

CLIMATE-RELATED FINANCIAL RISK REGULATIONS ARE FIRMING UP ALL AROUND THE WORLD

THE WORLD'S CENTRAL BANKS AND REGULATORS ARE WATCHING GOVERNMENTS CREATE POLICIES AND PROMISES THAT WILL CAUSE SHORT-TERM ECONOMIC PAIN, IN THE NAME OF LONG-TERM SUSTAINABILITY. THE LIQUIDITY IMPLICATIONS ARE BECOMING OBVIOUS, AND BANK REPORTING RULES ARE CHANGING. BANKS SHOULD FOLLOW THESE CHANGES CAREFULLY TO AVOID BEING LEFT FLAT-FOOTED IN THE GLOBAL RACE TO NET ZERO.

Climate Risk Perspectives

GREEN LIGHTS



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INTRODUCTION

Welcome to Green Lights, the fourth e-book in our green finance series. This collects articles 31 to 35, and covers the regulatory advances in the area of climate-related financial risks around the world.

From guidance from the Basel Committee on Banking Supervision (BCBS) (which has been significantly enhanced in the climate change area), to specific advances from the Federal Reserve System (Fed), European Central Bank (ECB), and multiple African central banks, the need to report potential credit and liquidity impacts is growing.

The UK was a frontrunner in terms of green policy, but the possible effects on the climate-based economic scenarios of missing its early targets are explored in the 'Mission Zero' piece. Africa and the EU are leading the way in adopting BCBS' best practices, and the US is catching up fast. All are covered in specific papers, as well as a review of the BCBS guidance itself.

Understanding the state, directionality and speed of change of these regulations is vital to prudent risk management and preparedness for regulatory compliance. We hope that you find this e-book informative and useful while preparing to include climate-related risks into your risk management frameworks.

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There is much discussion about the physical impacts of climate change on africa, but the central banks of this continent are well aware of, and are preparing regulations to deal with increased credit and liquidity risks created by the physical and transitional elements of global warming. Banks in the region need to pay close attention.

Chapter 1

MISSION ZERO: A REPORT THAT CAN HELP BANKS CHART THEIR WAY TO FINANCING A GREEN FUTURE

THE UK'S 'MISSION ZERO' REPORT OFFERS BANKS A USEFUL BLUEPRINT FOR MEASURING THE GULF BETWEEN AMBITION AND POLICY. THE REPORT AND ITS RECOMMENDATIONS ARE USEFUL IN CLIMATE SCENARIO PLANNING, AS WELL AS IN INTERPRETING RESULTS FROM THEM.

Originally published MARCH 08 2022

In January 2023, The UK released its assessment of its own progress towards net zero by 2050...

The report - [Mission Zero](#) - offers a detailed review of the progress made towards the UK's stated target, as well as the economic context in which net zero must be achieved. Throughout the report, it is stressed that:

- The transition to a sustainable economy involves significant disruption to the current UK model
- The transition offers as many economic opportunities, with 90% of GDP covered by the target
- The UK is in a global race to exploit 'green' economic opportunities, citing the US '[Inflation Reduction Act](#)' (IRA) and the EU's '[Fit for 55](#)' initiative
- The UK is well-placed in the global race due to its natural abundance of renewable energy, particularly offshore wind and green finance

10 priority missions were identified within the report:

A strategic framework and delivery plan for the critical networks of the future to turbocharge onshore and offshore development

1. Grid and Infrastructure



Full-scale deployment of solar including a rooftop revolution to harness one of the cheapest forms of energy, increase our energy independence and deliver up to 70GW of British solar generation by 2035

2. Solar



Pave the way for onshore deployment, working closely with communities to deliver local benefits

3. Onshore Wind



A programmatic approach for a next generation fleet of nuclear, supporting a high-tech British industry covering the whole supply chain

4. Nuclear



Setting a clear plan for industry decarbonisation built around long term investment in CCUS and hydrogen networks and technologies

5. Energy Intensives and Industry



Stimulate the efficient and circular use of resources across the economy, galvanising action on recycling and the reuse of critical materials

6. Circular Economy and Waste



Unblocking the planning system and reforming the relationship between central and local government to give local authorities and communities the power they need to act on net zero

7. Net Zero Local Big Bang



Working towards gas free homes by 2035 and giving consumers greater understanding of their household through a new Net Zero Performance Certificate

8. Energy Efficiency for Households



Embed nature and habitat restoration throughout transition plans, maximising co-benefits for climate and nature wherever possible

9. Net Zero Nature



Catalyse decisions and action with an R&D and technology roadmap to 2050, pushing for more agile regulation, and supporting up to three 10-year demonstrators

10. R&D And Innovation



Source: mission-zero-independent-review.pdf

A key point that is made early in the report underlines just how swiftly the net zero trajectory may steepen.

The Review's evidence points towards some basic principles of effective net zero decision-making that should underpin this action. We must:

- Quickly take the **decisions we know we have to**. This is how we will achieve net zero in a more affordable and efficient way, at the same time as providing certainty for inward investment in the UK;
- **Invest in research and development** so we are ready to take decisions that we know we are going to have to make, such as rolling out demonstrator projects; and
- Prepare the ground with **agile and flexible policy frameworks** so we are ready for the future, resilient in the face of uncertainty, and equipped to act at speed when opportunities arise.

Further, the economic conditions that must be created for the private sector to fully engage and play its part are detailed:

The UK economy is transitioning towards net zero – with businesses decarbonising and capturing new opportunities. But the Review has heard from the hundreds of businesses consulted that more is needed. In many cases, cross-cutting actions is required – on skills,

support for small and medium businesses, and providing the right investment environment. The Review recommends:

- **Reviewing incentives for investment:** Review how HMT incentivises investment in decarbonisation, including via the tax system and capital allowances
- **Protecting industries from environmental undercutting:** Progress with the consultation on carbon leakage measures and speed up decision-making to enable Government to implement effective future carbon leakage mitigations from 2026
- **Providing a forward look on the ETS:** To provide businesses with certainty and increase the incentives to invest in new, green technologies, the government should work within the UK ETS Authority to develop a pathway for the UK ETS until 2040
- **Building the skills needed for the transition:** Drive forward delivery of the Green Jobs Taskforce recommendations and the commitments from the Net Zero Strategy, reporting regularly on progress starting by mid-2023
- **Helping SMEs upskill:** Launch a 'Help to Grow Green' campaign, offering information resources and vouchers for SMEs to plan and invest in the transition

The important message here is that policies are under development to support the 'net zero' objective, and these policies will structurally make brown companies more expensive to run, at the same time as incentivizing their green competitors. It is this market-based 'invisible hand' approach that will go on to fundamentally change the funding conditions that banks will contend with as they, in turn, finance the transition.

Specific industries are singled out for green wins...

Homes and home building represent a large proportion of the UK's emissions, and naturally receive focus with specific recommendations that will have a material impact on firms building houses and the future market for private real estate. These include:

- Government must bring forward all consultations and work to mandate the Future Homes Standard by 2025 and for all homes sold to be EPC 'C' by 2033.
- A Net Zero Homes Standard should be considered for the future, as homes that have taken the appropriate steps to be as efficient as possible through a mixture of fabric and low-carbon heating measures will be more financially desirable to live in, buy, and sell.
- The government must urgently adopt a 10-year mission to make heat pumps a widespread technology in the UK and regulate now for the end of new and replacement gas boilers by 2033 at the latest.
- The government must urgently reform EPC ratings to create a clearer, more accessible Net Zero Performance Certificate (NZPC) for households.

The wider list of 25 industry-oriented high-level recommendations is as follows:

Objective	Recommendation
<p>1. Cleaner, greener homes</p>	<p>Provide certainty by 2024 on the new and replacement gas boiler phase out date to drive industry and investor confidence. The Review recommends bringing the proposed date of 2035 forward and legislating for 2033.</p> <p>Set a legislative target for gas free homes and appliances by the same date, to contribute to a gas free grid in future.</p> <p>Legislate for all homes sold by 2033 to also have an EPC rating of C or above, with exclusions around certain properties (e.g. listed properties, on grounds of affordability). Government should mandate landlords to include ‘average bill cost’ alongside EPC (and possible NZPC) rating, when letting out a property. This will help renters understand what costs to expect, while also helping to put a premium on energy efficient homes.</p>
<p>2. Cleaner, greener homes</p>	<p>Bring forward all consultations and work to mandate the Future Homes Standard by 2025 to prevent further delays by ensuring standard applies to all developments. This should include a consultation on mandating new homes to be built with solar and deliver the Net Zero Homes Standard, ensuring that the planning system is flexible enough to enable this.</p>
<p>3. Non-domestic energy efficiency</p>	<p>Legislate by 2025 the minimum energy efficiency rating to EPC B for all non-domestic buildings, both rented and owned, by 2030. Legislate for EPC B rating for all new non-domestic buildings from 2025.</p>
<p>4. Stable environment for business to plan and invest</p>	<p>Conduct and publish, before Autumn 2023, a review of how we should change regulation for emerging net zero technologies to enable their rapid and safe introduction, to support the net zero transition and boost growth.</p>
<p>5. Stable environment for business to plan and invest</p>	<p>By the end of 2023 HMT should review how policy incentivises investment in decarbonisation, including via the tax system and capital allowances.</p>

Objective	Recommendation
<p>6. Stable environment for business to plan and invest</p>	<p>Through their update to the Green Finance Strategy, BEIS and HMT should set out a clear, robust and ambitious approach to disclosure, standard setting, and scaling up green finance – including how it will meet existing commitments to implement Sustainable Disclosure Requirements across the economy; how it will provide a clear, long-term plan for attracting capital to meet net zero ambitions, and how to maintain the UK's position as the leading green finance hub internationally and metrics for success.</p>
<p>7. Stable environment for business to plan and invest</p>	<p>A new forum to coordinate across all regulators on the signals they are sending to businesses and investors across sectors about the net zero transition – including Ofwat, Ofgem, Environment Agency, Competition and Markets Authority, FCA, and the North Sea Transition Authority.</p>
<p>8. Long term funding certainty</p>	<p>At the next Spending Review, review options for providing longer-term certainty to a small number of major priorities for net zero – where we know that long-term policy commitment will be essential for success and provide long-term opportunities to save money.</p>
<p>9. Stable environment for business to plan and invest</p>	<p>Publish an overarching financing strategy covering how existing and future government spending, policies, and regulation will scale up private finance to deliver the UK's net zero enabled growth and energy security ambitions. This should include setting out the role of UKIB, BBB, BII, and IPA and UKEF in the transition.</p>
<p>10. CCUS</p>	<p>In 2023, government must act quickly to re-envisage and implement a clear CCUS roadmap, showing the plan beyond 2030. As part of the roadmap, government should take a pragmatic approach to cluster selection. This means allowing the most advanced clusters to progress more quickly.</p>
<p>11. Accelerating renewables</p>	<p>Set up taskforce and deployment roadmaps in 2023 for solar to reach up to 70GW by 2035 and onshore wind to reach required deployment levels for 2035 net zero grid.</p>
<p>12. Hydrogen</p>	<p>By the end of 2023, develop and implement an ambitious and pragmatic '10 year' delivery roadmap for the scaling up of hydrogen production. Government should deliver hydrogen business models as soon as legislation allows and confirm the long-term funding envelope available for hydrogen revenue support, to incentivise timely investment.</p>

Objective	Recommendation
<p>13. Nuclear</p>	<p>Implement reforms set out in the British Energy Security Strategy to double down on achieving UK's nuclear baseload requirement:</p> <ul style="list-style-type: none"> a. Expedite the set-up of Great British Nuclear in early 2023, ensuring required funding and skills are in place; b. Government and GBN to set out clear roadmap in 2023 for reaching final investment decision in the next Parliament. Government to ensure funding is in place. As part of the roadmap, government should assess the possibility to increase the current ambitions supporting the development of supply chain to service a fleet of projects; c. Roadmap to set out clear pathways for different nuclear technologies (including small modular reactors) and the selection process. This should consider how to use programmatic approach to deliver further cost reductions in a competitive environment; d. Government to deliver on siting strategy by 2024.
<p>14. Empowering consumers</p>	<p>Ofgem should maintain focus on a timely implementation of its market-wide half-hourly settlement.</p>
<p>15. Transport</p>	<p>Swift delivery of ZEV mandate to apply from 2024 while maintaining regulations and funding to support EV/ZEV uptake and continuing to drive emission reductions from internal combustion engines.</p>
<p>16. Food, agriculture and nature</p>	<p>Publish a Land Use framework as soon as possible, and by mid-2023.</p>
<p>17. Circular Economy</p>	<p>Launch a task force to work jointly with industry to identify barriers and enablers and develop sector-specific circular economy business models for priority sectors. This should have representation from BEIS, Defra, DLUHC, HMT and DIT, and include the role of Extended Producer Responsibility in promoting reuse, repair, remanufacturing, and rental alongside recycling, in line with the powers under the Environment Act 2021.</p>
<p>18. Oil and Gas</p>	<p>Publish an offshore industries integrated strategy by the end of 2024 which should include roles and responsibilities for electrification of oil</p>

Objective	Recommendation
	and gas infrastructure, how the planning and consenting regime will operate, a plan for how the system will be regulated, timetables and sequencing for the growth and construction of infrastructure, and a skills and supply chain plan for growth of the integrated industries.
19. Oil and Gas	Accelerate the end to routine flaring from 2030 to 2025.
20. Local and regional	Fully back at least one Trailblazer Net Zero City, Local Authority and Community , with the aim for these places to reach net zero by 2030.
21. Local and regional	Reform the local planning system and the National Planning Policy Framework now. Have a clearer vision on net zero with the intention to introduce a net zero test, give clarity on when local areas can exceed national standards, give guidance on LAEP, encourage greater use of spatial planning and the creation of Net Zero Neighbourhood plans, and set out a framework for community benefits.
22. Individuals	Publish a public engagement plan for England by 2023, to ramp up public engagement on net zero.
23. International	Conduct a strategic review of the UK's international climate leadership and ensure the 2030 Strategic Framework on Climate and Nature provides practical direction for the UK's international climate and nature leadership.
24. Carbon Markets	By 2024, work within the UK ETS Authority to develop a pathway for the UK ETS until 2040. This pathway should address: <ul style="list-style-type: none"> a. Set out a vision on the future design and operation of the ETS; b. Set out a timeline for expanding the coverage to the rest of the UK economy, as well as sectors consulted on including maritime and waste; c. Address inclusion of GGRs to incentivise early investment in new technologies and potentially nature-based solutions; d. Provide reassurance to businesses around how the Government will mitigate the risk of carbon leakage as a result of expanding the ETS.
25. R&D	By Autumn 2023, create a roadmap which details decision points for developing and deploying R&D and technologies that are critical for enabling the net zero pathway to 2050.

The UK's estimated costs to achieve net zero are massive. From a 2022 number of 13.5 billion pounds, to an annual 50-60 billion pounds per annum by the mid-thirties are expected to come mainly from the private sector. Apart from initial investments, opportunities within the UK's emergent green economy exist, demonstrated by specific commitments that have already been announced, within:

- Zero emission vehicles (ZEVs)
- Offshore wind
- CCUS and Hydrogen
- Clean heat

The report provides 129 highly specific recommendations to support the high-level aims...

The detailed UK roadmap to net zero is broken into six pillars.

1. Securing net zero: A framework for a sustainable industrial strategy to deliver growth and jobs during the transition.
2. Powering net zero: The gear shift we need in delivery to achieve our targets and recommends specific actions to unblock the pipeline, including a re-think of our energy infrastructure. It proposes a solar revolution and an onshore wind revolution.
3. Net zero and the economy: Going further to capture the economic opportunities across sectors for businesses of all sizes.
4. Net zero and the community: How we unlock local action by reforming the relationship between local and central government, making sure the planning system supports net zero and turbocharging community energy and action.
5. Net zero and the individual: Role of individuals in the transition, how they can be supported to make green choices, and how government can ensure that net zero works for everyone.
6. The future of net zero: Seizing the global opportunities from new technology and R&D innovation now and out to 2050. It also looks at the UK's carbon pricing regime and how the UK can maintain its international leadership on climate.

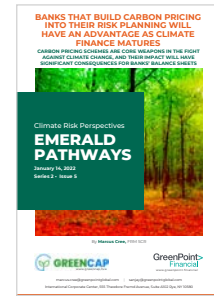
Within these pillars, specific references are made to general concerns, which have been discussed within this series before, including:



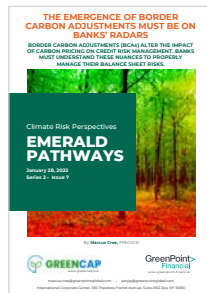
Circular economies - covered in [circular economies](#)



Energy trading schemes (ETS) - covered in [Carbon pricing schemes](#)



International trade - covered in [Carbon border agreements](#)



All of the above are designed for policymakers to create an environment where investment in a clean energy, low-emission future becomes the default, less risky way for investors to make returns. Banks and their risk departments need to think about these planned or required changes in the context of their current risk assessment and loan pricing.

What becomes clear is that a carbon pricing scheme would significantly ease analysis of potential borrowers as it provides a common context for such work. It is easy to see how this becomes the basis of comparison when assessing future costs of compliance.

The report concludes with all 129 specific recommendations, but we have pulled out some for special consideration in terms of how they may impact borrowers' credit profiles:

#	Area	Owner	Timing	Recommendation
65	SME support	BEIS	2023	Building on the UK Business Climate Hub, Government should launch a 'Help to Grow Green' campaign, offering information, resources and vouchers for SMEs to plan and invest in the transition by 2024.
66	SME support	BEIS	2023	Government should develop an SME role models programme, which provides mentoring for micro businesses and the self-employed by 2023.
67	SME support	BEIS	2023	Government should establish a taskforce of suppliers, small business landlords and business groups to agree on how to cut energy use in rented premises by 2023.

#	Area	Owner	Timing	Recommendation
68	Financial services	HMT/ BEIS	2023	Review how the UK can become the most competitive financial centre for green and transition listings, capital raising and project financing; to include reviewing prospectus and listing regimes to encourage integrity and growth in the market for green finance instruments, exploring new opportunities arising for professional services, climate and nature data and analytics and innovative product development.
69	Financial services	BEIS / HMT	2023	Through its update to the Green Finance Strategy, Government should set out a clear, robust and ambitious approach to disclosure, standard setting, and scaling up green finance – including how it will meet existing commitments to implement Sustainable Disclosure Requirements across the economy; how it will provide a clear, long-term plan for attracting capital to meet net zero ambitions, and how to maintain the UK's position as the leading green finance hub internationally and metrics for success.
70	Manufacturing	BEIS	2024	Government should develop a policy proposal to incentivise on-site generation in Manufacturing by Q2 2024, with options to consult on the funding formula required by the public and private sector to reach the tipping point of adoption.
71	Manufacturing	BEIS	2023	Government should progress its consultation on carbon leakage measures, including a carbon border adjustment mechanism (CBAM) and mandatory product standards by 2023. This will enable Government to implement effective carbon leakage mitigations from 2026.
72	Construction	BEIS	2023	Government to develop a public procurement plan for low-carbon construction and the use of low-carbon materials, by the end of 2023.
73	Construction	BEIS/ Defra	2023	BEIS, DfT and Defra to develop a strategy on the decarbonisation of non-road mobile machinery by the end of 2023.

