [AfDB 2021](#)). Developed countries are also not spared the climate physical risk. For instance, US\$2.2 trillion of syndicated loans from 28 major US banks is projected to be exposed to physical risks of about US\$250 billion ([Ceres 2021](#)).

There are barely precise assessments of the degree of transitional and physical risk exposure in developing countries. This has led to mispricing (overestimation) of especially physical risk and has partially resulted in underinvestment in these countries on the argument that their projects are not bankable and/or very risky. Presently, Africa needs an annual investment of about US\$20-30 billion to adapt to the consequences of climate change ([UNFCCC 2021](#)). However, climate change effects such as floods and droughts have continued to increase more than ever, worsening food insecurity and malnutrition problems ([IPCC 2022](#)).

Timely and structural solutions that assess and measure these risks in a precise manner can bring financial institutions, and in particular, those focused on development, one step closer to appropriately investing in the Global South. Several researchers and economists have also stressed the vital role of insurance companies in protecting businesses and investors against the consequences of climate change ([Breitenstein et al. 2021](#), [Deloitte 2019](#), [McCarney 2022](#), [Nobanee et al. 2022](#)). While most insurance companies provide orthodox services, a few have restructured their insurance landscape and premiums to cover climate-associated risks that directly or indirectly affect individuals, households and businesses. Effective CRA would help insurance companies to impose the right premiums on entities seeking their services. It would also help financial institutions for development to move beyond their current incomplete panorama of focusing narrowly on the fossil fuel sector to broadly build resilience and adaptation capacity, as evidenced by the increasing and perceived benefits of investing in climate adaptation projects.

3. Climate risk assessment approaches: A snapshot from public financial institutions

Some financial institutions for development consider climate risks a core element of their operations. These have developed disparate climate risk assessment models, methodologies or scorecards to better understand, measure and manage their risk exposure. This is the case, for instance, of the European Investment Bank (EIB), which has become the European climate bank.

The extent to which these institutions can appropriately account for climate risks remains an open question. In this section, we look at climate risk assessment models used by a few selected institutions: the European Investment Bank, two European Development Financial Institutions (EDFIs) - British International Investment and Dutch FMO, two National Promotional Banks (NPBs) - German KfW and Italian Cassa di Risparmio di Padova e Rovigo (CRIP), which also operate internationally, and an Export Credit Agency (ECA), the Dutch Atradius Dutch State Business. Although there are some commonalities in their concerns and overall approaches to climate risks, there are no common frameworks. Such diversity can encourage innovation and creativity but leaves these methodologies fragmented, affecting the quality of assessments and, arguably, climate finance decisions.

3.1 An MDB: the European Investment Bank

The European Investment Bank (EIB) is at times presented as the [largest multilateral development bank](#) in the world based on its volumes of borrowing and lending, although about 90% of its operations take place inside the EU. As the EU bank that recently established itself as the Climate Bank, the EIB aspires to deliver on the climate objectives of the European Green Deal within and outside the EU ([Ahairwe 2021](#), [Hoyer 2022a](#), [von der Leyen and Hoyer 2021](#)). The EIB has adopted a comprehensive approach to [climate and environmental sustainability](#), including a specific action plan on climate adaptation (EIB 2020a, EIB 2020b, [EIB 2021a](#), [EIB 2022b](#), [EIB 2022c](#), [Fayolle 2021](#), [Hoyer 2022a](#), [Hoyer 2022b](#), [Hoyer 2022c](#), [Saich 2021](#)). It has adopted in 2019 an EIB climate risk assessment system to assess the exposure to climate risks of the EIB portfolio, its counterparty at country and client levels, and sectoral and project levels ([EIB 2022a](#), [Ferrazzi et al. 2021a](#), [Ferrazzi et al. 2021b](#), [Saich 2020](#)). The EIB has since taken significant steps to further develop its methodology and screening tools and reports on it in line with the Task Force on Climate-related Financial Disclosures (TCFD), which the EIB support ([EIB 2022a](#)).

The bank has also adopted, in 2021, the Paris alignment for counterparties (PATH) framework. It assesses the climate risk of counterparties not only on the project financed by the EIB but on the broader activities of the counterparties ([EIB 2021b](#)). It considers criteria such as the counterparties' revenues, the sector (e.g., health, water, agriculture) invested in, and the extent to which these are exposed to climate change risks. For treasury investments, the EIB has developed a specific methodology relevant to financial markets, in line with PATH principles. The ultimate objective of the PATH framework is to engage and support counterparties in their alignment with the goals of the Paris Agreement. The EIB assesses climate risks for all counterparties at the appraisal stage, updated annually. The EIB discloses climate risk information in line with the TCFD principles ([EIB 2022a](#)).

To assess its counterparts, the EIB developed the Climate Risk Screening tool. The tool is made of two components, the anchors' scores (based on sectors and country scores) and the idiosyncratic part (related to the specificities of the counterpart). As input for the Climate Risk Screening tool, the bank has put in

place a set of country scores. These are based on a model developed in-house as part of its risk management framework to assess the exposure of individual countries to physical and transitional risks, using the variables presented in Figure 3 (EIB 2022a, Ferrazzi et al. 2021a, Ferrazzi et al. 2021b). The EIB uses these scores, graded from 1 -5, as a tool to map the exposure of its portfolio to climate risk in about 184 countries. The EIB obtains its physical risk and transition risk scores for ranking countries by considering a selected number of variables and paying due attention to aggregating (i.e., avoiding equal weights).

Figure 3: Overview of risks stemming from climate change at the country level



Source: [EIB \(2022a\)](#)

The EIB model clearly identifies significant cases of transition and physical risk, but risks that are smaller in size are sometimes more difficult to differentiate.

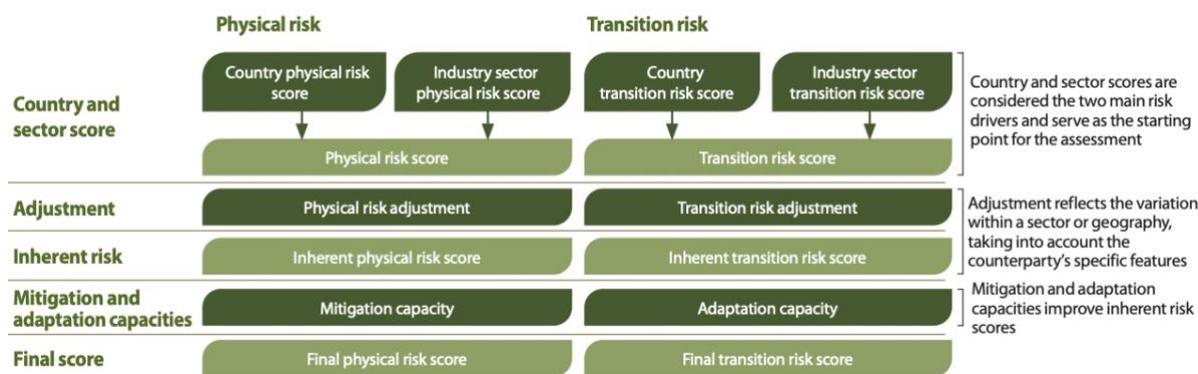
Regarding acute physical risks, the EIB does not directly model the probability of an event but instead considers a long-term span in which it takes the average risk. The methodology of the EIB aggregates the variables under consideration to obtain two major scores for physical and transition risks, upon which countries are ranked (Ferrazzi et al. 2021a). In estimating the physical risks, the EIB considers: (1) acute risks from extreme weather events as measured by the monetary damage caused (e.g. hydrological risks, meteorological risks, and climatological risks), (2) chronic risks from gradual and long-term effects of climate change and a series of variables are employed to measure the impact of climate change on (e.g. crop production (food security and agriculture), sea level rise, required infrastructure quality, loss of labour productivity due to heat); and (3) adaptation capacity, i.e. the ability of economies to adapt to climate change as can be measured by fiscal revenues and the EIB’s sovereign rating as well as institutional and governance ability.