#	Area	Owner	Timing	Recommendation
79	Transport	DfT	2024	Government to swiftly deliver the ZEV mandate, to apply from 2024, while maintaining regulations and funding to support the uptake of electric and other zero emission vehicles, and continuing to drive emission reductions from internal combustion engines.
80	Transport	DfT	2023	Government to publish the Low Carbon Fuels Strategy in 2023 and the necessary legislation for the sustainable aviation fuels (SAF) mandate to apply from 2025. Recognising that an adequate price stability mechanism is vital for investments in SAF, government to set out evidence for barriers to SAF investments and options to address this.
81	Transport	DfT	2024	Government to set out options for further legislative steps by 2024 and take a leading role in International Maritime Organization (IMO) negotiations to decarbonise the maritime sector.
82	Transport	DfT	2024	Government should continue to work with industry to set out a clear programme by 2024 to accelerate decarbonisation of the wider freight sector through modal shift and deployment of new technologies, building on the Future of Freight Plan.
83	Transport	DfT	-	Government to reduce delays to anticipated reforms by bringing forward the delayed Future of Transport Bill this Parliament.
84	Food, agriculture, nature and land	Defra	2023	Government to publish a Land Use framework as soon as possible, and by mid-2023.
85	Food, agriculture, nature and land	Defra	2023	Government to publish full details of all Environmental Land Management Schemes and future plans by the end of 2023 - with a particular focus on how participants can take advantage of both public and private finance.
86	Food, agriculture, nature and land	Defra/ UKRI	2025	By 2025, Government to ensure that 50% of UK-based food and drink businesses measure and report their scope 3 emissions against a

#	Area	Owner	Timing	Recommendation
				government- and industry-agreed standard. Defra and UKRI research should prioritise innovations that support on-farm measurement and processes to accurately collect the remainder by 2030.
87	Food, agriculture, nature and land	Defra/ Natural England	-	Deliver accurate monitoring of carbon across broader range of ecosystems, with a view to bringing more habitats into the inventory to drive habitat creation and restoration efforts.
88	Food, agriculture, nature and land	Defra (and delivery bodies)	2023	In line with wider thinking on voluntary carbon and ecosystem markets, ensure a pipeline of investable nature- based solutions projects is available.
108	Energy efficiency	BEIS/ DLUHC	2023	Government should bring forward all consultations and work to mandate the Future Homes Standards by 2025 to prevent further delays by ensuring the standard applies to all developments. This should include a consultation on mandating new homes to be built with solar and deliver the Net Zero Homes Standard, ensuring that the planning system (discussed in Pillar 4) is flexible enough to enable this.
113	Energy efficiency	BEIS	2024	<p>Government should provide certainty by 2024 on the new and replacement gas boiler phase out date to drive industry and investor confidence. The Review recommends bringing the proposed date of 2035 forward and legislating for 2033.</p> <p>Government should set a legislative target for gas free homes and appliances by 2033, to contribute to a gas free grid in future.</p> <p>Government should legislate for all homes sold by 2033 to also have an EPC rating of C or above in line with the aforementioned NZPC, with exclusions around certain properties (e.g. listed properties, on grounds of affordability). Government should also mandate landlords to include 'average bill cost' alongside the EPC (and possible future NZPC) rating, when letting a property out. This will help renters understand what costs to expect, while also helping to put a premium on energy efficient homes.</p>

#	Area	Owner	Timing	Recommendation
125	Carbon markets	BEIS, HMT	2024	<p>By 2024, Government should work within the UK ETS Authority to develop a pathway for the UK ETS until 2040. This pathway should:</p> <ol style="list-style-type: none"> Set out a vision on the future design and operation of the ETS. Set out a timeline for expanding the coverage to the rest of the UK economy, as well as sectors consulted on including maritime and waste. Address inclusion of GGRs to incentivise early investment in new technologies and potentially nature-based solutions. Provide reassurance to businesses around how the Government will mitigate the risk of carbon leakage as a result of expanding the ETS.
126	Carbon markets	BEIS	2024	Government should endorse international VCM standards as soon as possible and consult on formally adopting regulated standards for VCMs and setting up a regulator for carbon credits and offsets by 2024.
127	Carbon markets	BEIS	2024	Government should set up a programme for offsets and carbon credits, providing guidance to businesses looking to invest in carbon credits and offsets, for businesses looking to provide carbon credits and offsets, and explore the opportunities to create a market in the UK for offsets through energy efficiency measures.
128	International trade	DIT	2024	Government should establish baseline environmental and climate protections in Free Trade Agreements (FTAs) and for removal of trade barriers to environmental goods and services.

Source: mission-zero-independent-review.pdf

Banks need to consider what this report is telling the market...

It is important to note that this report does not change the UK environmental targets as much as it does redefine the roadmap to reach them. This is important intelligence for banks considering how to meet the requirements for credit risk reporting. These have been evolving as the Basel Committee has considered how best to reflect climate risk in the standard bank risk calculations.

In short, the most likely end point is that banks use scenario analysis to determine the potential increases in credit risk and associated economic capital against multiple possible climate pathways.

The evolution of these rules is discussed in - [Banking view of climate risk](#)



The problem that banks have is that the specific industrial targets for regulatory pressure can be difficult to determine and make meaningful scenarios hard to design and run. A report such as 'Mission Zero' provides missing detail that can be used to specify borrower-level adjustments by industry. Combined with pathway cost data, which can be gleaned from the 'Network for Greening the Financial System' (NGFS), risk departments can build scenarios that:

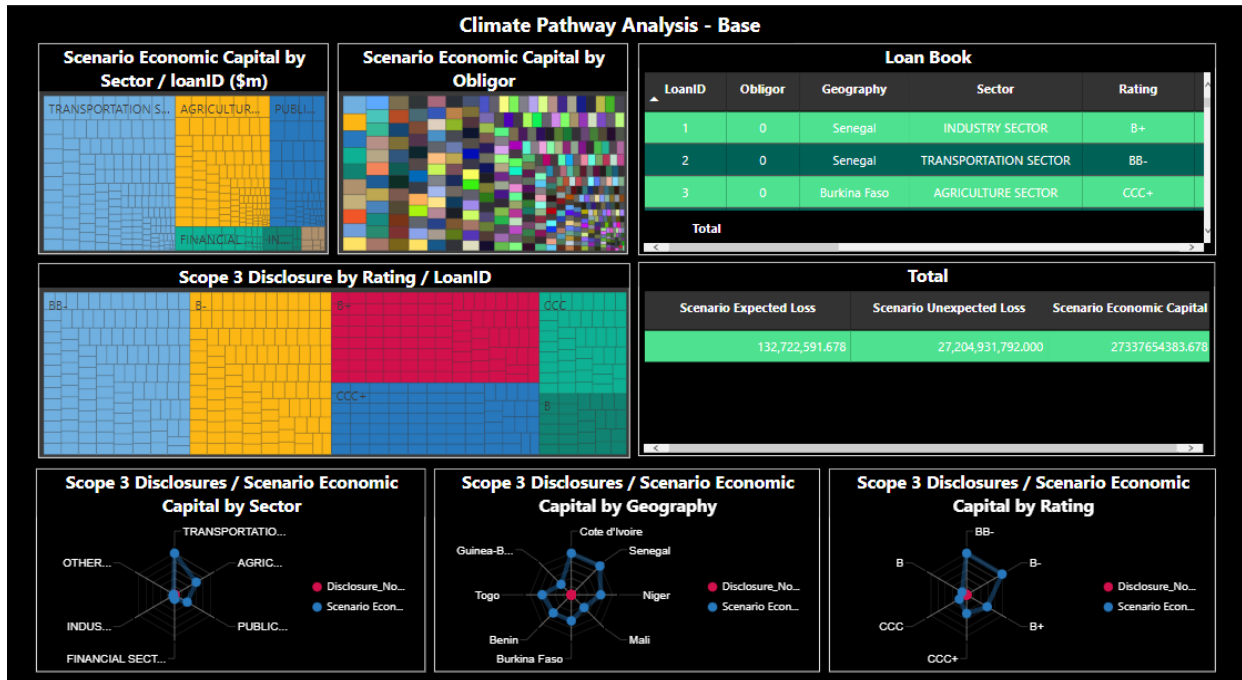
- Are costed by reliable sources
- Impact specified industries as per governmental planning
- Match scenarios from 'current policies', through 'Nationally Determined Contributions' (NDCs), to '1.5- or 2-degree limited' pathways
- Provide meaningful, defensible results for regulatory and stakeholder reporting

GreenCap can help...

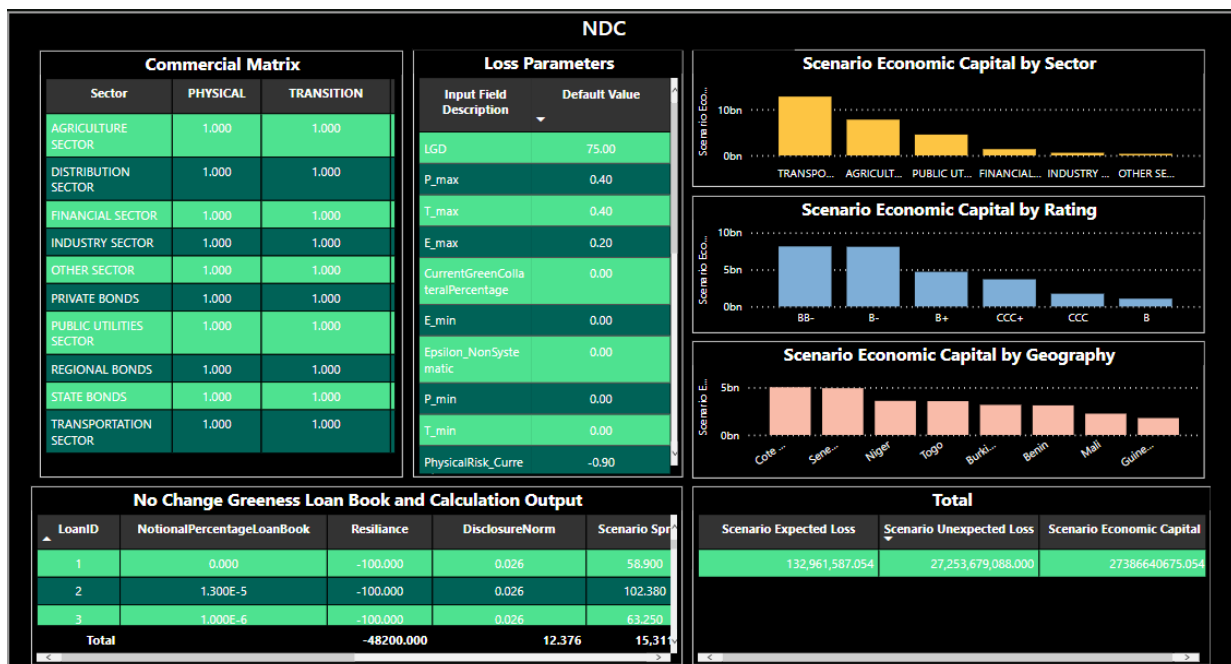
GreenCap is a turnkey 'Risk as a Service' (RaaS) solution that enables users to build scenarios based upon reliable data that can be applied to the entire loan book/balance sheet and recalculate per scenario:

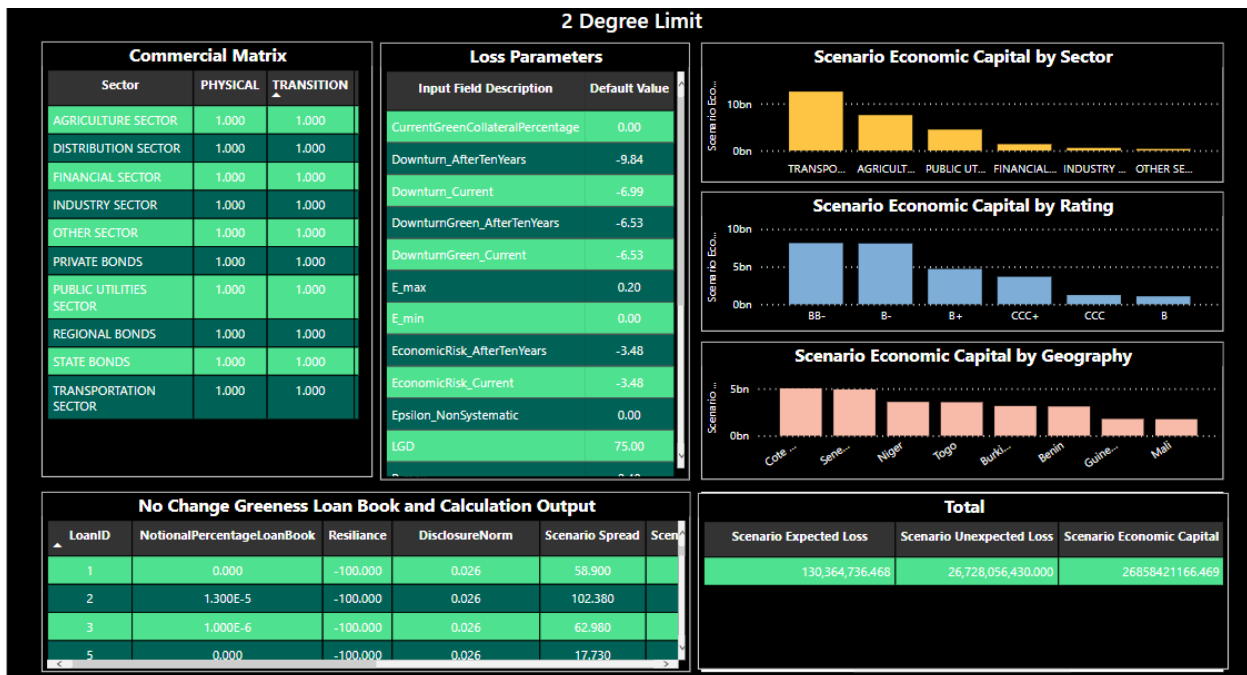
- Loan to portfolio level changes in expected and unexpected losses (Economic Capital)
- Changes in probability of default per loan
- Repricing of loans in terms of basis point spreads

The system provides an intuitive balance sheet analysis.



Multiple scenarios can be designed to match climate pathways.





Loan level adjustments can be made to fine-tune analysis and ensure that early adopters of expected policy changes are rewarded.

Use Loan level value
 Use Green Cap Matrix(Sector)value
 Scorecard value

Physical Risk (Correlation) * Transition Risk (Correlation) *

0.3 0.2

Hazard Zone * Adaptation * Total(100%) : 0%

Hazard Zone 5 Select Adaptation

Note: Please generate the report after saving your data.

GreenCap was designed for banks that want to arm themselves with the information needed to navigate the transition to a more sustainable economy.

Visit greencap.live for more resources on the financial aspects of climate change, and more insights into how best to build a futureproof balance sheet in the current time of climate-based uncertainty.

Chapter 2

AVOIDING BANK LIQUIDITY RISKS ARISING FROM CLIMATE CHANGE

RECENT PROBLEMS AT CREDIT SUISSE, SILICON VALLEY BANK AND SIGNATURE BANK HAVE REKINDLED MARKET FEARS AROUND LIQUIDITY AND STABILITY WITHIN THE BANKING SECTOR. IT IS WORTH USING THIS MOMENT TO CONSIDER HOW DESTABILIZING CLIMATE CHANGE MAY BE TO THE SECTOR.

Originally published on [APRIL 05, 2023](#)

Banking liquidity is defined in highly specific ways...

Specific liquidity ratios exist that serve as singular measures of the strength of a bank. These include:

Liquidity Coverage Ratio (LCR) - Proportion of High-Quality Liquid Assets (HQLA) that a bank needs to hold in order to continue to meet their short- and mid-term obligations.

Net Stable Funding Ratio (NSFR) - A liquidity standard that requires banks to hold enough stable funding to cover their long-term assets (assets with durations of greater than one year).



These ratios are, though, just snapshots. In 2008, the Basel Committee on Banking Supervision (BCBS) released its 'Principles of sound liquidity risk management and supervision', which detailed the best practices for banks to ensure their liquidity, and by extension, market stability.

The section within this document that covers risk management includes the following principles:

Principle 5: A bank should have a sound process for identifying, measuring, monitoring, and controlling liquidity risk.

Principle 6: A bank should actively monitor and control liquidity risk exposures and funding needs within and across legal entities, business lines, and currencies.

Principle 7: A bank should establish a funding strategy that provides effective diversification in the sources and tenor of funding. It should maintain an ongoing presence in its chosen funding markets and strong relationships with funds providers.

Principle 8: A bank should actively manage its intraday liquidity positions and risks to meet payment and settlement obligations on a timely basis under both normal and stressed conditions.

Principle 9: A bank should actively manage its collateral positions, differentiating between encumbered and unencumbered assets.

Principle 10: A bank should conduct stress tests on a regular basis for a variety of short-term and protracted institution-specific and market-wide stress scenarios to identify sources of potential liquidity strain and to ensure that current exposures remain in accordance with a bank's established liquidity risk tolerance.

Principle 11: A bank should have a formal contingency funding plan (CFP) that clearly sets out the strategies for addressing liquidity shortfalls in emergency situations.

Principle 12: A bank should maintain a cushion of unencumbered, high-quality liquid assets to be held as insurance against a range of liquidity stress scenarios, including those that involve the loss or impairment of unsecured and typically available secured funding sources.

Taken together, these 'best practices' demand that banks assess their liquidity against multiple stress tests, with a view to ensuring that there is a buffer of cash or cash equivalents (typically government paper with a short-dated maturity).

The principles need to be considered and incorporated into bank governance, including those covering new business initiatives or emergent risks. Climate change falls into both of these categories.

Climate change is introducing risks that will impact banks' capacity to manage their liquidity risk...



The same BSBC has been looking at the particularities of climate change, and has augmented the risk management advice with a paper released in June 2022 - Principles for the effective management of climate-related financial risks.

The 12 key principles intended for banks are as follows:

Principle 1: Banks should develop and implement a sound process for understanding and assessing the potential impacts of climate-related risk drivers on their businesses and on the environments in which they operate.

Principle 2: The board and senior management should clearly assign climate-related responsibilities to members and/or committees and exercise effective oversight of climate-related financial risks.

Principle 3: Banks should adopt appropriate policies, procedures, and controls that are implemented across the entire organization to ensure effective management of climate-related financial risks.

Principle 4: Banks should incorporate climate-related financial risks into their internal control frameworks across the three lines of defense to ensure sound, comprehensive and effective identification, measurement and mitigation of material climate-related financial risks.

Principle 5: Banks should identify and quantify climate-related financial risks and incorporate the ones assessed as material over relevant time horizons into their internal capital and liquidity adequacy assessment processes, including their stress testing programs where appropriate.

Principle 6: Banks should identify, monitor and manage all climate-related financial risks that could materially impair their financial condition, including their capital resources and liquidity positions. Banks should ensure that their risk appetite and risk management frameworks consider all material climate-related financial risks to which they are exposed and establish a reliable approach to identifying, measuring, monitoring, and managing those risks.