The EIB acknowledges the unique nature of transition risks, which are more policy-driven and can affect countries and firms in wildly divergent ways. For instance, as a firm transitions to a more climate-friendly technology, it may suffer new operational costs that are unlikely to affect other firms or the economy. Businesses are increasingly pressured to transition by either lowering their emissions footprint or paying carbon taxes (Sautner 2021; Chia 2022). Those who fail to transition may suffer different financial consequences ranging from reduced corporate valuation, capital liquidity, business income and even reputation (Chia 2022).

On transition risks, the EIB considers and evaluates two components to understand the extent to which its portfolio might be exposed to the transition risks. The first component is the exposure component, which evaluates: (1) the revenues from fossil fuel export (oil, gas and coal rents) and how these are expected to evolve due to strict climate change policies; and (2) the costs from past, present and future greenhouse gas emission performance. The second component is the mitigation component that focuses on three dimensions; (1) deployment of renewables, (2) improvements in energy efficiency, and (3) climate ambitions as measured by the commitment of countries.

The EIB's climate risk assessments are also conducted at the project level. The assessment process starts with an initial screening based on the physical risk of the country and industry corresponding to the project. Following this screening, only potentially high-risk operations undergo a second, more thorough screening using climate service tools. The process is outlined in Figure 4. Adjustments are made to account for the specific vulnerabilities of the counterparties to climate risks. The inherent score combines the country and industry score with the adjustment score, scoring physical and transition risks separately. If the second screening also reveals potentially high risks, the counterpart must conduct a climate risk and vulnerability assessment and develop adaptation measures where appropriate. This gives the mitigation and adaptation capacities score. The final score is a combination of the score for inherent risks and for mitigation and adaptation capacities, again treating physical and transition risks separately (EIB 2022a).

Figure 4: EIB’s climate risk screening tool for the corporate credit segment



Source: EIB (2022a)

The EIB assesses the exposure of its portfolio to physical and transition risks using the PATH framework ([EIB 2021b](#)). It further develops its risk sensitivity and climate stress testing capabilities, drawing lessons from its 2020 analysis to improve its 2021 testing approach, using various scenario proxies.

Although the bank has made significant progress in assessing climate risks, its scoring model comes along with some challenges ranging from missing or fragmented data and lack of harmonised industrial standards to complexities in 1) choosing the correct variables, 2) the appropriate metrics, and 3) aggregating variables ([Calthrop 2022](#), [Ferrazzi et al. 2021a](#)). The EIB indices for measuring climate risk are also slow-moving as they exhibit a high degree of stability yearly. This might make them less reactive to shocks affecting businesses and assets in the immediate future. The consideration of aggregated risks is also prone to over-generalisation and outlier problems, especially for countries with an extensive geographical scope.

The climate risk scores do not also have explanatory power in the overall sovereign risk rating of the EIB (which is a frequent finding for other climate risk indices as well). This could be due to the shorter time horizon of ratings or the high correlation with other sovereign risk drivers, especially if the scores are instead too noisy due to, e.g., data quality. Other challenges that broadly affect climate risk assessment models from other financing institutions will be discussed in detail in the rest of this brief and highlighted in Section 4. The EIB climate assessment is already well-developed and could potentially serve as a benchmark for other European financial institutions for development. Yet, it should still be further elaborated by the EIB and preferably in cooperation with other (development) financiers. Such improvements should seek a more granular assessment of climate risks, particularly at the project and client levels. In 2022, the EIB wants to replicate the European Central Bank's 2022 climate stress test to more accurately assess its counterparty ratings ([EIB 2022a](#)). This should lead to precious insights. The next step for the EIB should be to aim to translate climate risk assessments into financial values, with explicitly accurate pricing of climate risks.

3.2 European DFIs: BII and FMO

European DFIs have been increasingly active in addressing climate change. In the context of the Association of European Development Financial Institutions (EDFI), they have adopted harmonised approaches to align their financing with the Paris Agreement. It includes harmonised approaches to assess greenhouse gas emissions of loans and investments at the portfolio level and to their climate-related financial disclosures ([EDFI 2020](#), [EDFI 2022](#)). European DFIs collective efforts also include alignment around a common definition of climate finance and the exclusion of fossil fuel investments, as well as the harmonisation of standards and practices, as part of the *EDFI Harmonisation Initiative on Impact Measurement and Responsible Financing* ([EDFI 2022](#)).

Several EDFI members, including BII and FMO, and PDBs such as the EIB and KfW, are also members of the *Adaptation & Resilience Investors Collaborative*, which aims to accelerate and scale up private investment in climate adaptation and resilience in developing economies ([BII 2021](#)). One of the explicit commitments of the Collaborative is also to “develop common good practice approaches for identifying, assessing, and managing physical climate risks, including common tools for engaging with counterparties” ([Adaptation & Resilience Investors Collaborative 2022](#), [BII 2021](#)). This echoes the individual commitments of the *EDFI Statement on Climate and Energy Finance* that “EDFIs will embed climate action and climate risk management at every level of [their] institutions”, which means that “EDFIs will adapt [their] internal decision-making processes and organisational incentives to take account of physical and transition risks from climate change, and to embed climate action at every level of [their] institutions” ([EDFI 2020](#)).

While some EDFI members, such as BII and FMO, have been very active in developing their climate risk assessment, cooperation to that end has so far been relatively limited among EDFI members collectively and with their international partners. The *Adaptation & Resilience Investors Collaborative* aims to remedy this situation and boost cooperative efforts towards adopting common principles and methodological approaches to address climate adaptation and identify relevant investor metrics. The Collaborative has already helped identify ways to assess and manage physical climate risk throughout the investment cycle, as illustrated in Figure 5.

The Collaborative will pursue this endeavour and seek to establish “guidance to identify, assess, and manage physical climate risks for direct transactions such as corporate and project financing, and develop a toolkit for engaging with and assessing counterparties in the context of indirect transactions such as financing via intermediaries” ([Adaptation & Resilience Investors Collaborative 2022](#)). This should notably help assess the links between adaptation measures and the reduction of climate risks. If properly quantified and translated into financial terms, it could be conducive to more accurate pricing of climate risks and net valuation of adaptation measures.

The EDFI members should collectively build on the Collaborative dynamics and similar or complementary initiatives, among them (e.g., BII and FMO), by European PDBs such as the EIB and KfW, and other relevant initiatives such as the United Nations Environment Programme Finance Initiative ([UNEP FI](#)) and Task Force on Climate-related Financial Disclosures ([TCFD](#)) to improve their climate risk assessment and climate risk pricing approaches.

Figure 5: Schematic approach to physical climate risk throughout the investment cycle

	Key objective	Key output
Screening due diligence	Identify which physical climate risk(s) may affect the performance of the activity during its expected lifetime	Inherent physical climate risk categorization
In-depth due diligence	Gain enhanced understanding about exposure and vulnerability to physical climate risks, related implications and counterparty's capabilities Identify and evaluate climate A&R solutions	Residual physical climate risk categorization informed by A&R solutions
Investment decision	Take investment decisions informed by physical climate risks and A&R opportunities	Investment decision
Investment legal agreement	Secure and formalize the commitment and resources required to increase an activity's / the counterparty's resilience to climate change shocks and stressors	A&R solutions formalised in an A&R action plan and supported with capital where needed
Monitoring & reporting	Oversee and support the counterparty to implement A&R solutions and build physical climate risk management capabilities Receive information on physical climate risks and the implementation of A&R solutions over the life of the investment	Ongoing physical climate risk management through A&R
Exit with value add	Enhanced activity's & counterparty's capabilities to withstand climate shocks and stressors Longer-term delivery of climate-resilient development impact objectives	Successful exit and value creation materialised

Source: [Adaptation & Resilience Investors Collaborative \(2022\)](#)

The British International Investment (BII), formerly called CDC, has been at the forefront of the European DFIs to address climate and environmental sustainability and conduct comprehensive climate risk assessments. This is also explained by the priority BII gives to climate finance, including its new five-year strategy target to reach 30% of all new investments to qualify as climate finance. BII is already close to its target, having increased its climate finance by 50% in 2021 compared to 2020, accounting for a quarter of the 2021 new commitments by BII ([BII 2022](#)). BII is also committed to aligning all its investments and portfolio with the Paris Agreement and reaching the net-zero target by 2050 ([BII 2022](#), [CDC 2020a](#)).