Principle 7: Risk data aggregation capabilities and internal risk reporting practices should account for climate-related financial risks.

Principle 8: Banks should understand the impact of climate-related risk drivers on their credit risk profiles and ensure that credit risk management systems and processes consider material climate-related financial risks.

Principle 9: Banks should understand the impact of climate-related risk drivers on their market risk positions and ensure that market risk management systems and processes consider material climate-related financial risks.

Principle 10: Banks should understand the impact of climate-related risk drivers on their liquidity risk profiles and ensure that liquidity risk management systems and processes consider material climate-related financial risks.

Principle 11: Banks should understand the impact of climate-related risk drivers on their operational risk and ensure that risk management systems and processes consider material climate-related risks.

Principle 12: Where appropriate, banks should make use of scenario analysis to assess the resilience of their business models and strategies to a range of plausible climate-related pathways and determine the impact of climate-related risk drivers on their overall risk profile.

The unmissable message here is that climate-specific risk management needs to be added to existing risk frameworks. Specifically, plausible scenarios should be used to identify risk drivers and resultant impacts on the banks' business and liquidity.

The 2008 and 2022 principles need to be seen as complementary...

Stress testing the impacts of climate change on banks' liquidity must take into account the fact that, from an economic model perspective, what is being proposed is a wholesale paradigm shift. Scenarios need to be built on the following pillars:

1. Transitional climate-related policies will create regulations/taxes/fines that impact borrowers whose loans make up the balance sheets of the bank.
2. Increased pressure on revenue through investment in simply complying with new regulations, will impact borrowers' risk profiles and the resultant economic capital that will need to be held by the bank against these loans.

- There are multiple climate pathways with differing transitional and physical climate outcomes that have been developed by the 'Intergovernmental Panel on Climate Change' (IPCC), as well as individual 'Nationally Determined Contributions' (NDCs) from 196 countries.

In order to properly understand the potential liquidity requirements created under these scenarios, banks must develop economic stress tests that can apply the costs, estimated by the 'Network for Greening the Financial System' (NGFS) economists and central bankers, to the policies that are already in place, committed to, through the NDC and implied by the wider UN commitment to hold global warming to 2 degrees above pre-industrial levels by 2100.

Effective stress tests also need to allow climate adaptations already made by borrowers to be reflected by reducing the future financial impact on the borrower and bank's economic capital. This effectively means starting with a top-down approach, but adding nuance from bottom up, loan level adjustments.

The results of the stress tests must include, per stress, expected deterioration in credit scores as well as increases in economic capital for each loan. The cumulative effect will inform the liquidity group within the risk committee to properly develop a contingency liquidity plan that matches the outcomes by climate pathway.

Building climate scenarios has been covered in -

[Constructing a feasible approach to climate-related credit risk](#) and [Creating Meaningful Climate Change Scenarios in a Changing World](#)

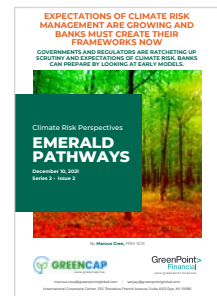


Governance is vital to risk management...

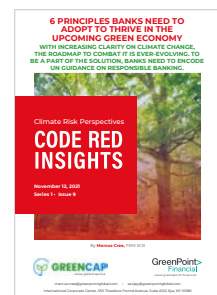
Once the underlying numbers have been computed, banks must then build into their risk frameworks:

- Regular reporting of potential liquidity outcomes as local and global climate policy direction becomes clearer.
- Target outcomes in economic capital terms that align with any public statements made by the bank.
- Increasingly detailed adaptations as various economic sectors develop their own guidelines and rules.
- Limits on loans and loan pricing that take the expected climate effects into account and can be applied as the first line of defense.

Incorporating climate risk into existing risk frameworks is covered in - [Expectations of climate risk management are growing and banks must create their frameworks now](#)



Aligning sustainability goals with risk management is covered in - [6 principles banks need to adopt to thrive in the upcoming green economy](#)



There is no doubt that properly reflecting climate-related financial impacts in banks' risk management frameworks and appetites will take significant work and involve multiple bank divisions. The result, however, will enable those banks that invest in the effort to avoid the liquidity shocks that are likely to be one of the most turbulent aspects of the transition to a greener global economy.

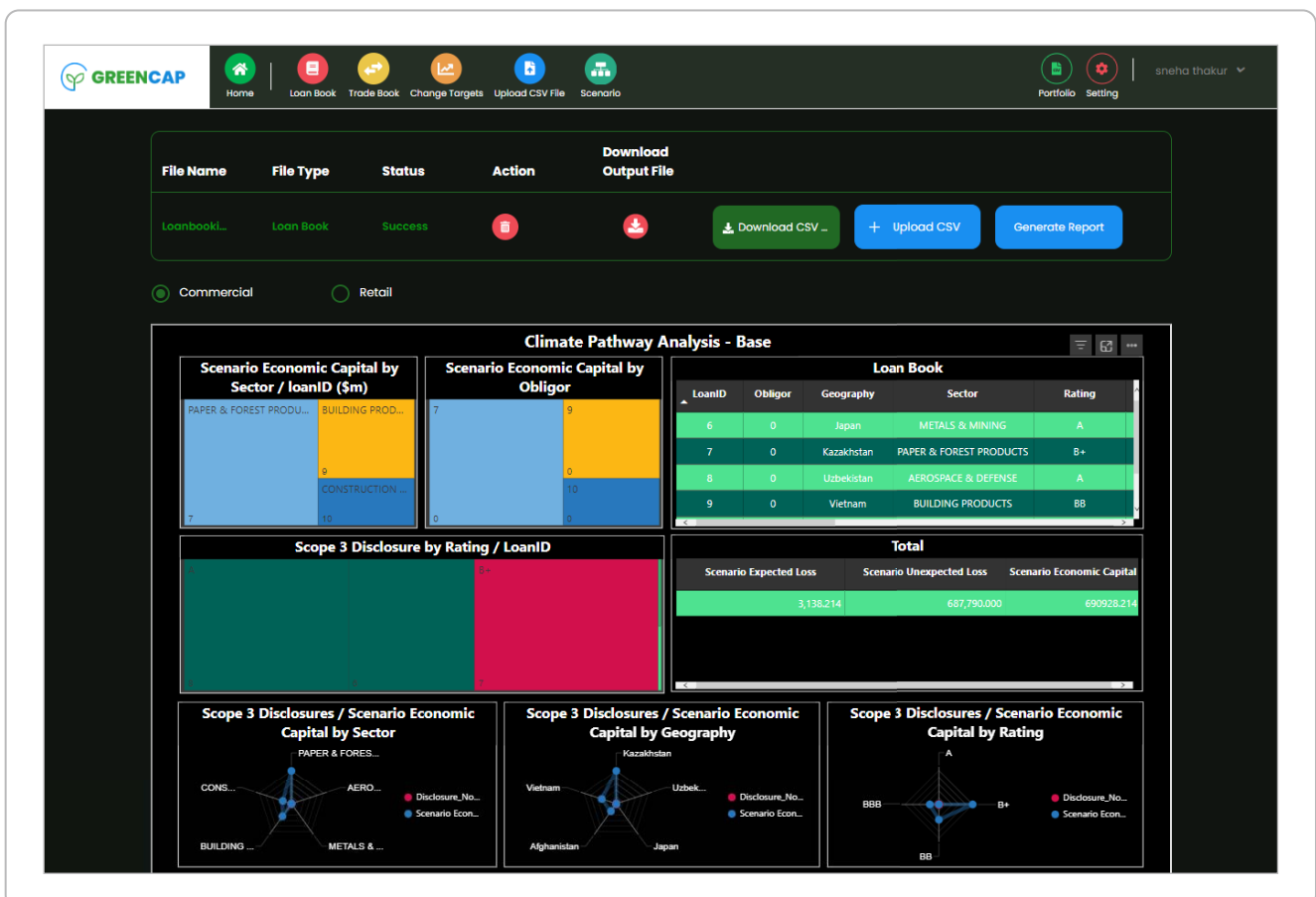
GreenCap can help...

GreenCap is a 'Risk as a Service' (RaaS) solution that gives banks the capacity to build meaningful climate scenarios that mirror the multiple available climate pathways and stress test their balance sheets.

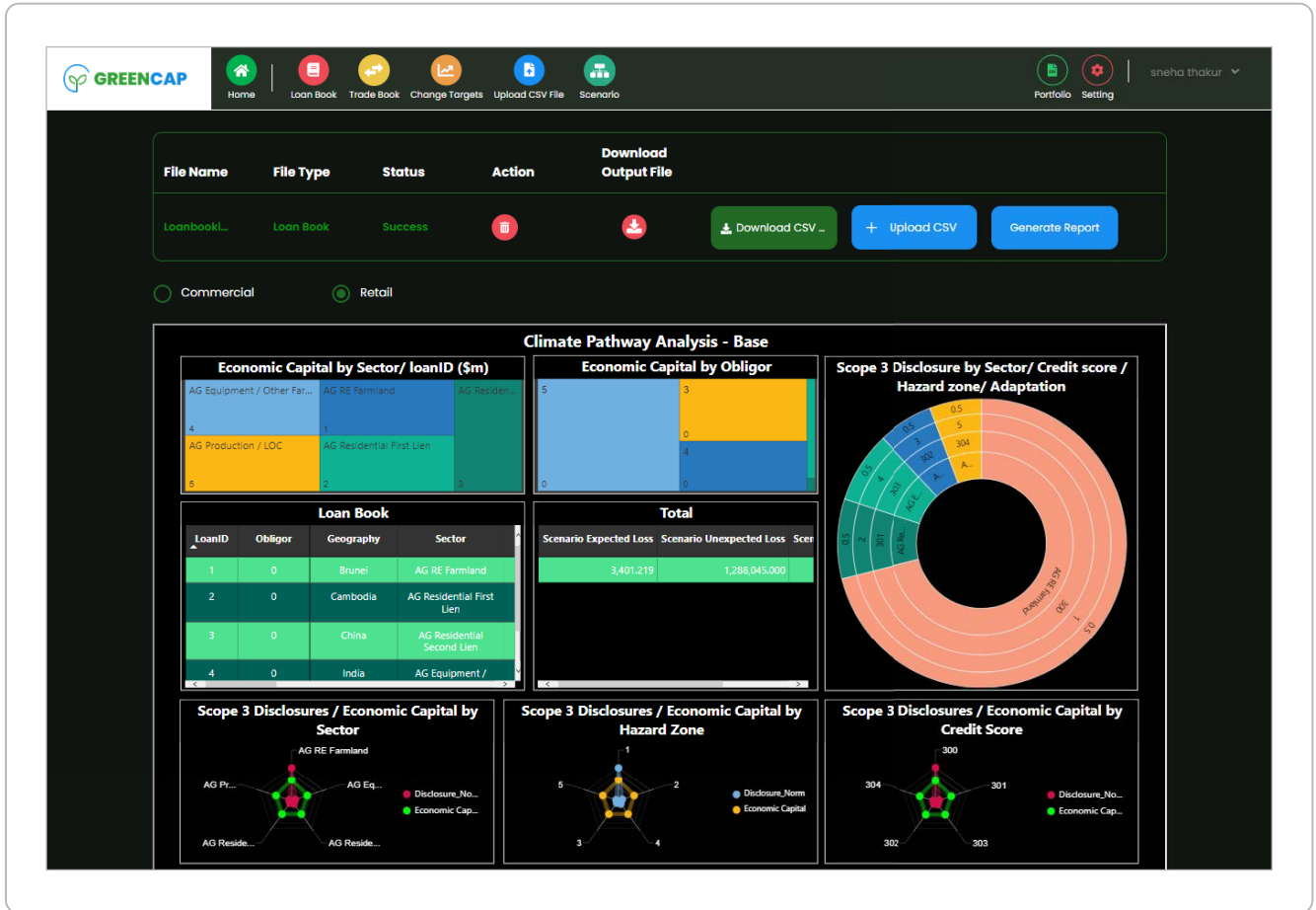
The results produced by the system include:

- Changes, by scenario, in borrower risk ratings
- Implied spreads, by loan, needed to make up borrower credit deterioration under each scenario
- Increase in economic capital, broken into expected and unexpected losses
- Targets and limits to be applied and monitored by risk management and lending officers

CC main screen (corporate)



GC main screen (retail)



GreenCap is designed to fill the gap in risk frameworks that need deterministic climate stress tests in a way that can be transparently used by the risk governance committee to meet the best practices recommended by the BCBS.

Visit greencap.live for insights, news and resources curated specifically to assist banks in managing the risks associated with climate change.

Chapter 3

THE US GOVERNMENT IS PICKING UP PACE ON CLIMATE CHANGE, AND BANKS' RISK DEPARTMENTS SHOULD FOLLOW SUIT

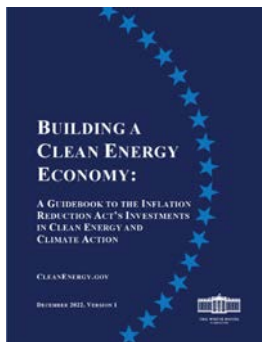
BANKS STRUGGLING TO CREATE ECONOMIC SCENARIOS TO REPLICATE CLIMATE PATHWAYS OUGHT TO REVIEW THE RECENT WHITEHOUSE WHITEPAPER ON HOW THEY ARE INCORPORATING CLIMATE CHANGE INTO THEIR OWN BUDGET FORECASTING. THIS MAY PROVE INVALUABLE FOR EVALUATING THEIR OWN POTENTIAL CLIMATE-RELATED CREDIT COSTS AND AVOID FUTURE LIQUIDITY ISSUES.

Originally published on MAY 18, 2023

The US government has been more active in the climate space recently...

The current administration has been on a mission to put America on a 'net zero' path, which includes multiple executive actions designed to steer the economy in a 'green' direction. These are not limited to, but include:

- **20th January 2021** - Newly inaugurated, President Biden signs the official instrument to put the US back into the Paris Accord
- **19th February 2021** - US officially rejoins Paris Accord
- **22nd April 2021** - US submits revised 'Nationally Determined Contribution' (NDC) to the UN
- **16th August 2022** - US signs the 'Inflation Reduction Act' into law, including \$391b on clean energy and climate change
- **13th March 2023** - Whitehouse releases its 'Methodologies and Considerations for Integrating the Physical and Transition Risks of Climate Change Into Macroeconomic Forecasting for the President's Budget', explaining how costs of the administration's climate policies could be calculated



The above actions may have restored the US's standing in the eyes of the United Nations Framework Convention on Climate Change (UNFCCC), but they also represent a significant economic directional change, and as such, banks need to study both the policy changes and the estimated costs. A drastic switch away from a fossil fuel-powered 'brown' economy will have severe implications for the businesses and households that make up their balance sheets and loan books. This has the capacity to deteriorate credit profiles, increasing banks' credit risk and their need to hold economic capital against it. The more capital that needs to be held in reserve, the less profitable the bank, and the more likely it becomes of breaching liquidity floors.

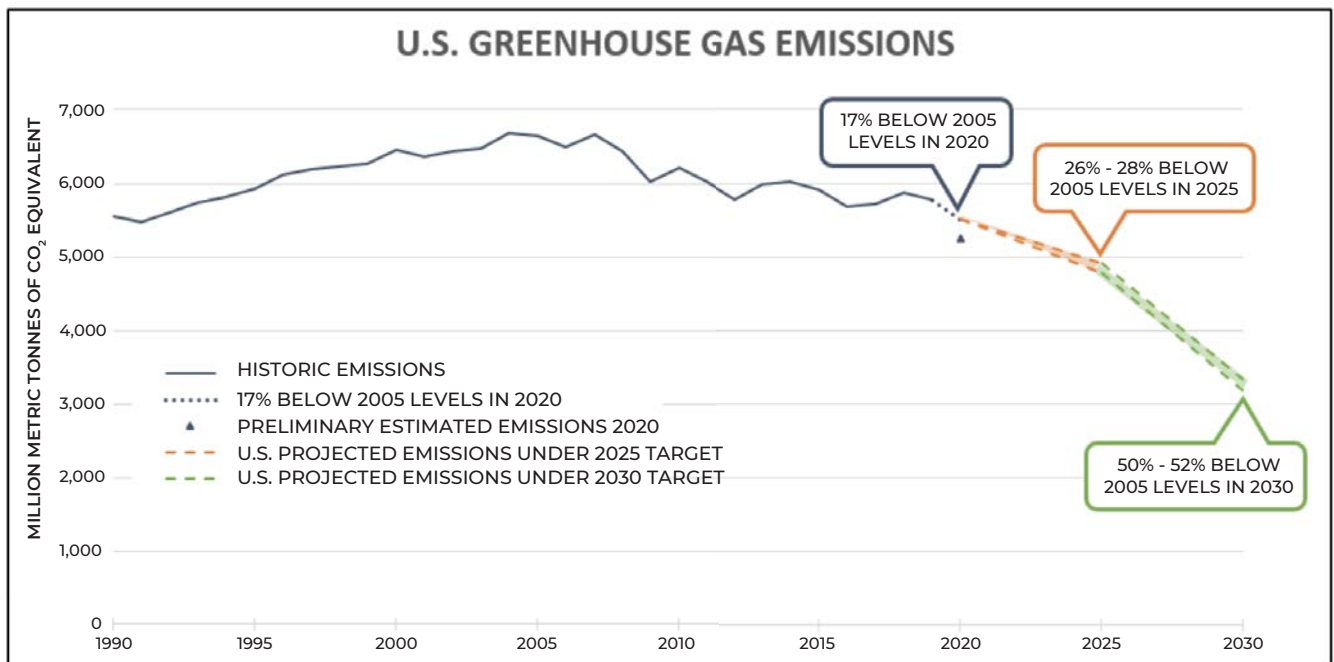
To plan for potential credit shocks and to prevent these from becoming liquidity events, risk departments must look into the ambitions and costs of 'net zero' plans.

US NDC goes far, but more may be needed...



The United State of America Nationally Determined Contribution

The US government has made a commitment to reduce CO₂e emissions (CO₂ or equivalent greenhouse gas) to 50-52% of 2005 levels by the year 2030.



United States Historic Emissions and Projected Emissions Under 2030 Target

The principle targets for change within the NDC are:

- **Electricity :** The United States has set a goal to reach 100 percent carbon pollution-free electricity by 2035.
- **Transportation:** Policies to reduce CO₂ from the transportation sector will include -
 - Tailpipe emissions and efficiency standards
 - Incentives for zero-emission personal vehicles
 - Charging infrastructure to support multi-unit dwellings, public charging, and long-distance travel

- **Buildings** : The emissions reduction pathways for buildings consider include -
 - Support for energy efficiency and efficient electric heating and cooking in buildings via funding for retrofit programs
 - Wider use of heat pumps and induction stoves
 - Adoption of modern energy codes for new buildings
- **Industry** : Policies will incentivize -
 - Carbon capture
 - New sources of hydrogen – produced from renewable energy, nuclear energy, or waste
- **Agriculture and lands** : This will include -
 - Scaling of climate-smart agricultural practices
 - Reforestation
 - Rotational grazing
 - Nutrient management practices

This document should be used as guidance in all top-down economic scenario building.

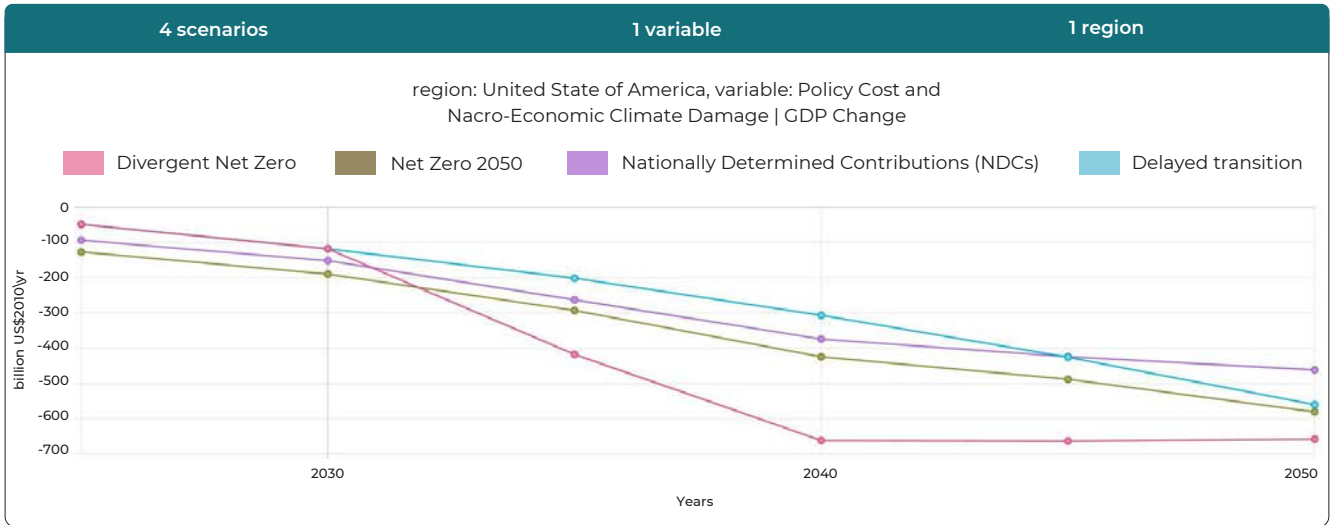
Pricing of policy pathways is a major hurdle for risk departments...

From an external perspective, the 'Network for Greening the Financial System' (NGFS) can be used as a resource to obtain pathway costs. The group has researched multiple potential scenarios per country, including:

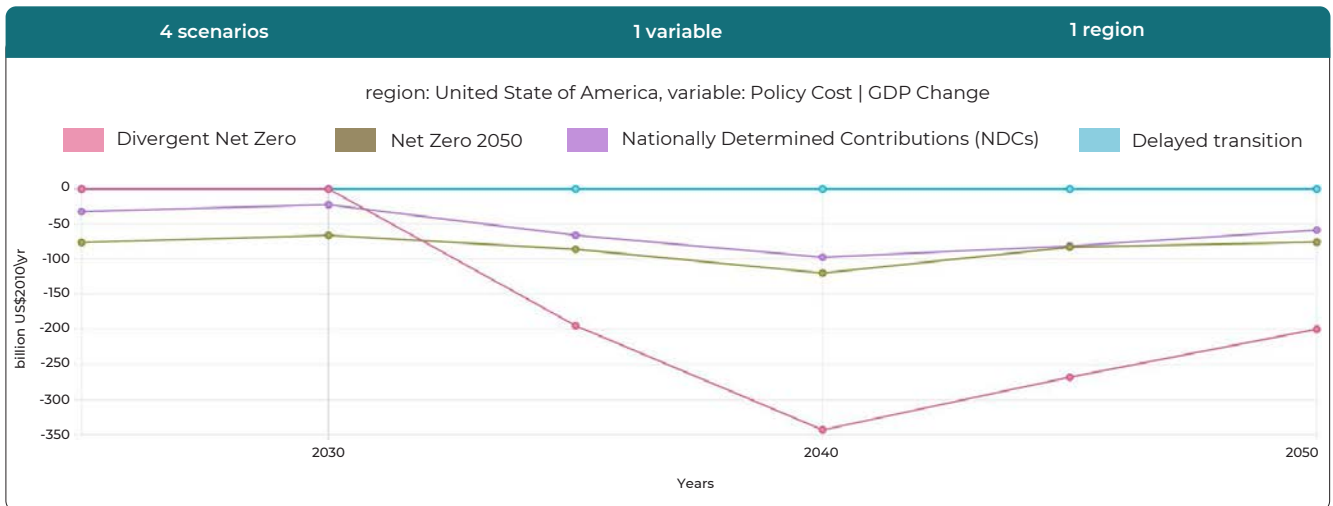
- **Current policies** - Assuming actual policies currently in place are not built upon, but are enacted
- **NDC** - Assuming the commitments stated within the NDC are met on the timescales indicated
- **NDC delayed** - Assuming a two-year delay in implementation of NDC plans
- **2-degree limit** - Assumes a scaling up from the NDC towards a 'fair share' CO₂e reduction to meet a globally agreed target of limiting global warming to 2 degrees by 2100
- **1.5-degree limit** - Assumes a scaling up from the NDC towards a 'fair share' CO₂e reduction to meet a globally agreed aspiration of limiting global warming to 1.5 degrees by 2100

All of these consider both transitional (policy) and physical (damage) costs that are estimated by the NGFS for each scenario.

GDP

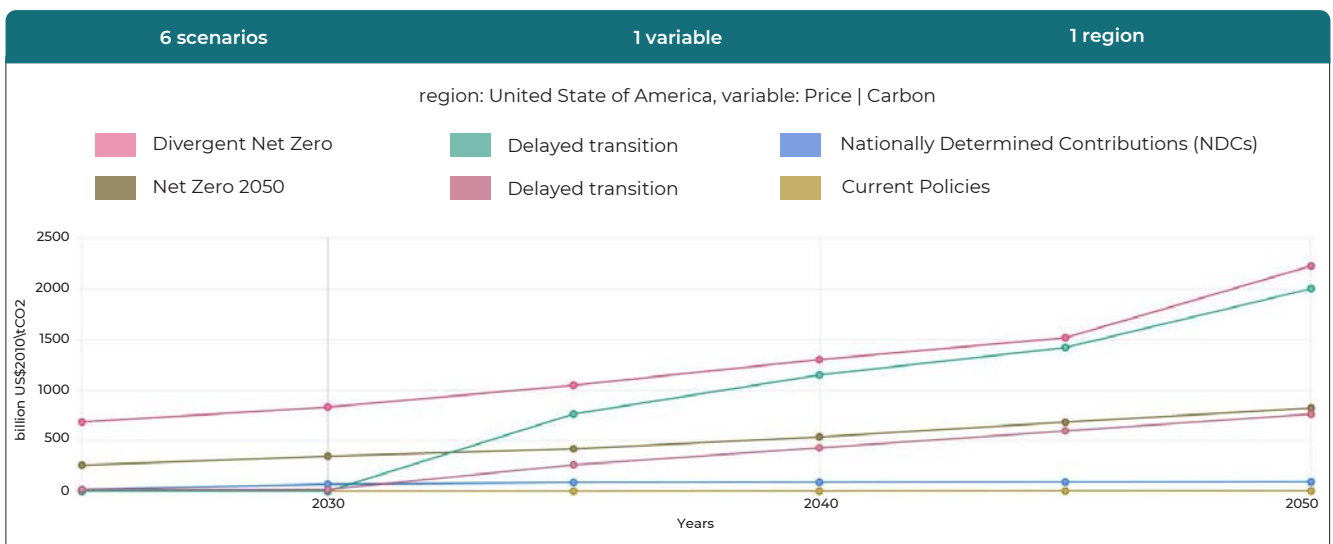


GDP



Alternatively, the NGFS also run a policy-specific estimate of the implied price of carbon, which can also be used, in conjunction with the headline reduction pledge, to arrive at a policy cost per year.

Carbon price



Notably, the NGFS treats countries as single units, including the US. This approach may develop

errors as the size of the country and distribution of its industrial and agricultural assets are suited to a more intra-regional way of thinking.

The administration has published ways its policies can be costed out...



White Paper
Council of Economic Advisers &
Office of Management and Budget

This document considers multiple methodologies that can be used to include transitional costs and physical damage estimates in the 10-year economic forecast and the 'Long-Term Budget Outlook' (LTBO). This includes appropriate measures to use, such as 'debt to GDP', as well as actual econometric methodologies.

Both physical and transitional factors are taken into account with listed physical factors including:

Table 2: Examples of pathways by which climate change can affect macroeconomic variables

Broad Pathway	Specific Climate Pathway	Discussion	U.S. Government Analytic Capacity	References
Labor	Migration	Climate change, including displacement from sea-level rise, could affect the propensity to migrate to and from the United States in complex ways, as well as the distribution of population within the United States	Limited	Benveniste et al. 2020 ; Benveniste et al. 2022 ; Jesoe et al. 2018
	Workweek	Changes in extreme temperatures alter hours worked, particularly in more exposed industries (e.g., construction, agriculture)	Good	Rode et al. 2022 ; Graff-Zivin and Neidell 2014
	Population Growth - Fertility	There is some suggestion climate change may affect fertility decisions, though magnitudes may be small for a services-led economy with high air conditioner penetration like the United States	Limited	Casey et al., 2019 ; Barreca et al., 2018

Broad Pathway	Specific Climate Pathway	Discussion	U.S. Government Analytic Capacity	References
	Population Growth – Mortality	Substantial evidence that temperature extremes lead to premature mortality, though effect sizes are smaller for prime workforce ages. Other mortality effects operate through changes in disease and extreme weather events	Good	Carelton et al. 2022 ; Cromar et al. 2022 ; Bressler et al. 2021
Capital Services	Destruction	Climate-change-related extreme events could destroy capital investments. Resources required for recovery may be diverted from productive investments.	Partial	Hallegatte et al. 2007 ; Otto et al. 2023 ; studies referenced in Martinich and Crimmins 2019
	Uncertainty	Additional uncertainty from climate-change-related weather extremes raises risk premia on certain assets and financing costs for related investments. Climate uncertainty could limit availability or increase costs of disaster insurance in certain markets, slowing recovery.	Limited	Fernando et al. 2021 ; Otto et al. 2023
Factor Productivity	Labor	Extreme hot temperatures lower labor productivity in highly exposed industries	Good	Lima et al. 2021 ; Kjellstrom et al. 2010
	Capital Services	Changing climate may alter the productivity of climatesensitive capital such as dams, electricity transmission and generation, and roads.	Partial	Studies referenced in Martinich and Crimmins 2019 ; EPRI 2022
	Land	Higher temperatures and CO2 concentrations affect agricultural yields and forest productivity	Good	Beach et al. 2015 ; Moore et al. 2017 ; Baker et al. 2022

Note: Modeling capacity definitions: “None” = potential pathway but not quantified or modeled; “Limited” = pathway has been fully or partly modeled in the academic literature, but adapting results for Budget forecasting purposes remains challenging; “Partial” = capacity exists to quantify some but not all of these effects; “Good” = capacity exists to quantify the bulk of these effects and/or used in existing U.S. Government work

Transitional factors are also listed, including:

Table 3: Examples of pathways by which the energy transition can affect macroeconomic variables

Broad Pathway	Specific Energy Transition Pathway	Discussion	U.S. Government Analytic Capacity	References
Labor	Skill and Geographic Mismatch	The energy transition will decrease labor requirements in some industries while increasing them in others. Differences in the skill requirements and location of growing compared with shrinking sectors, combined with labor market frictions, could lead to localized unemployment or labor shortages.	Limited	Council of Economic Advisors 2022 ; Hafstead et al. 2022 ; Greenspon and Raimi 2022 ; Castellanos and Heutel 2019
Capital Services	Investment	A rapid energy transition requires large investments in new energy infrastructure. Macroeconomic effects of this investment might result from diversion of investment from other productive uses and economic stimulus under certain circumstances. Capital adjustment frictions could lead macroeconomic costs to increase with the speed of the transition.	Good	See discussion of macroeconomic models in following sections.
	Policy Uncertainty	Energy infrastructure investments are forward-looking and depend on investor expectations regarding future returns. Policy uncertainty around the speed and nature of the energy transition could lead	Limited	IMF 2022 (Chapter 3)

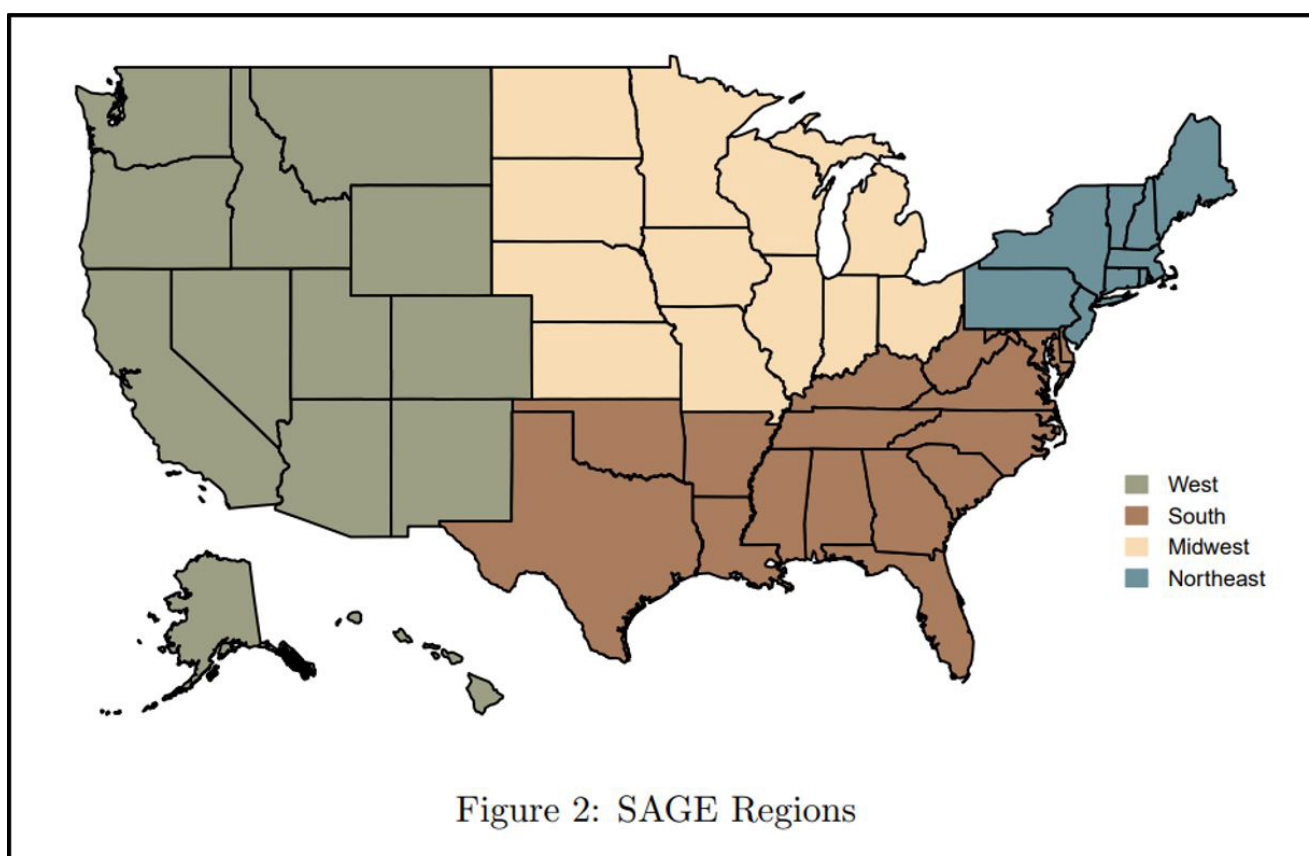
Broad Pathway	Specific Energy Transition Pathway	Discussion	U.S. Government Analytic Capacity	References
		to higher financing costs and under-investment in energy generally, with implications for energy prices and volatility.		
Factor Productivity	Energy and Energy-Intensive Infrastructure	Rapidly changing policy conditions could lead energy infrastructure to under-perform relative to expectations. Capital in downstream, energy-intensive industries may also be rendered prematurely obsolete or less productive as energy markets and technology change.	Partial	A substantial literature on asset stranding associated with energy transitions exists, including Fofrich et al 2020 ; van der Ploeg and Rezai 2020 ; Grubert 2020
Energy	Price Levels	Energy prices can affect macroeconomic conditions. For instance, oil prices are a standard factor in macroeconomic forecasting (Figure 3). The energy transition may change energy prices in the near-term, particularly if it is disorderly. The longer-term effects on energy prices are unclear, as they depend on future technological evolution and policy that could lead to either decreases or increases in energy prices.	Partial	McKibbin et al. 2020
	Price Volatility	Volatile energy prices increase uncertainty for producers and consumers, potentially with macroeconomic implications. A disorderly transition could increase energy price volatility in the short- to medium-term. In the longer-run, the declining share of fossil fuels in the energy mix could lower price volatility.	Limited	

Note: Modeling capacity definitions: “None” = potential pathway not quantified or modeled; “Limited” = pathway has been fully or partly modeled in the academic literature, but adapting results for Budget forecasting purposes remains challenging; “Partial” = capacity exists to quantify some but not all of these effects; “Good” = capacity exists to quantify the bulk of these effects and/or used in existing U.S. Government work

The requirements for viability are that these factors are incorporated into the model as well as:

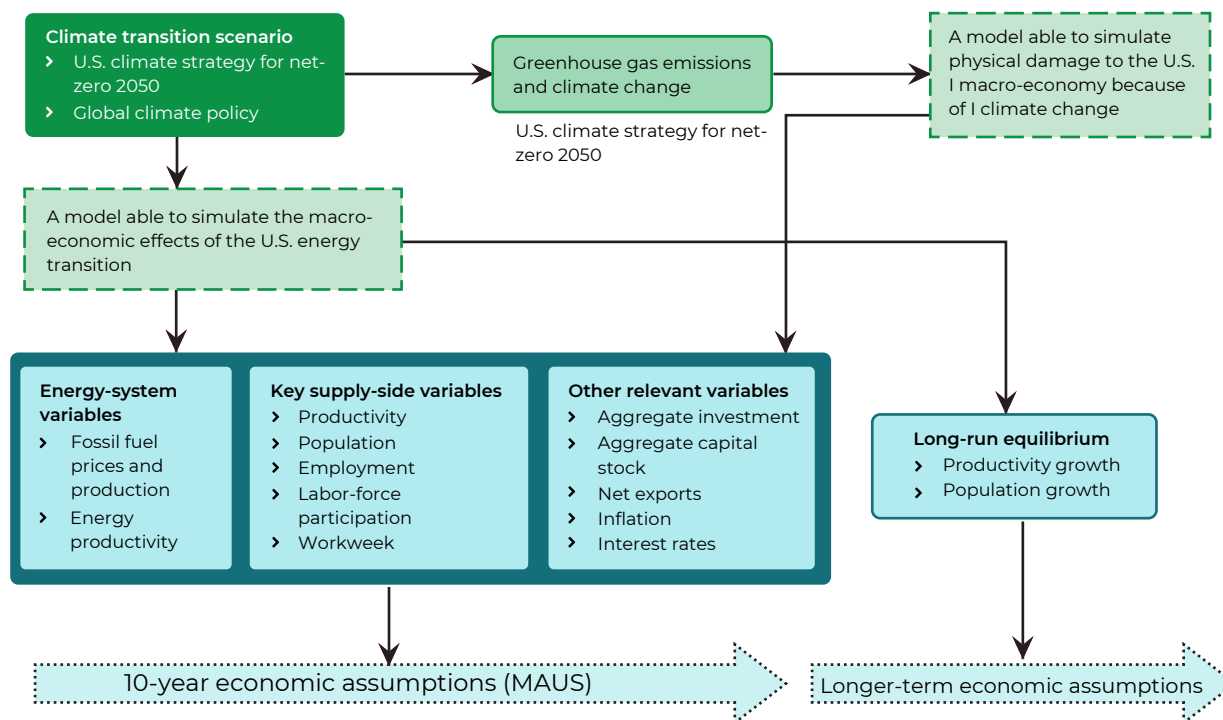
- Model has been properly peer-reviewed
- Sub-national level results within the US
- Includes capital and labor frictions

While some models produce state-level results, one, EPA-SAGE divides the country into four regions for analytic purposes.