BII currently defines and assesses climate-related risks using its own approach, illustrated in Figure 6, which is embedded in its environmental and social process and investment due diligence ([BII 2022](#)). In 2021, BII systematically screened its direct investments, i.e., equity or debt BII direct investments, for physical climate-related hazards in sectors of infrastructure, agriculture, manufacturing, construction and real estate sectors, as part of its environmental and social due diligence process. These screenings are carried out using publicly available data and provide preliminary knowledge on whether the DFI should further carry out a climate risk or vulnerability assessment as part of the due diligence process.

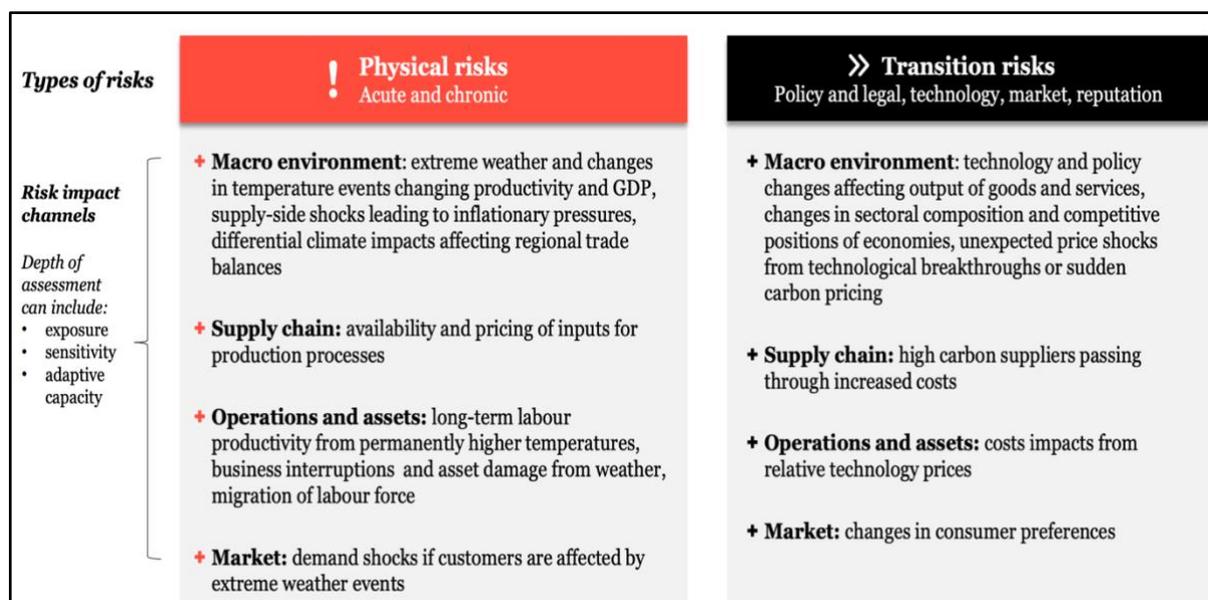
Figure 6: BII definition of climate-related risks and indicative opportunities

Risks	Potential financial impacts	Our building blocks for climate action	Opportunities Examples across industry groups
Transition risks <hr/> Policy and legal <hr/> Technology <hr/> Market <hr/> Reputation	Early retirement of existing assets driven by policy changes	Net zero by 2050	Infrastructure and climate <hr/> Renewable energy generation <hr/> Electric transport infrastructures <hr/> Climate-resilience and low-carbon water infrastructures
Physical risks <hr/> Acute: extreme weather events <hr/> Chronic: gradual shifts of the climate such as rising average temperatures; changes in precipitation	<hr/> Write-offs and early retirement of assets due to damages from extreme weather events <hr/> Changes in borrowers' repayment capacity due to increased capital costs and reduced revenues as a result of climate-induced business disruptions	Just transition	SMART <hr/> Green & climate-resilient buildings <hr/> Low-carbon and climate-resilient agriculture and nature-based solutions <hr/> Adaptation and resilient-enabling solutions e.g. climate analytics <hr/> Manufacturing of clean technologies
		Adaptation and resilience	Financial services <hr/> Green and climate-resilient lending <hr/> Climate insurance <hr/> Green bonds <hr/> Green trade

Source: [BII \(2022\)](#)

BII considers not only climate risks as environmental and social risks at the project level but also assesses them as financial risks at the portfolio level. To achieve this, it will integrate the *Metrics, Targets, and Transition Plans guidance* of the Task Force on Climate-related Financial Disclosures ([TCFD](#)) framework of physical and transition risks into its investment and portfolio management processes, (2) embed the TCFD recommendations into its overall risk framework and governance; and (3) take the first steps towards stress-testing its portfolio in different climate scenarios ([CDC 2020a](#); [TCFD 2017](#), [TCFD 2021](#)). Notably, the BII seeks to incorporate several TCFD-aligned climate risks into its overall risk assessment, as indicated in Figure 7. BII conducts thorough assessments to identify the type of climate-related risks it is potentially exposed to and develops metrics to quantify them, which is not a trivial undertaking.

Figure 7: Climate risks that BII will integrate into its broader risk management framework



Source: [CDC \(2020\)](#)

As part of its climate change strategy, BII is committed to better assessing climate risks and identifying opportunities related to climate change ([BII 2022](#)). The aim is to integrate climate risks into BII's overall risk management framework. BII considers a broad approach to climate change risks, defined as "the risk of financial loss, diminished reputation, or reduced ability to operate and deliver objectives as a result of climate-related transition and physical risks at BII or our investees", included as a specific risk type in its risk taxonomy ([BII 2022](#)). However, investing in programmes and projects prone to climate-related risks is subject to the risk appetite of the BII as defined by its Board ([BII 2022](#)). It is interesting to note that BII has established a dedicated climate change governance structure, adjusted in 2021, which includes a climate risk working reporting to the Investment Committee and the Executive Committee ([BII 2022](#)). Proper climate change management also requires direct involvement of the Board of financial institutions, which then must be provided with the appropriate information, including related to climate risks, as outlined, for instance, by the Global Association of Risk Professionals (GARP) and United Nations Environment Programme Finance Initiative ([GARP and UNEP FI 2022](#)).

BII also pays specific attention to its clients' climate-related risks exposure and management. To that end, BII has developed an [ESG Toolkit](#) for Financial Institutions and for Fund Managers, providing relevant practical guidance for responsible investors in developing countries. This comprises guidance throughout the [investment cycle](#), guidance [on E&S management systems \(ESMS\) and on Business Intelligence Management Systems \(BIMS\)](#), on a range of [sectors](#) and on specific [ESG topics](#), including biodiversity, climate change, pollution, waste management, resource efficiency and circular economy, as well as on Sustainable Finance Disclosure Regulation by the EU for fund managers ([BII and Akin Gump 2022](#)).

Although BII takes into account climate change and its associated risks, it continues to work on the development of a proper climate risk assessment tool to accurately evaluate its exposure to and manage physical risks ([BII 2022](#), [CDC 2020a](#)), [CDC 2020b](#)). Building on the TCFD recommendations, BII has enhanced its disclosure of climate-related risks and adopted an enhanced methodology for its quantitative assessment of transition and physical risks, focusing on three main factors: 1) exposure to climate-related risks, 2) sensitivity to climate change, and 3) resilience capacity to climate risks. In this endeavour, BII also engages with partners. These include EDFI and the *Adaptation & Resilience Investors Collaborative*, as mentioned above, notably in the context of the G7 ([Adaptation & Resilience Investors Collaborative 2022](#)). It also involves an active engagement of BII in the *Coalition for Climate Resilient Investment (CCRI)*, a private sector-led initiative to support investors and policy-makers to better assess and manage physical climate risks, which brings together a wide range of critical private, public and civil society actors. CCRI can be a valuable conduit to stimulate better climate risk assessment, as in the case of the CCRI's *Physical Climate Risk Assessment Methodology (PCRAM)*, for instance ([CCRI 2021](#)).

BII also intends to translate its improved climate risk assessment approach into financial terms to consider climate risk-adjusted financial returns, including over longer-time horizons. This is necessary to avoid the mispricing of climate risks, as discussed in this brief.