The general framework for modeling climate risks econometrically is summarized as follows:

Figure 4: Illustration of modeling framework able to integrate climate risks into the economic assumptions.



Note: Boxes with dashed outlines denote required modeling capabilities. Boxes with solid lines indicate input or output variables from modeling process

It is incumbent upon banks to extend budget thinking into stress scenarios...

The previous sections summarize how the administration is developing and pricing its climate policy. This thinking must be adopted by banks in order that they develop scenarios that are able to expose upcoming credit risks to their own loan books and balance sheets, with a view to building contingency plans to avoid the resultant liquidity shocks.

To do this, they will need to:

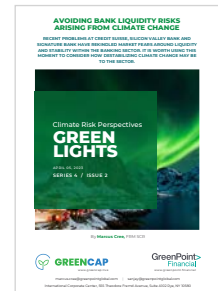
- Identify top-down industry-level impacts
- Decide on an approach to price these impacts nationally and regionally
- Detail any adaptations that are specified or implied by the transitional policies of industry
- Convert the pricing into a credit risk measure

Once such a framework is built, transitional and physical costs can be attributed by applying a general top-down approach, but adjusting at the loan level according to investments/adaptations already made by the borrower.

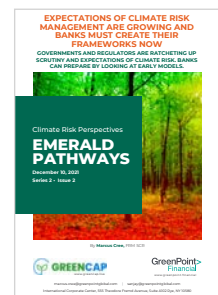
While challenging, once built, climate risks could be calculated and reported alongside market, credit and liquidity risks, and included in the overall risk framework and appetites.

Building climate into banks' risk management frameworks has been covered in:

[Avoiding bank liquidity risks arising from climate change](#)

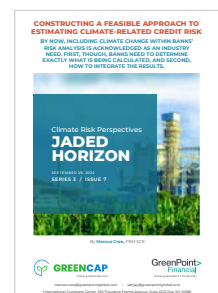


[Expectations of climate risk management are growing and banks must create their frameworks now](#)

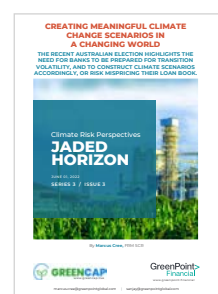


And climate scenario construction has been covered in:

[Constructing a feasible approach to climate-related credit risk](#)



[Creating Meaningful Climate Change Scenarios in a Changing World](#)



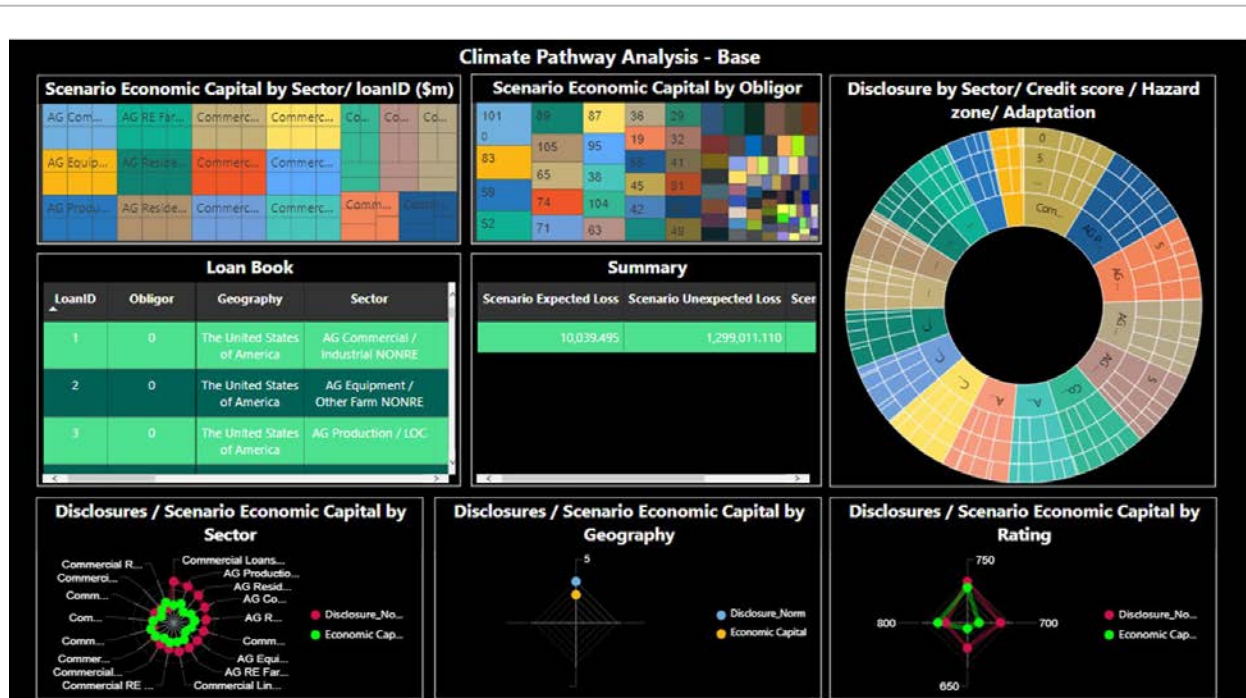
GreenCap can help...

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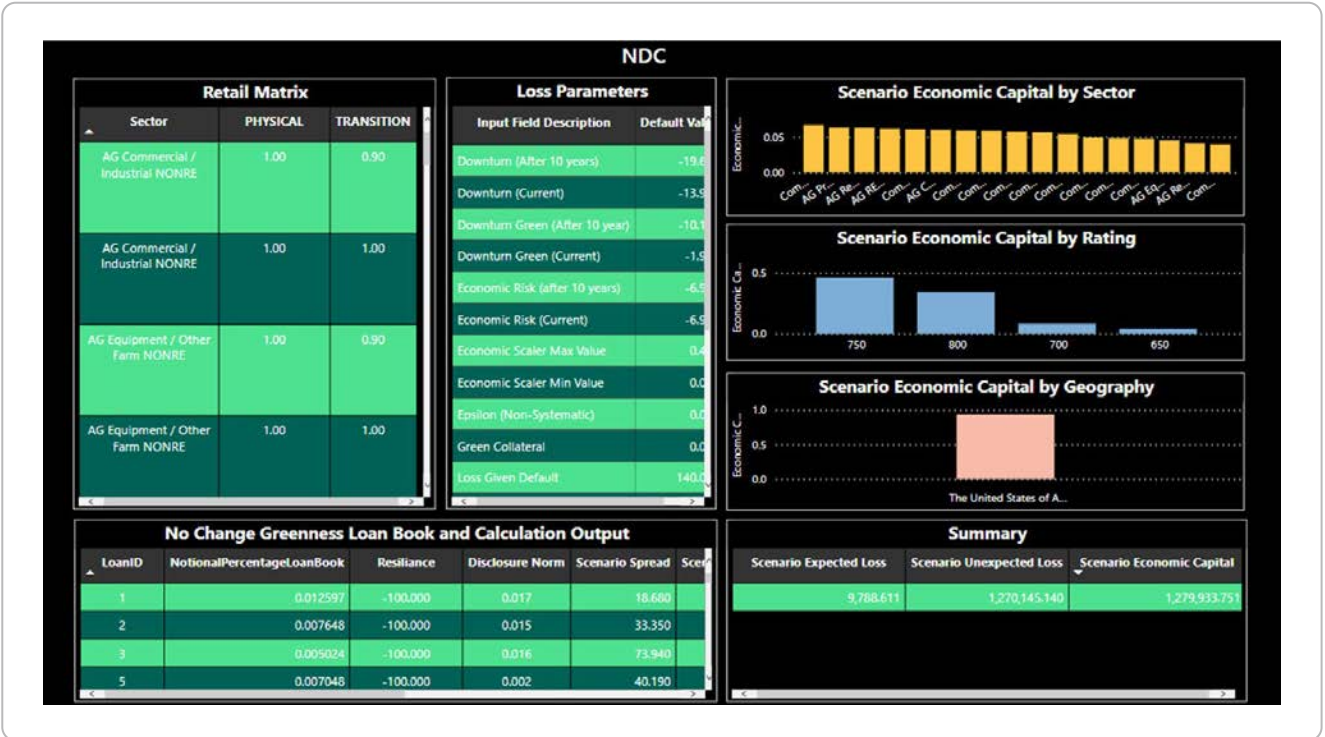
The results produced by the system include:

- Changes, by scenario, in borrower risk ratings
- Implied spreads, by loan, needed to make up borrower credit deterioration under each scenario
- Increases in economic capital, broken into expected and unexpected losses
- Analytics, targets and limits by industrial sector, geography or rating

GC main screen (retail - US latest)



GC scenario screens (US latest)



GreenCap is designed to fill the gap in risk frameworks that need deterministic climate stress tests in a way that can be transparently used by the risk governance committee to properly manage risks that climate change will create, both physical and transitional.

Visit GreenCap.live for more insights and resources, curated for use by banks aiming to add climate risk to their existing risk frameworks.

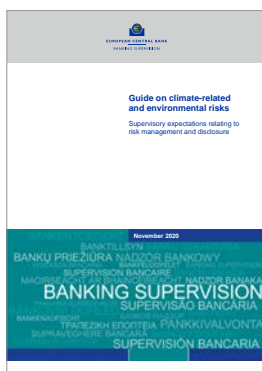
Chapter 4

THE ECB HAS LED THE WAY IN CLIMATE GUIDANCE; NOW, BANKS NEED TO FOLLOW IT

IN 2020, THE EUROPEAN CENTRAL BANK (ECB) RELEASED ITS GUIDANCE FOR INCLUSION OF CLIMATE CHANGE IN RISK MANAGEMENT FRAMEWORKS. THE 2022 SURVEY CONDUCTED BY THE CENTRAL BANK SHONE A LIGHT ON WHERE THE INDUSTRY IS IN ITS JOURNEY AND HOW MUCH FURTHER IT HAS TO GO.

Originally published on MAY 31, 2023

The ECB issued guidance on how financial institutions should incorporate climate-related risks into existing frameworks...



The ECB's 'Guide on climate-related and environmental risks' was written with the aim of clearly laying out how directly supervised institutions must incorporate both physical and transition-related risks into their existing risk frameworks. It was also clear that it was intended to be a risk management blueprint for all banks across the EU bloc.

Covering 'Risk Appetite', 'Risk Frameworks', 'Credit Risk', 'Liquidity Risk', 'Market Risk', 'Operational Risk', and 'Risk Reporting', the guide explicitly speaks to climate-specific stress testing and scenario analysis. The supervisory expectations were as follows at a high level:

Overview of ECB supervisory expectations

1. Institutions are expected to understand the impact of climate-related and environmental risks on the business environment in which they operate, in the short, medium and long term, in order to be able to make informed strategic and business decisions.
2. When determining and implementing their business strategy, institutions are expected to integrate climate-related and environmental risks that impact their business environment in the short, medium or long term.
3. The management body is expected to consider climate-related and environmental risks when developing the institution's overall business strategy, business objectives and risk management framework, and to exercise effective oversight of climate-related and environmental risks.
4. Institutions are expected to explicitly include climate-related and environmental risks in their risk appetite framework.
5. Institutions are expected to assign responsibility for the management of climate-related and environmental risks within the organisational structure in accordance with the three lines of defence model.
6. For the purposes of internal reporting, institutions are expected to report aggregated risk data that reflect their exposures to climate-related and environmental risks with a view to enabling the management body and relevant sub-committees to make informed decisions.

7. Institutions are expected to incorporate climate-related and environmental risks as drivers of existing risk categories into their existing risk management framework, with a view to managing, monitoring and mitigating these over a sufficiently long-term horizon, and to review their arrangements on a regular basis. Institutions are expected to identify and quantify these risks within their overall process of ensuring capital adequacy.
 8. In their credit risk management, institutions are expected to consider climate-related and environmental risks at all relevant stages of the credit-granting process and to monitor the risks in their portfolios.
 9. Institutions are expected to consider how climate-related and environmental events could have an adverse impact on business continuity and the extent to which the nature of their activities could increase reputational and/or liability risks.
 10. Institutions are expected to monitor, on an ongoing basis, the effect of climate-related and environmental factors on their current market risk positions and future investments, and to develop stress tests that incorporate climate-related and environmental risks.
 11. Institutions with material climate-related and environmental risks are expected to evaluate the appropriateness of their stress testing with a view to incorporating them into their baseline and adverse scenarios.
 12. Institutions are expected to assess whether material climate-related and environmental risks could cause net cash outflows or depletion of liquidity buffers and, if so, incorporate these factors into their liquidity risk management and liquidity buffer calibration.
 13. For the purposes of their regulatory disclosures, institutions are expected, to publish meaningful information and key metrics on climate-related and environmental risks that they deem to be material, with due regard to the [European Commission's Guidelines on non-financial reporting: Supplement on reporting climate-related information](#).
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The guidance makes it clear that financial institutions must treat both transitional and physical climate risk as drivers of existing risk categories, specifically pointing to how the costs of transitional policies will likely cause increased credit spreads and potentially impact national GDPs during that transition.

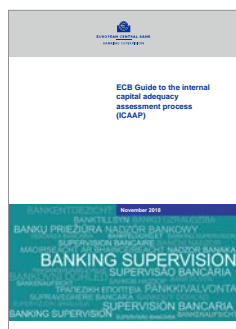
Examples of climate-related and environmental risk drivers

Risks affected	Physical		Transition	
	Climate-related	Environmental	Climate-related	Environmental
	<ul style="list-style-type: none"> › Extreme weather events › Chronic weather patterns 	<ul style="list-style-type: none"> › Water stress › Resource scarcity › Biodiversity loss › Pollution › Other 	<ul style="list-style-type: none"> › Policy and regulation › Technology › Market sentiment 	<ul style="list-style-type: none"> › Policy and regulation › Technology › Market sentiment
Credit	The probabilities of default (PD) and loss given default (LGD) of exposures within sectors or geographies vulnerable to physical risk may be impacted, for example, through lower collateral valuations in real estate portfolios as a result of increased flood risk.		Energy efficiency standards may trigger substantial adaptation costs and lower corporate profitability, which may lead to a higher PD as well as lower collateral values.	
Market	Severe physical events may lead to shifts in market expectations and could result in sudden repricing, higher volatility and losses in asset values on some markets.		Transition risk drivers may generate an abrupt repricing of securities and derivatives, for example for products associated with industries affected by asset stranding.	
Operational	The bank's operations may be disrupted due to physical damage to its property, branches and data centres as a result of extreme weather events.		Changing consumer sentiment regarding climate issues can lead to reputation and liability risks for the bank as a result of scandals caused by the financing of environmentally controversial activities.	
Other risk types (liquidity, business model)	Liquidity risk may be affected in the event of clients withdrawing money from their accounts in order to finance damage repairs.		Transition risk drivers may affect the viability of some business lines and lead to strategic risk for specific business models if the necessary adaptation or diversification is not implemented. An abrupt repricing of securities, for instance due to asset stranding, may reduce the value of banks' high quality liquid assets, thereby affecting liquidity buffers.	

It is also mentioned that the costs of this transition and the costs of dealing with the physical impacts are highly correlated and largely dependent upon the speed and nature of the transition. There are choices to be made between orderly and disorderly transition routes, as well as climate targets, expressed as ultimate global warming limits by the end of this century.

The climate guidance invokes the Capital Requirements Directive (CRD)...

The [CRD](#), specifically articles 73 and 74, require institutions to implement internal governance and processes that ensure effective and prudent management. This must include the identification, assessment and monitoring of climate change on the business environment that they operate within. This must include geographic and sector-specific degradation brought about by climate change and policies designed to mitigate it.



The ECB also point out that these recommendations are explicitly covered by requirements specified in the 'Internal Capital Adequacy Assessment Process' ([ICAAP](#))

Risk management frameworks are expected to carry much of the weight for compliance...

The guidance document lays down several expectations of risk management, including:

- Incorporation of climate-related risks as drivers of existing risk categories, with a view to managing, monitoring, and mitigating over short-, mid- and long-term time horizons.
- Consideration of climate-related risks at all stages of the credit granting and risk monitoring process.
- Consideration of how climate-related events may impact their own business continuity and any impacts that may have on their liability or reputation.
- Developing stress tests that monitor potential impacts on their market risk positions and future investments.
- Examining existing stress testing capabilities with a view to evaluating them for climate-related appropriateness.
- Assessment of climate-related risks to net cash outflows and/or liquidity buffers.

The highest focus is given to the credit risk section, as would be expected due to its capacity to deteriorate the profitability, liquidity and, ultimately, viability of a financial institution through capital requirement escalation.

Climate-related credit risks are expected to be part of loan origination and pricing and are constantly monitored. Climate-related in this context, includes:

- Exposure to physical hazard
- Potential increases in default risk
- Client risk mitigation measures
- Development of climate-related risk limits
- Climate-related deleveraging strategies

One suggestion from the ECB is the development of 'Climate-informed shadow probabilities of default', which could be reported in parallel.

As expected, liquidity risk is also a concern, and the ECB may also invoke the 'Internal Liquidity Adequacy Assessment Process' ([ILAAP](#)), encouraging institutions to include direct and indirect impacts of climate-related risks in their reporting. They specifically focus on the potential erosion of the value of liquidity buffers through the falling value of 'High Quality Liquid Assets' (HQLA).

Regarding appropriate stress tests, institutions are encouraged to use a variety of scenarios in line with pathways developed by the 'Intergovernmental Panel on Climate Change' (IPCC). Scenarios used for stress testing must include:

- How the institution may be affected by physical risk and transition risk.
- How climate-related risks may evolve under various scenarios, taking into account that these risks may not be reflected in historic datasets.
- How climate-related risks may materialize over short, mid and long terms.