The Nederlandse Financierings-Maatschappij voor Ontwikkelingslanden N.V. - Entrepreneurial Development Bank (FMO), the Dutch DFI, defines climate risks as the risks that are posed by direct or indirect - through the counterparty- exposure to climate change ([FMO 2022](#)). FMO considers both an inside-out perspective and an outside-in perspective in line with the double materiality concept. In this regard, FMO acknowledges the financial and non-financial impact of physical and transition risks that can be transmitted to credit, operational, liquidity, business model, and regulatory compliance risks, as presented in Box 2. Regulatory developments and market practices in this regard are closely monitored.

Box 2: Climate-related risks as presented by FMO

In its 2021 Task Force on Climate-related Financial Disclosures (TCFD), FMO considers two types of climate-related risks: physical and transition risk ([FMO 2022](#)).

Transition risks: FMO presents transition risks to mean climate risks that arise from the uncertainty relating to the timing and speed of the adjustment process to an environmentally sustainable economy. Such transition risks can materialise through policy, legal, regulation, reputation, technology, market, or behavioural changes ([FMO 2022](#)). The continued new regulations (e.g., carbon pricing and taxation) to create a carbon-neutral world might cause additional financial costs – which might increase FMO's risk exposure – but also opportunities. The additional disclosure regulations in line with the European Banking Authority (such as transparency and Pillar 3) might also require FMO to carry out extra processes to comply with

them, especially considering the complexities of applying European regulations and related data requirements to clients operating in emerging markets.

Physical risks: FMO defines physical risks as climate risks that arise from the impact of climate change, stemming from, e.g., extreme weather events and gradual shifts in climate. These can be either chronic or acute. Physical related risks such as floods can cause damages to the assets and property of FMO clients, which might increase operating costs or reduce clients' creditworthiness (FMO 2022). Besides, ever-increasing climate-related risks can influence insurance premiums or reduce insurance companies' willingness to offer services under such high risks. This might increase the bank's exposure to credit and business model risks.

FMO currently assesses climate risk at the project level, that is, on specific transactions but in the broader context of its ESG assessment, relying on FMO in-house staff and independent consultants. In assessing climate risk at the individual investment level, FMO also takes into account the asset client's location (sector and country), the client, the capacity of the client, and the client's ability to adapt to the risks in question. The capture of broad risks is already a challenge for most banks. The individual evaluation of climate risks might worsen this impediment by leading to the problem of double counting as additional costs are included at the expense of benefits, which might increase the pricing of risk and make development finance expensive. Moreover, the impact of climate risks is difficult to quantify in the short term. On some occasions, the short-term costs of climate change might outweigh the benefits, but this might not be the case in the long run.

At the portfolio level, FMO has made progress in analysing exposure to climate risks across sectors of its operations and at the country level. It has also updated its risk taxonomy and risk appetite framework to include ESG risks as "a risk type with a defined appetite," climate change as "an external causal factor," and plans to feature climate risk assessment in its due diligence processes (FMO 2020). FMO is also putting in place processes that will enable it to better integrate climate-related risks into its strategy, risk management framework, and disclosures for the next two to three years, as recommended by both the Dutch Central Bank (DNB) and the European Central Bank (ECB) (FMO 2020; 2021).

In 2021, FMO has also engaged with regulators and is set out to implement the expectations of the ECB guide on climate-related and environmental risks and hopes to align these with the TCFD recommendations (FMO 2021; 2020; 2019). With the approval of its management board, FMO has also focused on developing an ambitious climate risk project that would lead to the development of, among others, (1) the climate-risk framework that is intended to assess the portfolio of FMO and new transactions, (2) scenarios; and (3) stress-tests. FMO is also currently working on integrating climate risks from the contracting and monitoring stage, ensuring that this is formalised in the due diligence processes (FMO 2020). The new framework will help FMO assess climate-related risks at the portfolio level. FMO is already making progress in this aspect through its structured portfolio scan that is intended to create a

better understanding of short-, medium- and long-term climate-related risks. It started with its energy portfolio and will be extended further to cover the investment portfolio ([FMO 2020](#)).

3.3 National promotional and development banks: KfW and CDP

Kreditanstalt für Wiederaufbau (KfW) is the [world's largest national development bank and Germany's third largest bank by the balance sheet](#). As a national promotional banking institution, KfW invests mainly in Germany, but it also acts as the German public development bank, active in many developing countries. KfW has adopted a comprehensive sustainable finance strategy and strong sustainability and ESG guidelines ([KfW 2022e](#), [KfW 2022d](#)). Not surprisingly, KfW's ESG risk is externally assessed as negligible (with strong management of ESG material risk and low ESG risk exposure), making KfW a top ESG performer among all financial institutions ([Sustainalytics 2022](#)).

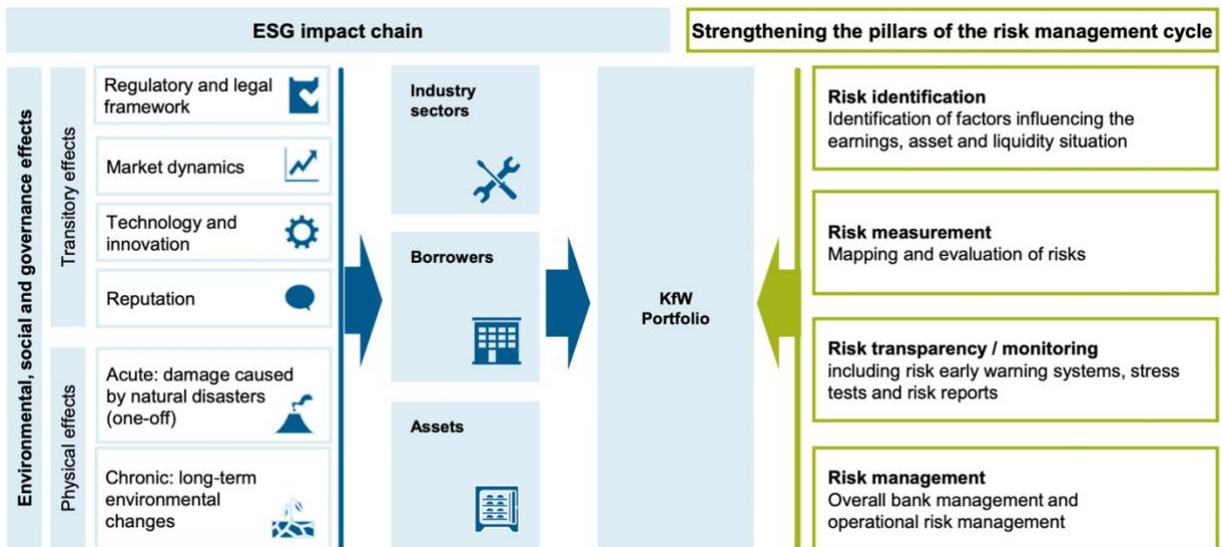
In 2021, KfW started the practical implementation of its 'transForm project' that aims at empowering the bank towards the sustainable finance agenda through four pillars, 1) KfW-wide impact management, 2) the compatibility of KfW financing activities with Paris targets, 3) strengthening the ESG risk management, and 4) reporting financial sustainability data, including according to the EU taxonomy. In contrast to BII, KfW does not classify climate risks as a separate or new risk category under its risk management framework. Instead, it considers them part of many other risk categories, i.e. credit, reputational, and operational risks, in particular, physical risks ([KfW 2022b](#)). Indeed, KfW stresses that "neither form of risk reflects primarily the damage caused by climate change, but its financial impact for KfW" ([KfW 2020](#), [KfW 2022b](#)). KfW assesses climate risks as part of its ESG risk management, presented in Figures 8 and 9. The objective is to assess both how KfW operations can help transform the world, contributing to climate change mitigation, adaptation and resilience, and biodiversity conservation (the inside-out perspective) and how climate-related physical and transitional risks may affect KfW operations and risk exposure, its clients/borrowers and portfolio (the outside-in perspective) ([KfW 2022b](#)). KfW has set out to strengthen its ESG risk management in terms of transparency, assessment, management, and recognition. Progress has been achieved in this regard. KfW has developed an ESG risk profile database, screens regulatory requirements, risk types and risk management cycles and carries out climate risk stress tests. Looking forward, it hopes to integrate ESG risks into its overall risk management, thereby potentially also providing the opportunity to consider compound risks (as suggested by [Monasterolo et al. 2020](#), [Ranger et al. 2022](#) and [Ringsmuth et al. 2022](#)). KfW also seeks to increase the integration of detailed ESG data into the ESG risk profile, including physical and transitional climate risks, and further develop its stress testing capabilities ([KfW 2022a](#)).