The guidance also covers internal roles and responsibilities and disclosures.

Recommendations of the Task Force on Climate-related Financial Disclosures

Governance	Strategy	Risk management	Metrics and targets
<p>Disclose the organisation's governance around climate-related risks and opportunities.</p>	<p>Disclose the actual and potential impacts of climate-related risks and opportunities on the organisation's businesses, strategy and financial planning, where such information is material.</p>	<p>Disclose how the organisation identifies, assesses and manages climate-related risks.</p>	<p>Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities, where such information is material.</p>
Recommended disclosures			
<p>a) Describe the board's oversight of climate-related risks and opportunities.</p> <p>b) Describe management's role in assessing and managing climate-related risks and opportunities.</p>	<p>a) Describe the climate-related risks and opportunities the organisation has identified over the short, medium and long term.</p> <p>b) Describe the impact of climate-related risks and opportunities on the organisation's businesses, strategy and financial planning.</p> <p>c) Describe the resilience of the organisation's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.</p>	<p>a) Describe the organisation's processes for identifying and assessing climate-related risks.</p> <p>b) Describe the organisation's processes for managing climate-related risks.</p> <p>c) Describe how processes for identifying, assessing and managing climate-related risks are integrated into the organisation's overall risk management.</p>	<p>a) Disclose the metrics used by the organisation to assess climate-related risks and opportunities in line with its strategy and risk management process.</p> <p>b) Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions and the related risks.</p> <p>c) Describe the targets used by the organisation to manage climate-related risks and opportunities and performance against targets.</p>

Source: TCFD.

These should be included in the overall planning by financial institutions.

2022 saw a European wide assessment of bank readiness for climate risk inclusion...

The ECB [surveyed](#) 104 significant institutions with the aim of determining how far banks had integrated climate-related risks into their risk management. Specific aims included:

- Progress banks have already made in developing climate risk stress-testing frameworks;
- Capacity of banks to produce climate risk factors, an intermediate step towards developing climate risk stress test estimates;
- Capacity of banks to produce climate risk stress test projections;
- Risks banks are facing in the form of transition risks (both short-term and long-term) and acute physical risk events.

The central bank looked at qualitative assessments, risk factor stock takes and also ran qualitative stress tests based upon scenarios and metrics from the 'Network for Greening the Financial System' (NGFS), covering both transition and physical risks. The scenarios used for the qualitative part of this exercise covered short- and long-term horizons, as well as multiple climate pathways. There was a focus on residential mortgages and corporate loans.

Module 3 scenarios and risk dimensions

	Exposures	Scenario	Projections ¹	Horizon	Credit risk	Market risk	Operational risk
Transition risk	Global	Short-term stress	Baseline	3 years (2022-2024)	Corporate loans (incl. SME, CRE) + mortgages	Bonds + stocks issued by NFCs ² (incl. accounting and economic hedges)	Operational and reputational risks to be assessed via a qualitative questionnaire
			Stress				
		Long-term paths	Orderly	30 years (2030, 2040, 2050)	Corporate loans (incl. SME, CRE) + mortgages		
			Disorderly				
			Hot house				
		Physical risk	EU countries	Drought & heat risk	Baseline		
Stress							
Flood risk	Baseline			1 year 2022	Mortgages + CRE loans		
	Stress						

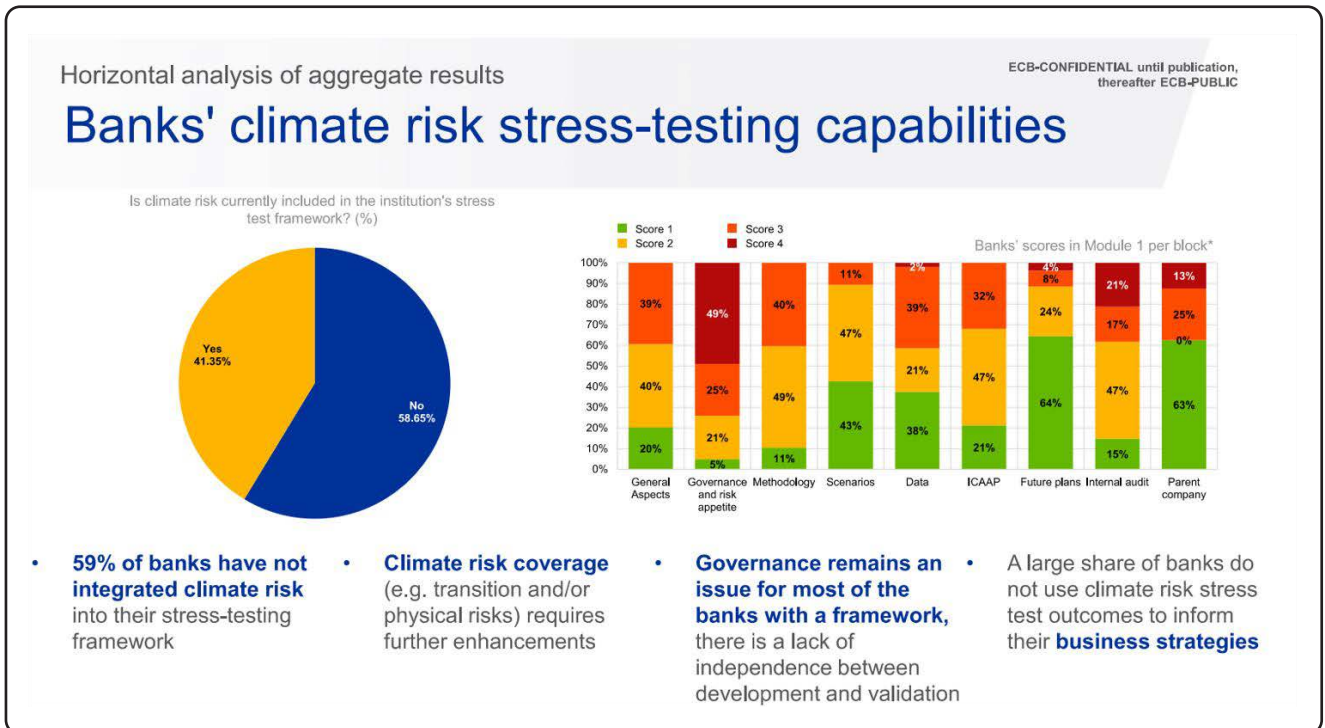
Source: ECB, climate risk stress test 2022, methodology, October 2021.

Notes: CRE stands for commercial real estate; NFC stands for non-financial corporation; SMEs stands for small and medium-sized enterprises.

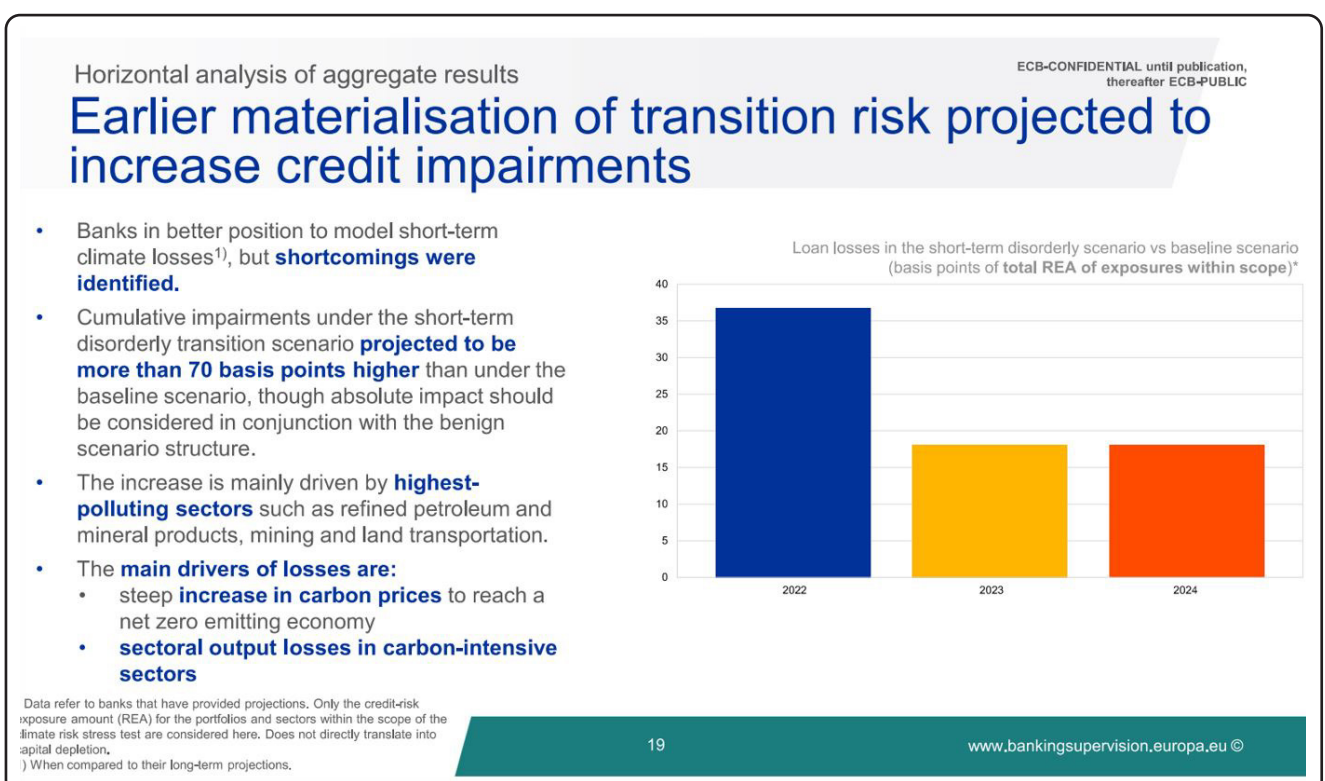
Ultimately, the ECB gained an insight into both potential losses to the European financial system arising from physical climate change and transitional policies, as well as the readiness of surveyed banks to manage those risks in a prudent manner.

Findings included:

- Slow integration of climate risk into risk management and stress testing.



- Early materialization of transition risk may significantly increase credit impairments



Ultimately, the ECB concluded with six strong recommendations:

- › Banks need to integrate climate risk stress into their ICAAPs.
- › Banks need to enhance their climate risk stress-testing frameworks to account for various transmission channels and asset classes, covering physical and transition risks.
- › Banks need to establish a robust governance structure for their climate risk stress-testing frameworks and integrate climate risk stress tests into their banking activities.
- › Banks need to incorporate climate risk scenarios into their stress-testing models, both transition and physical.
- › Banks should enhance climate risk management, understand their client's transition plans and strengthen their strategic plans to exploit the opportunities of a green transition.
- › Banks need to invest much more in climate-relevant data collection by engaging with customers and improving their proxy assumptions.

Banks need to take action...

All banks must consider the speed at which the ECB rolled out its guidance and how it is testing its directly-governed institutions. It is highly likely that these recommendations will become general reporting requirements sooner rather than later.

Of course, it must also be borne in mind that the reason for this speed of action is because the ECB recognizes the material risk that climate change represents to the European financial system.

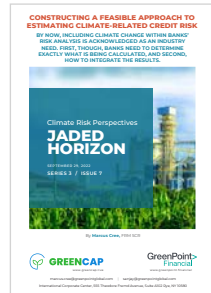
Financial institutions need to extend their risk management systems in ways that can capture specificities of climate-related threats. At a minimum, they must:

- › Develop the means to understand how multiple physical climate pathways may impact their customers and their credit profiles.
- › Understand how transition policies built into these pathways may deteriorate the business models of their corporate customers.
- › Work with customers to create adaptation plans to protect them from the worst effects and avoid business losses and stranded assets.
- › Include potential climate-specific losses as a range and as a standard in their capital and liquidity reporting.

Because of the unique nature by which IPCC climate pathways are created, it will be necessary to use deterministic scenarios for climate-specific stress tests and analysis rather than reusing historically calibrated stochastic processes already in place.

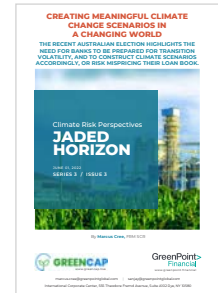
Climate-specific scenarios have been covered in -

[Constructing a feasible approach to climate-related credit risk](#)



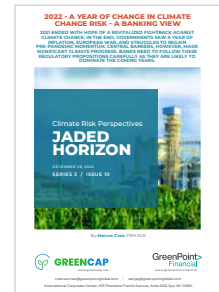
And

[Creating Meaningful Climate Change Scenarios in a Changing World](#)



Global regulation advances have been covered in -

[2022 – A year of change in climate change risk – A banking view](#)

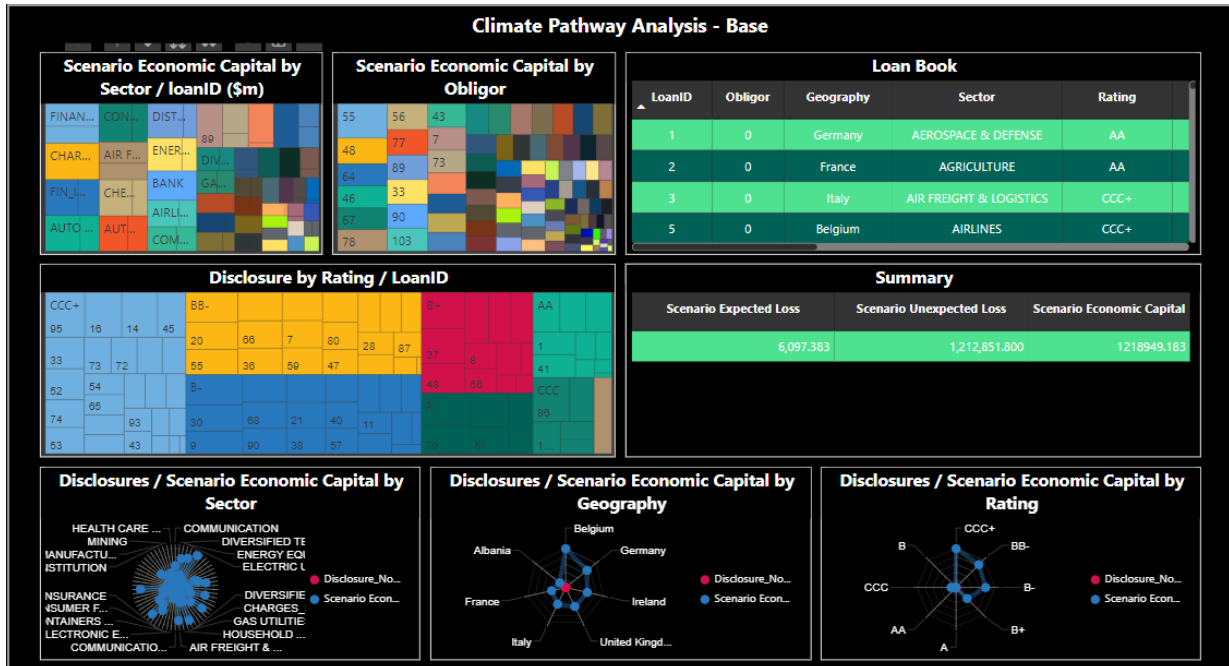


GreenCap can help...

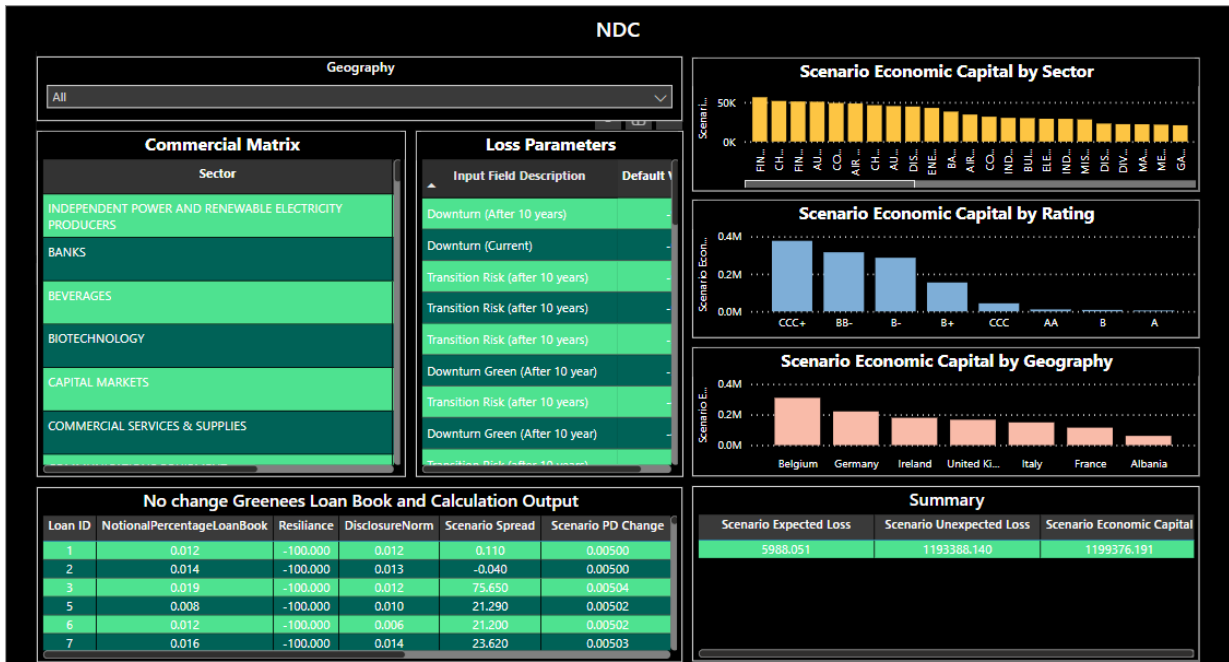
GreenCap is a 'Risk As A Service' (RaaS) solution that enables banks to run transitional and physical risk assessment against their balance sheet that reports individual loan and portfolio level, providing:

- Implied PD changes across multiple climate pathways
- Economic capital changes - Broken into expected and unexpected losses
- Implied spreads on climate-impacted loans

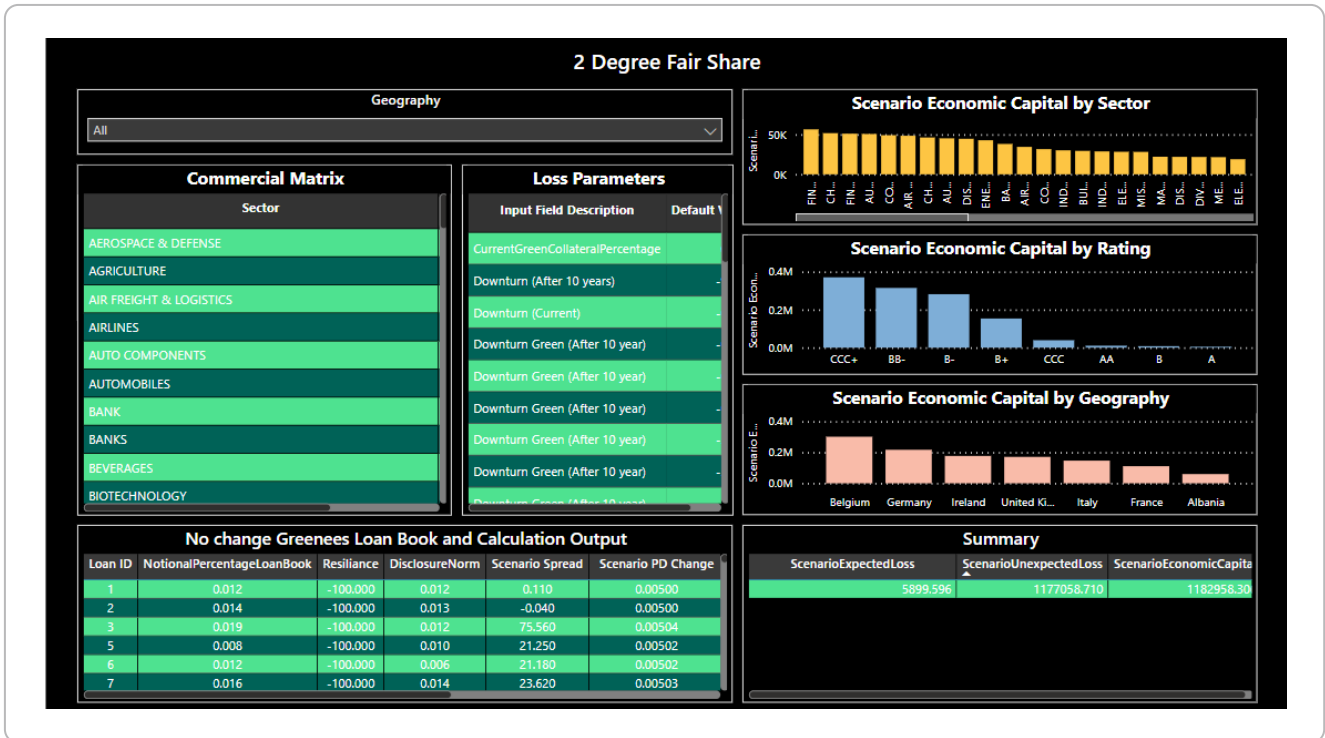
The system supports multiple scenarios and pathways and allows bottom-up adaptations to be added at the customer level for fine-tuning risks and exposures. As a cloud service, GreenCap is extremely fast to implement and use for exactly the type of analysis that is being asked for by the ECB and other Central Banks around the world.



Scenario



Scenario



GreenCap is designed to be used by banks of all sizes.

Visit [GreenCap.live](https://www.greencap.live) for more insights and resources designed to assist banks in navigating the challenges posed by climate change and policies introduced to mitigate it.

Chapter 5

BANKING RISK MANAGEMENT ON THE AFRICAN FRONTLINE OF CLIMATE CHANGE

THERE IS MUCH DISCUSSION ABOUT THE PHYSICAL IMPACTS OF CLIMATE CHANGE ON AFRICA, BUT THE CENTRAL BANKS OF THIS CONTINENT ARE WELL AWARE OF, AND ARE PREPARING REGULATIONS TO DEAL WITH INCREASED CREDIT AND LIQUIDITY RISKS CREATED BY THE PHYSICAL AND TRANSITIONAL ELEMENTS OF GLOBAL WARMING. BANKS IN THE REGION NEED TO PAY CLOSE ATTENTION.

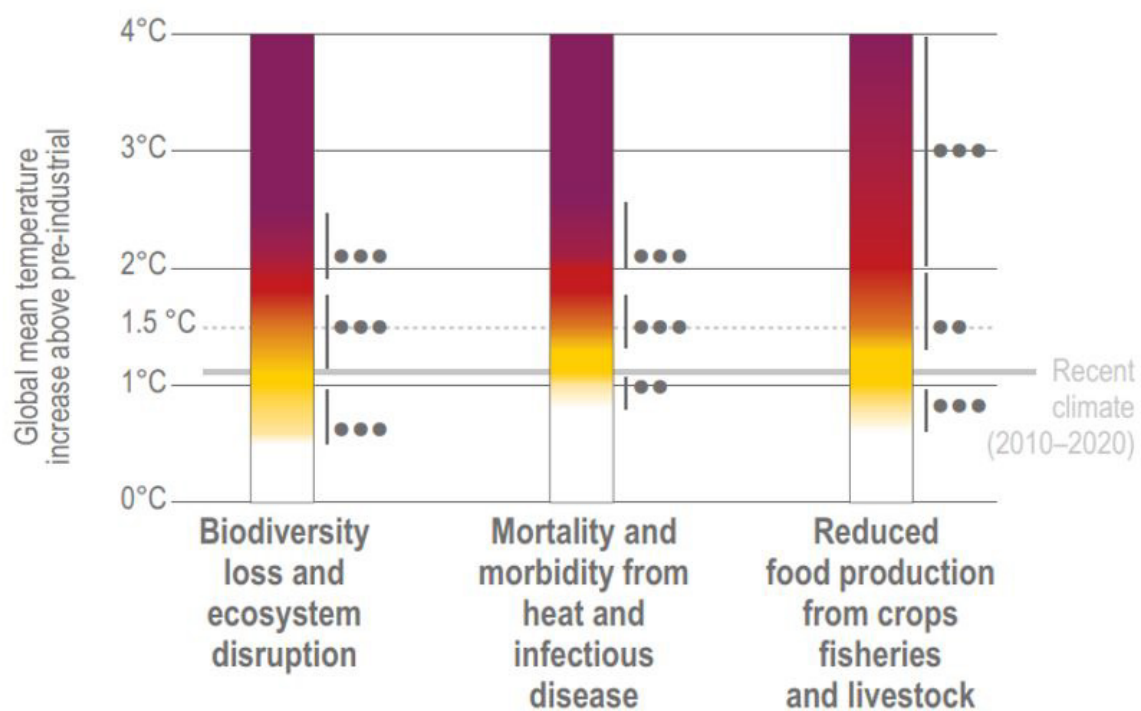
Originally published on JULY 18, 2023

Africa is disproportionately affected by climate change...

While contributing a negligible amount of CO₂ to the overall atmospheric accumulation, Africa is one of the most highly exposed continents to the impacts of climate change in the world. According to the latest [report](#) by the 'Intergovernmental Panel on Climate Change' (IPCC), the region is expected to experience substantial negative impacts from global warming, even in and around the globally agreed targets of 1.5 and 2 degrees.

Temperature rises of 3 degrees put Africa at 'very high risk' across key sectors.

Key risks for Africa increase with increasing global warming



Level of impact or risk

- Very high
- High
- Moderate
- Undetectable

Confidence level for transition

- Very high
- High
- Medium
- Low

Transition range

The report highlights more details on the sector with specific 'key risks' as follows:

Sector	Loss and damage from climate change
Ecosystems	<ul style="list-style-type: none"> Local, regional and global extinction Reduced ecosystem goods and services Declining natural coastal protection and habitats Altered ecosystem structure and declining ecosystem functioning Nature-based tourism Biodiversity loss
Water	<ul style="list-style-type: none"> Declining lake and river resources Reduced hydroelectricity and irrigation Disappearing glaciers Reduced groundwater recharge and salinisation Drought
Food systems	<ul style="list-style-type: none"> Reduced crop productivity and revenues Increased livestock mortality and price shocks Decreased fodder and pasture availability Reduced fisheries catch and fisher livelihoods
Human settlements and infrastructure	<ul style="list-style-type: none"> Loss or damage to formal and informal dwellings Damage to transport systems Damage to energy systems Water supply, sanitation, education and health infrastructure Migration
Health	<ul style="list-style-type: none"> Loss of life Loss of productivity Reduced nutrition
Economy, poverty and livelihoods	<ul style="list-style-type: none"> Loss of livelihoods, jobs and income Reduced productive land Reduced economic growth and increased inequality Community and involuntary displacement Reduced labour productivity and earning potential Delayed and poorer education progress Reduced tourism Increased urban in-migration
Heritage	<ul style="list-style-type: none"> Loss of traditional cultures and ways of life Loss of language and knowledge systems Damage to heritage sites

With specific vulnerabilities within the following areas:

Key climate change risk	Climate impact driver	Vulnerability
Local or global extinction of species and reduction or irreversible loss of ecosystems and their services, including freshwater, land and ocean ecosystems	Increasing temperatures of freshwaters, ocean and on land; heatwaves; precipitation changes (both increases and decreases); increased atmospheric CO ₂ concentrations; sea level rise; ocean acidification	Vulnerability highest among poorly dispersing organisms (plants) and species with narrow and disappearing niches (e.g., mountain endemics), and is exacerbated by non-climate hazards (e.g., habitat loss for agriculture or afforestation projects); vulnerability is high for Protected Areas surrounded by transformed land preventing species' dispersal and areas with limited elevational gradients that reduce their potential to act as climate refugia.
Risks to marine ecosystem health and to livelihoods in coastal communities	marine heatwaves, increased acidification and sedimentation/turbidity	low-income coastal communities (e.g., artisanal fisherfolk, fishmongers) whose livelihood depends on healthy coral reefs, seagrass beds and mangroves
Loss of food production from crops, livestock and fisheries	Increasing temperatures and heat waves for freshwaters, ocean and on land; precipitation changes; drought; increased atmospheric CO ₂ concentrations	High for low-income coastal and riparian communities whose livelihood depends on healthy ocean and freshwater ecosystems, and for populations reliant on fish for protein and micronutrients. Vulnerability is high for many food producers dependent on rainfall and temperature conditions, including subsistence farmers, the rural poor, and pastoralists. Lack of access to climate information and services increases vulnerability.
Mortality and morbidity from increased heat and infectious diseases (including vector-borne and diarrhoeal diseases)	Increasing temperatures; heatwaves; precipitation change (both increases and decreases)	Vulnerability is highest for the elderly, pregnant women, individuals with underlying conditions, immune-compromised individuals (e.g., from HIV) and young children. Regions without vector control programmes in place or without detection and treatment regimens.

Key climate change risk	Climate impact driver	Vulnerability
		<p>Inadequate insulation in housing in informal settlements in urban heat islands. Inadequate improvements in public health systems.</p> <p>Inadequate water and sanitation infrastructure, especially in rapidly expanding urban areas and informal settlements.</p>
<p>Reduced economic output and growth, and increased inequality and poverty rates</p>	<p>Increased temperatures; reduced rainfall; drought; extreme weather events</p>	<p>Conditions underlying severe risk are lower income growth, higher population levels, low rates of structural economic change with more of the labour force engaged in agriculture and other more climate-exposed sectors due in part to physical labour outdoors.</p>
<p>Water and energy insecurity due to shortage of irrigation and hydropower</p>	<p>Heat and drought</p>	<p>High reliance on hydropower for national electricity generation, especially east and southern African countries. Planned for high reliance on irrigated food production. Concentrations of hydropower plants within river basins experiencing similar rainfall and runoff patterns. Limited electricity trade between major river basins.</p>
<p>Cascading and compounding risks of loss of life, livelihoods and infrastructure in human settlements</p>	<p>Extreme heat; floods; drought; sea level rise and associated coastal hazards; compound climate hazards (e.g., coinciding heat and drought)</p>	<p>Coastal and low-lying urban areas and those in dryland regions with rapidly growing populations. People living in informal settlements. Increased magnitude of heat waves due to urban heat island effects. Climate shocks to municipal revenues (e.g., from water). Unaffordable maintenance of transport and protective infrastructure with increasing climate impacts. Greater water resource demand from urban and non-urban populations and key economic sectors</p>

A result of already being a relatively low 'Greenhouse Gas' (GHG) and its 'frontline' position against physical climate change, African countries are directing their climate-related commitments and policies as much towards adaptation than mitigation.

53 (of 54) African countries have submitted NDCs to the UN...

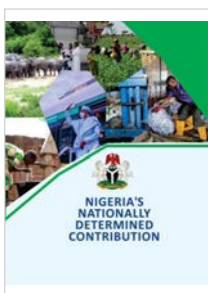
Governments from the continent have submitted 'Nationally Determined Contribution' (NDC) to the UN. These documents were created as a result of the Paris-based 'Conference of the Parties' (COP) 21. This conference was seen as a breakthrough moment in the history of climate change because of the agreements in several specific areas:

- Attendees agreed to limit global warming to 2 degrees above pre-industrial levels.
- Attendees agreed to make best efforts to limit global warming to 1.5 degrees above pre-industrial levels.
- Attendees agreed to create local plans within their own countries that would specify targets and actions to achieve them. These NDCs would then be ratcheted up over time.

The key to success was that the NDCs were separate from overall ambitions. This was a political device that allowed high-level ambitions to be agreed upon before the means of delivering it were decided. There has been, and continues to be, a disagreement between countries as to what constitutes 'fair share' in terms of economic disruption. The nexus of this argument is that Africa has the most to gain from reaching the target heating limits, while it contributes the lowest amount of GHG.

53 of the 54 African countries have submitted their NDC documentation. The breakdown of all NDCs can be accessed at the [African NDC Hub](#). As examples, below are three of them, along with the ambitions, targets and target sectors.

Nigeria



GHG Reduction:

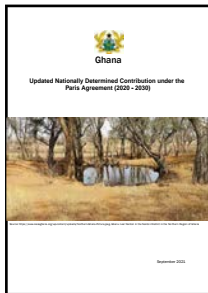
- 20% (unconditional) and 45% (conditional)
- 40% energy efficiency target by 2030
- 2% energy efficiency improvement per year
- End gas flaring by 2030

Targeted Economic Sectors:

- Energy & Efficiency
- Agriculture
- Infrastructure & Housing
- Waste

Adaptation Commitment:

- › Efficiency standards for new cars
- › Housing standards for CC adaptation
- › Climate-smart agriculture and reforestation

Ghana

GHG Reduction:

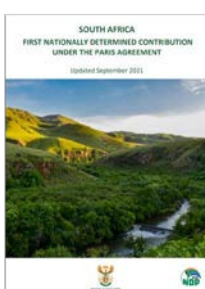
- › 15% below 'Business as Usual' (BAU) (unconditional), and 45% (conditional)
- › Double energy efficiency improvement to 20% in industrial facilities by 2030
- › Scale up access and adoption of 2 million efficient cook stoves up to 2030
- › Scale up renewable energy penetration by 10% by 2030
- › Increase solar lantern replacement in rural non-electrified households to 2 million
- › Double the current waste-to-compost installed capacity of 180,000 tons/annum by 2030

Targeted Sectors:

- › AFOLU
- › Energy
- › IPPU
- › Transport
- › Infrastructure (climate-proofing)
- › Waste

Adaptation Commitment:

- › City resilient infrastructure
- › Solar home systems (incl. lantern)
- › Efficient cook stoves
- › Mass transportation
- › Methane recovery increased to 60% of landfills by 2030 (40% in 2025)
- › Biogas
- › Compost
- › Phase-out of HFCs in AC (green cooling)

South Africa

GHG Reduction:

- › Targeted trajectory - peak, plateau and decline
- › Decarbonized Energy system by 2050

Targeted Sectors:

- › AFOLU
- › IPPU
- › Energy & Efficiency
- › Waste

Adaptation Commitment:

- › Energy-efficient lighting
- › Efficient motors + appliances
- › Solar water heaters
- › Electricity + hybrid vehicles
- › Advanced bioenergy
- › Carbon Capture & Storage
- › Implementing regulatory standards & controls

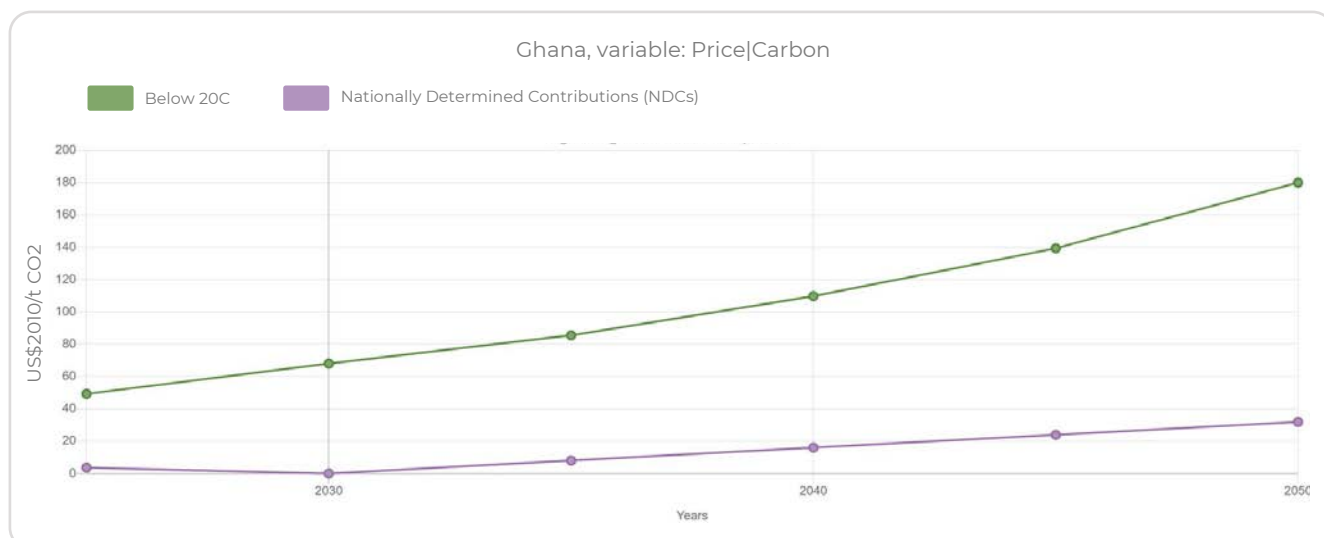
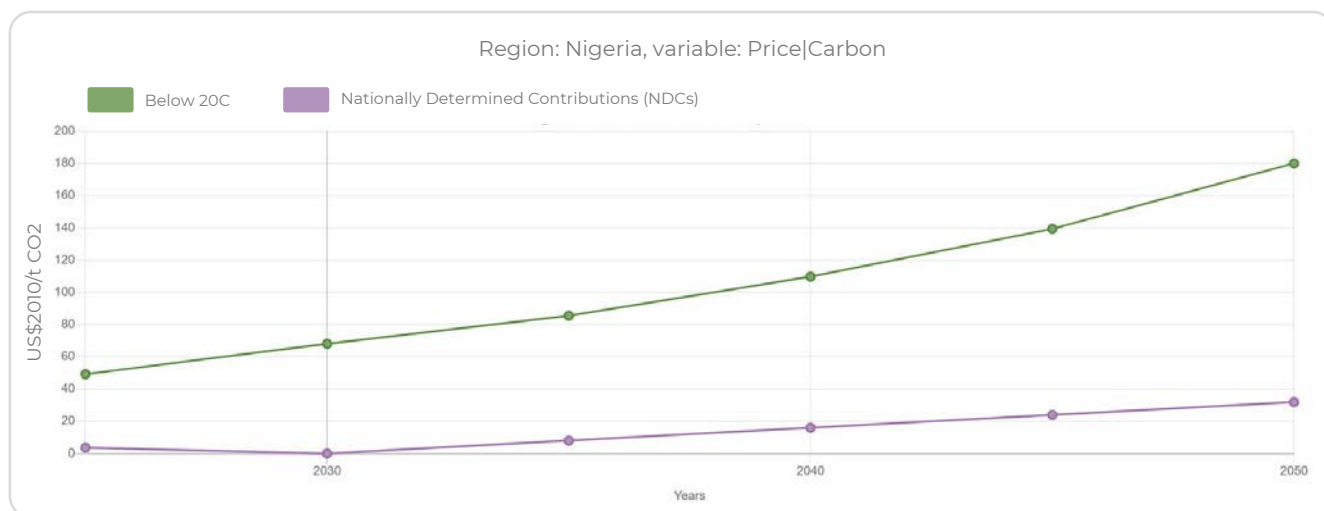
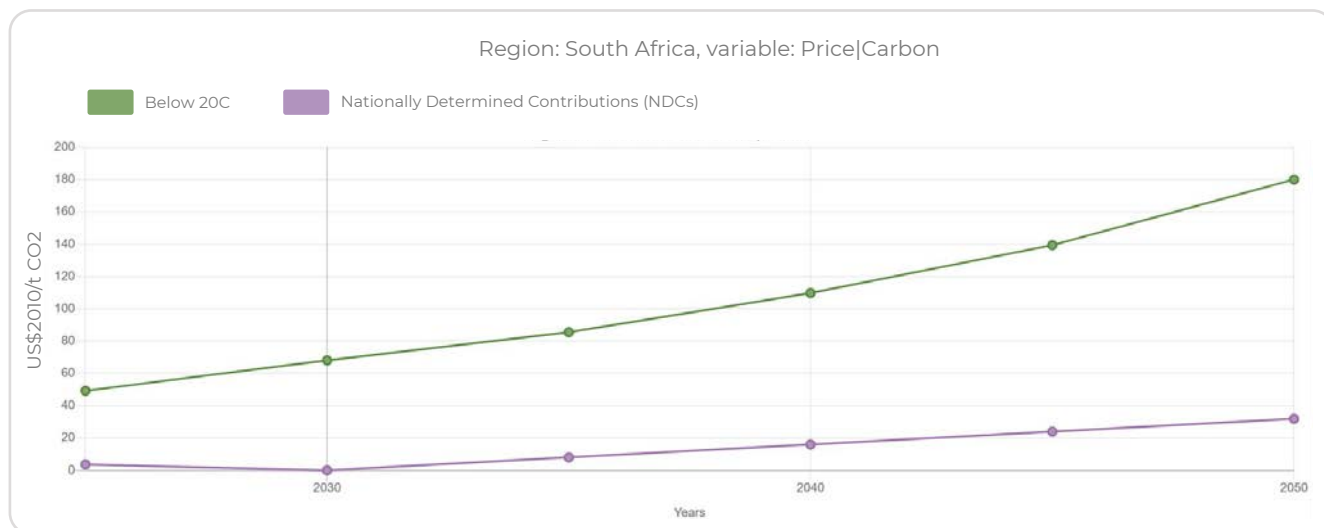
All NDCs across the continent can be segmented in the same way, providing a broad view of regional climate-related policy areas and economic ambitions.