Figure 8: An overview of ESG risk management in KfW's sustainability concept



Source: KfW: tranSForm – the core of KfW's Sustainable Finance Agenda

Figure 9: KfW ESG risk management mechanism



Source: KfW (2022e)

KfW has also been the first German bank and unilateral promotional bank to be an official supporter of TCFD in October 2018 (KfW 2020). It follows the recommendations of the TCFD and its climate-related risks and opportunities approach to promoting transparency in its climate risk reporting. It is also worth noting that TCFD recommends that financial institutions disclose climate-

related risks and opportunities based on [four building blocks](#), as presented in Figure 10 (KfW 2022b). KfW also conducts scenario analyses based on TCFD principles to determine the resilience of its business model to different climate risk potential future occurrences (KfW 2022b).

Figure 10: TCFD recommendations and dimensions for climate reporting



Source: [KfW \(2022b\)](#)

It is worth noting that climate risks are explicitly considered in the sovereign rating of KfW, affecting about 30% of KfW's portfolio (Schulze and Hastermann 2022). Climate risks may also affect the rating of specific funds and corporate ratings. Though KfW does not yet directly price climate risks, climate risks affect the probability of default and rating of KfW operations and funds, thus affecting KfW pricing. KfW's ESG risk assessment also influences the rating and, thus pricing of KfW. KfW also conducts stress tests on the exposure of its portfolio to transition risks. Looking forward, KfW plans, in 2023, to undertake a systematic assessment of (additional) ESG-risk drivers for all its sovereigns, banks, corporates and funds activities. It also plans to systematically evaluate climate risk (physical and transition) exposure for over 90% of KfW's portfolio and to conduct a stress test of its portfolio related to physical climate risks. KfW will also more systematically introduce ESG-risk data in its risk management cycle and validation decision-making process (Schulze and Hastermann 2022). Yet, KfW's climate-risk approach still falls short of seeking to directly price climate risks.

[Cassa Depositi e Prestiti \(CDP\)](#) is a National Promotional Bank with a 99% focus on Italy, with an expanded mandate since 2016 to international development cooperation as the Italian public development bank. [CDP](#) considers climate risk as a new field in finance but approaches it broadly. At the project level, the current development of the CDP, which its 2022-2024 strategic plan has strengthened, allows the bank to assess new projects on

sustainability. This assessment is majorly qualitative, and the bank engages limitedly in measuring climate risks quantitatively.

CDP also assesses climate risks as part of its ESG ex-ante risk monitoring and evaluations. It recently strengthened its processes for assessing its exposure to climate risks based on its nature and in compliance with the ECB and the European Banking Authority (EBA) requirements ([CDP 2021](#)). Relative to general financial risk consideration, CDP considers an extended period for climate-related risks ([CDP 2021a](#)). As the Italian development bank, CDP evaluates the risks of climate risk to understand their potential financial (economic) and non-financial (social, e.g., reputation) impact, as presented in Box 3.

Box 3: Climate-related risks as presented by [CDP](#)

Like BII, FMO, and KfW; [CDP](#) has also committed to the TCFD voluntary climate risk disclosures, reporting on the defined areas, particularly governance, strategy, risk management, metrics and targets - see Figure 10 ([CDP 2021a](#); [CDP 2021](#); [Econometrica - CDP 2022](#)). It evaluates climate risks together with environmental risks based on the following definitions.

Climate risks constitute both physical and transition risks. CDP defines **(1) physical risks** as risks of direct or indirect financial losses due to recurring or extreme weather and natural events, while **(2) transition risks** are those business risks that are linked to global warming mitigation policies that focus mainly on the energy sector ([CDP 2021a](#)). They are related to potential direct or indirect economic losses caused by a transition to a low-carbon and more environmentally sustainable economy ([CDP 2021a](#)). CDP also considers **(3) environmental risks** are risks resulting from damage to the environment during business activities and litigation risks from infringement of environmental protection regulations with the potential to cause reputation risk.

CDP carries out a qualitative and quantitative analysis to assess how the above climate-related risks transmit into capital adequacy and risk-weighted assets, liquidity risk, funding risk, market risk, credit risk, insurance risk, reputational risk, policy and legal risk, systemic risk, operational risk, strategic risk, among others ([CDP 2022](#)). CDP has also developed a climate and environmental assessment tool to evaluate the above three types of risk (presented in Box 2) based on setting risk classes in a qualitative-quantitative rating system - the sustainable development assessment (SDA), and this is compliant with the climate and environmental risk guidelines set by the ECB ([CDP 2021b](#); [2020](#); [ECB 2020](#)).

At the project and portfolio levels, the CDP uses the sustainable development assessment (SDA) to conduct a dimensional impact assessment by generating appropriate prudential assessment ([CDP 2021a](#)). This helps the bank to evaluate the likelihood of credit losses and assign a rating to counterparties based on their creditworthiness.

3.4 Export Credit Agencies: Atradius Dutch State Business and Bpifrance

Export credit agencies (ECAs) are financial institutions that tend to converge more with MDBs, DFIs and NPBs. They can be private companies or government agencies and provide different financial services, e.g., insurance, guarantees, and loans, among others, for the export of goods and services from a domestic creditor economy to a debtor economy abroad ([Shishlov et al. 2021](#)). ECAs can act as direct lenders, and when government agencies, they are often mandated to support national economic interests abroad through providing earmarked project finance and equity instruments. Additionally, while they are broadly understudied, ECAs are highly engaged in supporting the development of the private sector of developing countries and provided US\$ 2.47 trillion, far beyond all public development banks, including MDBs, in investments in 2018.

TCFD calls on all companies, including ECAs, to disclose their climate risks ([FHL 2020](#)). However, ECAs have been criticised by civil society organisations for their insufficient environmental and social standards, accountability and transparency, with arguably more than [90% of them not abiding by ESG standards](#). They have also been criticised for still highly financing fossil fuels and not yet implementing the pledge made by 39 countries at the UN Climate Conference [COP 26](#) to end new direct international public financing for unabated fossil fuel projects ([COP26 2021](#), [ECA Watch](#), [Gencsu et al. 2021](#), [IISD 2021](#), [IISD 2022](#), [Shishlov 2021](#)). Only a few ECAs have adopted new policies aligned to this pledge, including in Denmark and the UK. In contrast, others seem to be moving in that direction, like Credendo in Belgium ([Oil Change International 2022](#)). A coalition of ECAs, which comprises Belgium, Denmark, Finland, Germany, Italy, Netherlands, Spain, Sweden, and the UK, has engaged in some developments to address this issue, working together to promote investments in climate neutral and resilient projects as part of the [export finance for the future \(E3F\)](#). The aim is notably “to adopt Paris alignment strategies for their official trade and export finance” and “build a shared climate-oriented methodology and review of our activities to provide transparency on the progress that is made towards more sustainable financing” ([E3F 2021](#)).

Although effective climate risk assessment builds resilience to climate change and increases the perceived benefits of investing in climate adaptation and mitigation to protect assets against future climate change in short-term and long-term risks, ECAs are yet to take significant steps to accurately assess the climate risks. The OECD, for instance, has set **special provisions for climate adaptation under the OECD Climate Change Sector Understanding (CCSU) for ECAs**. Still, it is unclear if any ECAs have used these terms and conditions, especially in terms of extended payment terms.

At the European level, there is not yet a common approach adopted by ECAs to assess climate-related risks. The approach by the Dutch ECA, [Atradius Dutch State Business \(Atradius DSB\)](#), is highlighted in Box 4, and the one by the French ECA, [Bpifrance Assurance Export](#), in Box 5.

Box 4: Atradius Dutch State Business and its climate-related risk assessment approach

While the Dutch government and the De Nederlandsche Bank NV (DNB) - the Dutch central banks - are leading in regulating climate change, Atradius Dutch State Business (Atradius DSB) is still in the early stages of tackling climate change. As of 31 December 2021, 21% of the Atradius DSB portfolio was for investments relating to fossil fuel projects ([Atradius DSB 2022](#)). Between 2012 and 2018, two-thirds (€10.8 billion) of the export credit insurances provided by Atradius DSB were for the fossil energy sector ([Both ends ND](#)).

Atradius DSB excludes support related to coal and unconventional oil and gas. Besides, as advocated for by COP 26, Atradius DSB expects top-end support for fossil fuels. Atradius DSB does not yet know its total climate-risk exposure and does not yet carry out greenhouse gas emissions (GHG) accounting at the portfolio and institutional levels ([Censkowsky et al. 2021](#)).

Over time, however, progress has been made, and good intentions have been expressed. Between 2016 and 2019, the Atradius DSB focused on supporting a green transition in its products. In 2019 - before the EU taxonomy was issued, Atradius DSB - with the support and approval of the Ministry of Finance, started considering developing a methodology that would measure the share of fossil fuel-related activities. This methodology has helped the ECA understand its contribution to fossil fuels but still fails to capture some data at the project level ([Censkowsky et al. 2021](#)). Since 2019, Atradius DSB has accelerated efforts towards supporting a green transition, and in 2021, it launched a new product, the green cover investment for green investment with export potential ([Klasen et al. 2022](#)).

Box 5: Bpifrance and its climate-related risk assessment approach

Bpifrance, which is equally owned by the French state and Caisse des Dépôt, is a French public investment bank for entrepreneurs, which has been described as a national promotional bank, an innovation agency, a sovereign fund and an export credit agency ([CICERO 2021](#)). [Bpifrance Assurance Export](#) has also positioned itself as a [French Climate Bank](#), offering climate bonuses based on how a project abides by the compliance criteria set and defined by the European Taxonomy of Sustainable Activities ([EC 2021](#); [bpifrance 2022](#)). Indeed, based on analysis by the [CICERO \(2021\)](#), Bpifrance, also a member of E3F, appears to comply with the relevant technical mitigation criteria proposed by the EU taxonomy.

Although, Bpifrance has not supported coal-related projects since 2016; it seems to have no overall emission targets for its business operations, and it is yet to start reporting on its contribution to greenhouse gas emissions ([Shishlov et al. 2020](#); [CICERO 2021](#)). [CICERO \(2021\)](#) also argues that Bpifrance has not yet succeeded in aligning its operations with the TCFD recommendations. Overall, the findings of this study show that Bpifrance still has to develop a climate risk assessment strategy to understand the degree to which its projects and overall portfolio are exposed to risk.

[Atradius DSB](#) is mandated by the Ministry of Foreign Affairs and the Ministry of Finance to provide a range of credit insurance and guarantee products to exporters, internationally operating construction companies, banks and investors ([Atradius DSB 2022](#), [Shishlov et al. 2020](#)). Atradius DSB has developed a “green label” - a green list of economic activities aligned to the EU taxonomy's objectives that defines climate-relevant transactions in its portfolio. It is making progress in elaborating its methodology for assessing climate-related risks in collaboration with FMO while trying to tailor this to the ECA business model. It has also shared its methodology with other ECAs. Atradius DSB is scheduled to review its methodology in 2022.

Its approach is more qualitative because quantitative data (e.g., on clients - especially SMEs and sector GHG emissions) is challenging to collect. As a consequence, Atradius DSB cannot precisely assess the extent of climate risks related to transactions. It is currently developing a methodology for carbon footprint accounting, which does not yet exist for ECAs, as part of its climate strategy, following the Dutch government's commitment to ending fossil fuel support and reaching the net-zero target by 2050. Climate risks may also be considered in the Environmental and Social Impact Assessment (ESIA).

Unlike DFIs, ECAs are heavily regulated. This might affect their climate ambitions and arrangements that specify a level playing field - terms and conditions and premium models to incentivise ECA might need to be negotiated. For instance, Atradius DSB applies premium rules based on the OECD agreement, which does not allow for a bonus or malus for climate-positive or negative transactions. Atradius DSB should assess its risks on stranded assets in its portfolio and effects of climate change risks (location of clients and the activities for CRA), underwriter focus on financials, e.g., 10-year timeframe. Overall, climate risk assessment for Atradius DSB ought to be integrated and covered by the underwriting work as financial risks. Climate-related pricing considerations should probably be discussed at the OECD level based on premium rules on minimum thresholds.

4. Limitations of climate-risk assessment approaches

While financial development actors employ different approaches to assessing climate-related risks, they appear to face common challenges. These challenges can, at most, weaken the validity of their approaches and at least make it demanding for development financial institutions, including multilateral development banks, national promotional banks and export credit agencies, to include climate risks in their financial and nonfinancial risk assessment. This section discusses different limitations associated with strategies currently used by the institutions under study.

Limitation 1**Underestimation or overestimation of the climate risks**

Poor climate risk assessment and models that are not robust and do not adequately address uncertainty can lead to significant underestimation or overestimation of climate risks. While underestimating the climate risks might cause financial institutions to incur high unanticipated risks, affecting their overall portfolio, overestimating risks is a disincentive to invest in climate action and climate-risky countries, sectors and sectors and companies – especially in developing countries ([AfDB 2021](#)). This is especially the case with climate adaptation risks as financial Institutions cannot clearly understand the magnitude of climate risks to which they are exposed and their likely impact, at times wrongly perceiving adaptation projects as highly risky and not worth the benefits. . In addition, this can disproportionately affect emerging markets where a lack of available data might increase investors' perception of the risk. Measuring physical and transition risks and the impact of climate change remains problematic.

Limitation 2**Lack of proper methodologies to measure climate risks**

Among the selected financial institutions, only the EIB appears to have a climate risk assessment model and assigns country scores based on the country's exposure to climate-related risks. Many financial institutions also consider climate-related risks in their environmental and social risk assessment. The multi-facet approaches to climate and sustainable assessments can either dilute a specific climate risk assessment or enrich it, presenting methodological challenges in both cases. Access to information and knowledge differs among financiers. Some DFIs, such as FMO, rely on third parties, including independent consultants, to assess climate risks, while others have greater in-house expertise and capacity. Financial institutions, in general, lack a standardised risk assessment model with some common metrics. They often have difficulty obtaining minimal information or data (foreseeable and historical) required for climate risk assessment. This has led to fragmented approaches and methodologies for climate risk assessment, making it hard to aggregately use the information obtained to advise policy. There is also a tendency to rely overly on qualitative assessments. The lack of harmonised data and methodology is especially glaring for emerging markets.

Limitation 3**Assessments are generally done at the macro-level**

Financial institutions that invest in developing models for climate risk assessments generally use them to carry out macro-level climate risk assessments. For instance, the EIB in-house country score considers climate risks at a country level and gives countries different climate risk scores. BII does the same. Aggregated climate risk assessments provide averages that tend to

hide disparities in the physical risk exposure within a country, especially for countries with a more extensive geographical scope and differentiated exposure to climate risks. Besides, even when the climate risk assessment is conducted at a company level, it rarely considers the asset level climate risk exposure. This creates an overgeneralisation problem that might lead to climate risk mispricing for individual projects. Similarly, climate risk assessments consider useful sectoral and thematic issues but often fail to capture the specificities of a particular operation, client or activity.

Regarding climate physical risk assessment, the availability of highly granular, geolocalised information is of utmost importance. By considering geolocalised information about productive assets (e.g., industrial plants, real estate, etc.) owned by companies, one can downscale climate scenarios and disaster risk assessment (Caldecott et al. 2018, Eberenz et al. 2020) from high-resolution (e.g., sector or company-level) to low-level resolution (i.e., asset-level). Geolocation and type of assets play an important role in climate physical risk estimation. Accordingly, if asset-level information is unavailable, physical climate risk and, in turn, effects of climate finance policies cannot be adequately estimated. Similarly, transition risk assessment requires a more granular approach.

Limitation 4

Data on climate risk variables is usually missing

Only limited data exist on climate risk variables, especially in developing countries. Most of the data is missing or inadequate ([Calthrop 2022](#)). For physical risks, it often remains challenging to measure climate risks at project and portfolio levels based on granular data. This is especially the case with chronic risks. For some countries, when it comes to measuring the impact or economic consequences (e.g., physical risks do not affect buildings but might businesses, what role do insurance companies play) of climate change on a series of variables, this data is not often unavailable ([Ferrazziet al. 2021a](#)).

Moreover, obtaining additional information, especially after the signature, is often tricky. Counterparties may also be small and numerous, making assessing their climate risk exposure resource-intensive and cumbersome. Financial institutions often rely on external data at country and sectoral levels. Some sectors, such as the automobile industry, may also receive high climate risk scores due to regulatory pressures. More data is needed at the portfolio and project levels for proper risk assessment and pricing of loans.

Limitation 5

Lack of a central database providing data on all climate risk indicators

In addition to the lack of essential data, the limited data available is obtained from fragmented sources. For instance, the EIB uses data from multiple sources, including UN agencies, universities, research companies, and insurance institutes. Some institutions use different methodologies to develop their

database, which may make them incoherent. The misalignment is in terms of 1) the metrics and dataset to use for specific climate risk, 2) the methodology and criteria to assess the level of climate risks, and 3) the tools used and the technical solution adopted.

The lack of a central database providing open data on climate indicators makes the process cumbersome for some financial institutions to consider carrying out climate risk assessments. There are also challenges associated with geolocation data, and obtaining data on relocated assets and supply chains is also challenging, especially with the COVID-19 revelation of co-dependence along the supply chains. More specifically, most publicly available databases provide highly aggregated information on socio-economic losses (e.g., EM-DAT CRED / UCLouvain, 2009; country-level data) and, thus, no further disaggregation of shocks at the level of physical assets, needed for proper climate physical risk assessments ([Bressan et al. 2022](#)).

Limitation 6

No harmonised industrial standards and a proper regulatory framework

There are currently no harmonised industry standards to guide climate risk assessment, especially concerning choosing the correct variables, when and how to aggregate variables (weights to give) and selecting the right metric to ensure comparability of variables by different financial institutions. Some financial institutions have uniquely developed their models, while others rely on broader ESG risk assessment and principles. There is also an improper regulatory framework on climate risks as regards international and national financial regulations on identifying, managing, monitoring and reporting climate risk assessments ([DNB 2020](#), [Deloitte 2019](#)). The ECB needs to further engage with financial institutions, including the EIB, on climate risks stress tests. There is also a need for capacity building to measure climate risk and adopt appropriate financial regulations ([AfDB 2021](#)).

Moreover, increased availability of information and harmonisation of standards is also needed at the level of real-economy firms. In this regard, the lack of information (e.g., financial data and extra-financial information, such as capacity and their role in the value chain) about the physical assets owned by firms is particularly concerning. It may lead to misestimation of economic losses because the type and geolocation of physical assets owned by a company play a crucial role in determining the firm's exposure to physical climate risk. Standardised reporting practices for physical assets held within firms' portfolios are needed because, even in cases where raw data at the asset level are available, companies' ownership structure may be so complex that it leads to serious consolidation issues ([Bressan et al. 2022](#)).

5. An option for improved climate risk assessment

There are some commonalities in the European financial institutions' concerns and overall approaches to addressing climate risks. However, among those institutions considered in Section 3, the lack of common frameworks and their fragmented methodologies are even more pronounced. In particular, some financial institutions' climate-related risk approaches consider climate transition and physical risk (e.g., EIB), while the current focus of some other institutions is primarily on climate transition risk (e.g., Atradius DSB). The lack of consistent methodologies negatively affects the overall quality of climate financial risk assessment and sometimes leads to ambiguous climate finance decisions.

In terms of physical climate risk, the need for proper methodologies to assess the risk from chronic and acute shocks on a highly granular level and connect asset-level physical risk to the financial risk of firms and investors has been well articulated by, e.g., Giglio et al. (2022). [Bressan et al. \(2022\)](#) have mainly developed the first comprehensive methodology that logically connects asset-level physical risk to financial risk for firms and financial actors and, more broadly, to systemic risk for the financial system. It does so by translating economic losses on physical assets and sectors from chronic and acute climate physical risks into financial losses and shocks on prices in the market.

The methodological framework developed by [Bressan et al. \(2022\)](#) allows for a dynamic, asset-level assessment of physical climate risk, considering the cascading losses through the ownership chains of firms and investors. The methodology considers the interplay of: scenarios of chronic risks, scenarios of acute risks, and firms' revenues across business lines and geo-locations. The methodological framework is articulated in six steps, depicted in the boxes in Figure 11.

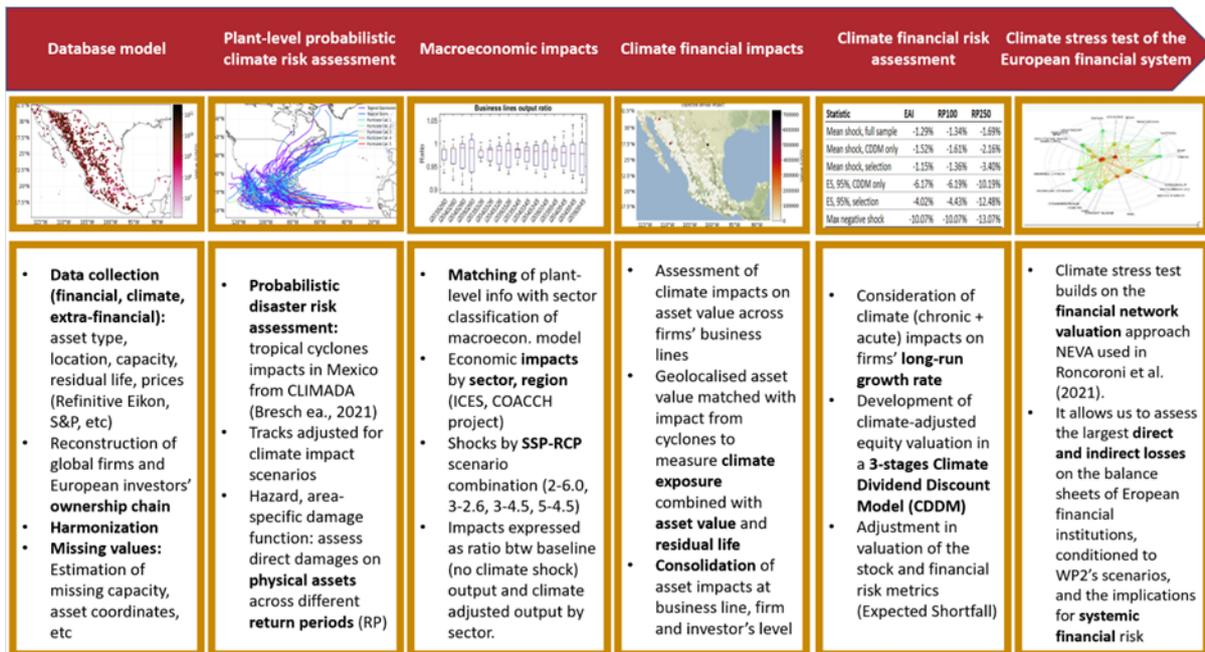
The first block consists of the development and implementation of the database model. The database model maps geolocalised physical assets and their non-financial information (climate, environmental, business), at the plant level, with the ownership chain information and financial information, at the level of financial contract and issuer (i.e., firm). It allows for the standardisation and harmonisation of the asset-level data and the estimation of missing values. The database model also leverages a newly developed methodology to decompose the firms' revenues into business units and business lines to estimate the relative contribution of physical assets.

The second and the third block in Figure 11 illustrate the methodology to quantify the exposure of geolocalised assets to physical climate risks and evaluate economic shocks to the financial valuation of assets, considering both

acute and chronic climate physical shocks. Acute shocks (depicted in the second block) at the asset level are obtained from probabilistic models of climate-related hazards. Building on the CLIMADA model (Bresch and Aznar-Siguan, 2021), [Bressan et al. \(2022\)](#) assess the damage of climate hazards, in this particular application, tropical cyclones, on individual geolocalised assets, considering different hazard intensity and climate change scenarios. Next, the methodology connects the asset-level acute shocks to sector-level chronic shocks (depicted in the third block) obtained from macroeconomic models. In their application, [Bressan et al. \(2022\)](#) leverage the outputs of the ICES macroeconomic model (Bosello et al., 2020, Eboli et al., 2010, Parrado and De Cian, 2014), with various climate scenarios defined as a combination of Representative Concentration Pathways (RCP) and Socio-Economic Shared Pathways (SSP), up to 2050. The shock on sector output is expressed as a ratio between the baseline output (i.e., no climate-related hazard and scenario) and climate-adjusted output. It should be noted that this methodology stage is modular; a range of probabilistic hazard models and macroeconomic models can be leveraged.

In the fourth block, economic shock is connected to the financial valuation of the asset, consolidating the impact at the firm level. Then, the asset-level (i.e. acute) and macroeconomic (i.e., chronic) shocks are translated into an adjustment in the financial valuation of stocks (see the fifth block). To this aim, [Bressan et al. \(2022\)](#) developed a Climate Dividend Discount Model, the CDDM, by introducing spatial information on firms' assets and climate-adjusted growth levels into equity valuation. CDDM is based on the three-stage version of the Dividend Discount Model (DDM, Sharpe et al., 1999). CDDM considers the climate change impact on firms' long-run growth rate across RCP-SSP scenarios and returns a shock on firms' equity values. Finally, the sixth block includes a climate stress test of the European financial system, building on the financial network valuation approach NEVA used in Roncoroni et al. (2021). This allows us to assess the largest direct and indirect losses of financial actors and implications for systemic financial risk.

Figure 11: Methodological framework of the asset-level approach to climate physical risk assessment and financial valuation



Source: Adapted from [Bressan et al. \(2022\)](#)

6. Policy recommendations

Recommendation 1

Develop a reliable database to provide the climate related risk information

The development finance actors should combine efforts to pioneer genuinely open and transparent data policies and databases on reliable climate-related risk information, easily accessible, sharable and reusable, covering all geographic areas. This should be done preferably in connection with other financial and climate-related actors, such as those part of the *Coalition for Climate Resilient Investment (CCRI)*. The open database on climate risks should be based on harmonised and standardised methodologies. For instance, it could gather data based on the EU taxonomy for sustainable finance. The Sustainable Finance Strategy of EU aims to reorientate capital towards sustainable investments. The lack of accurate data will be an obstacle to capital allocation, creating systemic risks in the economy and inefficiency in capital markets. An open, standardised database would, in turn allow for more standardised reporting on climate risks, helping solve the problem of using fragmented data sources, which also contributes to climate risk mispricing.

Recommendation 2**Improve transparency of risk assessment methodologies**

Most financial institutions use climate risk assessment approaches that are not fully transparent and openly accessible. Transparency can be improved by making financial institutions' climate risk assessment models, methodologies and strategies readily available and easily accessible to the public and interested stakeholders. This will promote their proper disclosure of climate data and attract debates on how these approaches can be improved for proper risk assessment.

Recommendation 3**Develop harmonised climate risk assessment methodologies**

Given the wide range of approaches to climate risk assessments (UNEP FI 2021, UNEP FI 2022), there is a strong need to develop a standardised climate risk assessment methodology. It should be based on common, harmonised terminologies that can be used by small and big investors alike. The ESG criteria are already in place, but efforts can be made to encourage proper climate risk assessment as this is not currently done effectively. Such an approach and terminologies should cut across financial institutions in developed and developing countries while considering the two's unique characteristics. Harmonised climate risk assessment methodologies will help provide comparative information that policymakers can use to advise investments in climate action based on financial valuations and investment cost-benefit analyses. Relying on and further strengthening already available initiatives such as the [physical climate risk assessment methodology \(PCRAM\) that has been developed by the CCRI](#) and the standardised metrics proposed by the Task Force on Climate-related Financial Disclosures (TCFD) could be a good start ([CCRI 2021](#), [TCFD 2021](#)).

Recommendation 4**Support establishment of project climate risk assessment**

Most climate risk assessments are done at the macro level and fail to provide the granularity needed for detailed analysis. Obtaining project-level climate-related risk information is difficult as most counterparties. Concerted efforts should be undertaken to refine project climate risk assessments based on transparent and harmonised methodologies. Moreover, innovations already exist in developing countries, with agencies working to provide data on climate risks a project might be exposed to. These can be extended to consider projects and businesses along the different sectoral and geographic value chains, on specific stages and in their entirety.

Recommendation 5**Exploit the potential of insurance companies**

Insurance companies can help in many ways. First, as climate risks and their impact are hard to measure, insurance companies can close the data information gap by providing climate-related risk data at the project level. Insurance companies use satellite data to know what and what not to insure. There is a need to build trust actors, as in the case of farmers in insurance systems, as these are usually suspicious about whether they will be paid back or not ([EIB 2020c](#)). Moreover, providing insurance to counterparties in developing countries, including smaller enterprises, reduces the magnitude to which they will have to deal with the consequences of climate risk from their portfolio. Bringing the insurance sector along can help improve precision in the climate risk assessment and pricing, possibly increasing the efficiency and affordability of insurance services.

Recommendation 6**Address the information asymmetry and knowledge gaps**

Finance institutions struggle to assess climate risks with precision because of knowledge gaps. Leading financial institutions for development can play a catalytic role, pioneering approaches (as in the case of BII, EIB, FMO and KfW, for instance), helping build coalitions and reaching out to other actors. Further training to build capacity can address the information asymmetry and knowledge gaps through knowledge generation. This can also be carried out in counterparties in developing countries and among independent agencies that assess climate-related risks in developing countries. Creating awareness among financial intermediaries, who are the partners or clients of financial institutions for development, can bring about medium and long-term benefits by improving the disclosure of climate-related data and hence leading to precise climate risk assessment.

Recommendation 7**Enforce climate related regulation at all levels**

Many climate commitments, regulations and guidelines, essential in understanding climate risks and combating climate change, have already been adopted. However, many financial actors at the moment are reluctant to, and often not required, implement them. Financial institutions for development can have a strong demonstration effect, pioneering or piloting innovative approaches to climate risk assessment and climate change initiatives. They can encourage their peers, clients and partners to pay greater attention to climate risks and draw on their experience or models. Climate risk reporting guidelines and regulations should be accommodated in international and national financial regulations, and financial institutions should be encouraged or required to abide by them. Voluntary commitments, through coalitions and group initiatives, can have a powerful influence, as in the case of EDFI initiatives, the

Adaptation & Resilience Investors Collaborative, the Coalition for Climate Resilient Investment ([CCRI](#)) and the Task Force on Climate-related Financial Disclosures ([TCFD](#)), for instance.

Recommendation 8**Embody climate risk assessment in overall sustainable investment strategy and use concessional financing to cover high climate risks**

Improved climate risk assessments may highlight the high level of climate risk exposure associated with some operations, deterring financiers from investing in such risky conditions, including in adaptation and resilience projects. Therefore, financial institutions must include climate risk assessments as an integral part of their climate and sustainability strategy. Financial institutions for development, in particular often have an ESG approach, Paris alignment, net-zero carbon targets, and climate finance targets as commitments. To achieve their objectives, they can also rely on concessional financing, when necessary, to cover the high climate risks associated with projects that have a high development impact.

Recommendation 9**Explicitly price climate risks and net returns from climate adaptation**

Climate risk assessments should ultimately also lead to a more thorough quantitative evaluation of climate-related risks. Financial institutions should develop and adopt methodologies to translate climate-related risks in financial terms, explicitly pricing climate-related risks and quantifying the net returns from climate adaptation and resilience investments. The failure to do so leads many financiers to erroneously misprice climate risks and consider climate adaptation endeavours as a cost only, resulting in inefficient investment allocation away from climate mitigation, adaptation and resilience.

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Towards adaptive and
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