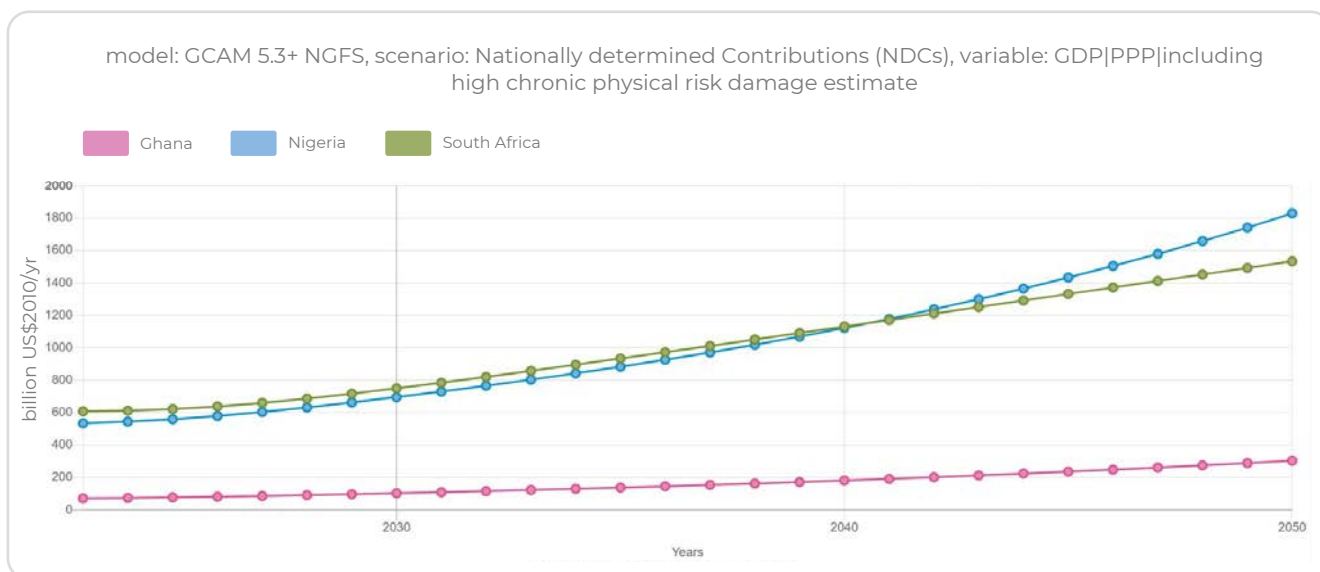
Costs associated with NDCs have been estimated...

The 'Network for Greening the Financial System' (NGFS) is an international collective of central bankers and economists who analyze climate policies and pathways with a view to putting costs against them. The NGFS view the issue in myriad ways, including:

- › No action.
- › 1.5-degree limit
- › 2-degree limit
- › Delayed transition
- › NDC
- › ...

This analysis provides the means to increase the dimensionality of African climate initiatives, from target sectors and actions, to costs, along multiple scenarios. There are two strong alternatives for the costing of policies - the first is to use the estimated GDP impacts, with the second using the implied cost of carbon that is calculated locally and can be used in the context of stated targets. Both are reasonable starting points for putting dollar values against NDCs.





The combination of researched policy outlines, along with analyzed costs to their affected economies, provides enough data for banks to estimate how countries, sectors and industries they lend to may be impacted by these additional costs. Once those impacts are estimated, they can be translated into impacts on borrower credit riskiness, economic capital and the rise in potential liquidity risk.

African Central Banks are taking notice and moving towards regulatory reporting...

Increasing climate-related risks to banks cover all areas, but the most concerning to central banks and regulators across Africa are credit and liquidity risk amplifiers. This mirrors the analysis emerging from the 'Basel Committee on Banking Supervision' (BCBS), which published, in June 2022, '[Principles for the effective management of climate-related financial risks](#)'.

The paper's 12 key principles are as follows:

Principle 1: Banks should develop and implement a sound process for understanding and assessing the potential impacts of climate-related risk drivers on their businesses and on the environments in which they operate.

Principle 2: The board and senior management should clearly assign climate-related responsibilities to members and/or committees and exercise effective oversight of climate-related financial risks.

Principle 3: Banks should adopt appropriate policies, procedures, and controls that are implemented across the entire organization to ensure effective management of climate-related financial risks.

Principle 4: Banks should incorporate climate-related financial risks into their internal control frameworks across the three lines of defense to ensure sound, comprehensive and effective identification, measurement and mitigation of material climate-related financial risks.

Principle 5: Banks should identify and quantify climate-related financial risks and incorporate the ones assessed as material over relevant time horizons into their internal capital and liquidity adequacy assessment processes, including their stress testing programs where appropriate.

Principle 6: Banks should identify, monitor and manage all climate-related financial risks that could materially impair their financial condition, including their capital resources and liquidity positions. Banks should ensure that their risk appetite and risk management frameworks consider all material climate-related financial risks to which they are exposed and establish a reliable approach to identifying, measuring, monitoring, and managing those risks.

Principle 7: Risk data aggregation capabilities and internal risk reporting practices should account for climate-related financial risks.

Principle 8: Banks should understand the impact of climate-related risk drivers on their credit risk profiles and ensure that credit risk management systems and processes consider material climate-related financial risks.

Principle 9: Banks should understand the impact of climate-related risk drivers on their market risk positions and ensure that market risk management systems and processes consider material climate-related financial risks.

Principle 10: Banks should understand the impact of climate-related risk drivers on their liquidity risk profiles and ensure that liquidity risk management systems and processes consider material climate-related financial risks.

Principle 11: Banks should understand the impact of climate-related risk drivers on their operational risk and ensure that risk management systems and processes consider material climate-related risks.

Principle 12: Where appropriate, banks should make use of scenario analysis to assess the resilience of their business models and strategies to a range of plausible climate-related pathways and determine the impact of climate-related risk drivers on their overall risk profile.



Examples of the incorporation of the BCBS paper can be seen across Africa, with Mauritius, a 'Small Island Developing State' (SIDS) that is highly vulnerable to climate change, being an example. Its own April 2022 '[Guideline on Climate-related and Environmental Financial Risk Management](#)' expects climate change to sit within banks' standard risk management. Climate-specific analysis and reporting must:

- Include the development of relevant risk indicators to categorize counterparties, sectors, and geographical locations based on the extent of climate-related and environmental financial risks.

- › Comprise an adequate risk monitoring process, which includes usage of qualitative and quantitative analytic tools and metrics to monitor relevant risk indicators and climate-related and environmental financial risk exposures against the overall strategy and risk appetite for climate-related and environmental financial risks, and to support decision making.
- › Ensure that the risk appetite framework incorporates relevant risk exposure limits and thresholds for risks.
- › Encompass measures to encourage counterparties to provide relevant disclosures on climate-related and environmental financial risks.

The message is very clear: climate change increases credit and liquidity risks from both its physical effects and the costly transitional policies created to halt its progress. African banks need to expand their current risk frameworks to explicitly include these risks.

Africa has other incentives to move quickly on climate-related financial risk regulation...

In 2022, Egypt hosted COP 27, where the major accomplishment was forward movement on the long-discussed 'Loss and Damage' fund. This concept is that high GHG emitting countries, where their economic development has been based, at least partly, on fossil fuels, pay into a fund to be used to assist highly impacted, low emitting countries. In Egypt, the fund was agreed upon in principle, but how it will be funded was left for analysis and reporting at COP28.

This becomes important in the context of regulation as it creates a new incentive for Africa to be seen as leading the way in terms of building green economies. As one of the most highly climate change impacted areas of the world, it must become the example of 'green' best practice to make a case for funding the 'Loss and Damage' fund inarguable.

The time for banks to take action is now...

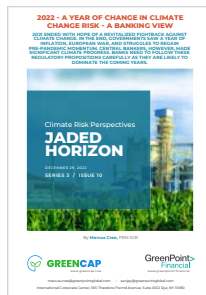
African banks must include climate-related risks within their standard risk management frameworks and risk appetites. This means:

- › Creating forward-looking scenarios that mirror published climate pathways, including physical and transitional elements.
- › Applying these scenarios to loan books and balance sheets.
- › Creating climate-influenced 'shadow' changes credit profiles and ratings.
- › Calculating changes in economic capital and implied loan spreads.
- › Incorporating these results into credit risk reporting and 'Contingency Liquidity Planning'.

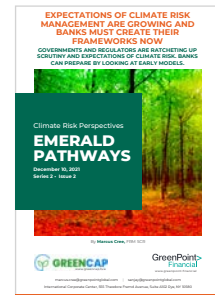
This will not only bring them into line with the regulatory trend towards specific climate-related risks, but also provide risk departments and governance committees with insights into emergent risks, which will allow them to prepare and strategize accordingly.

The recent changes in the global approach to climate-related financial risk has been covered in:

[2022 – A year of change in climate change risk – A banking view](#)

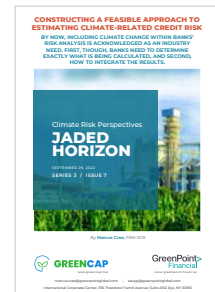


[Expectations of climate risk management are growing and banks must create their frameworks now](#)



Climate scenario building within banks has been covered in:

[Constructing a feasible approach to estimating climate-related credit risk](#)



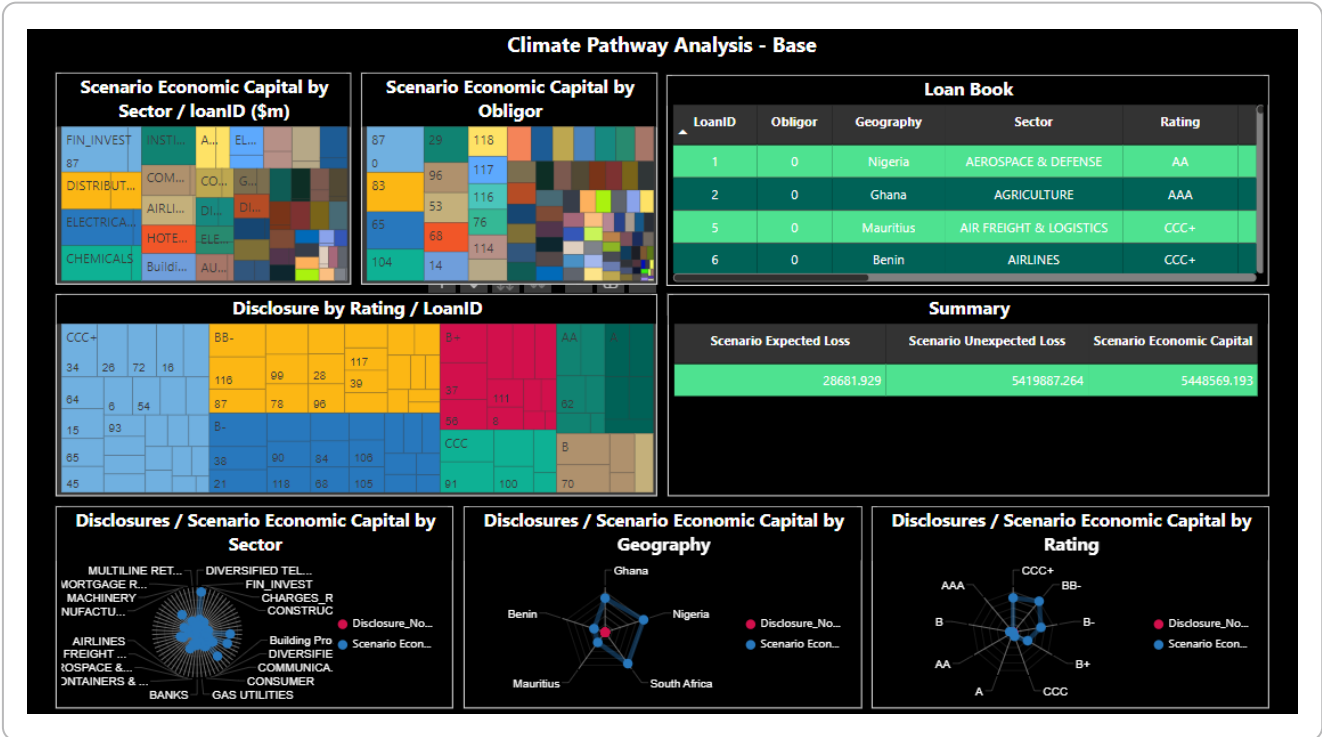
GreenCap can help...

GreenCap is a 'Risk As A Service' (RaaS) solution that enables banks to run transitional and physical risk assessment against their balance sheet that reports individual loan and portfolio level, providing:

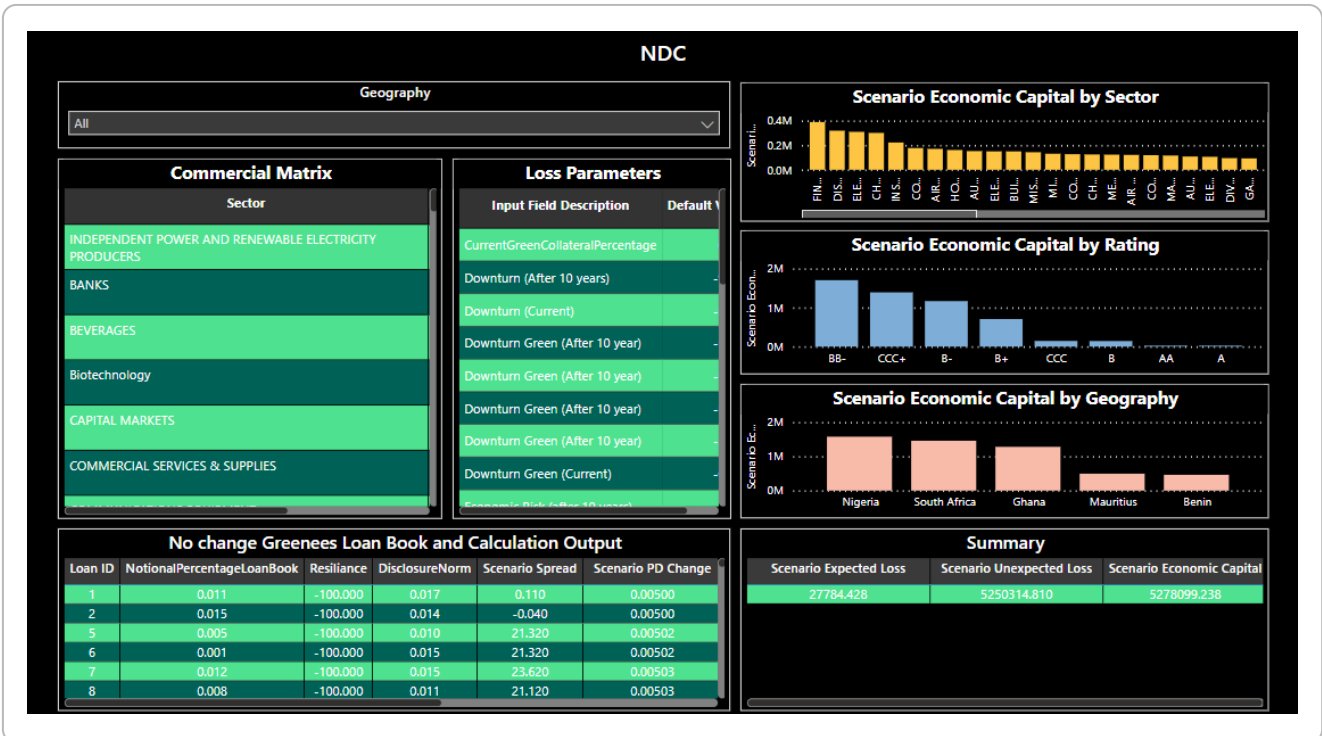
- Implied PD changes across multiple climate pathways
- Economic capital changes - Broken into expected and unexpected losses
- Implied spreads on climate-impacted loans

The system supports multiple scenarios and pathways and allows bottom-up adaptations to be added at the customer level for fine-tuning risks and exposures. As a cloud service, GreenCap is extremely fast to implement and use for exactly the type of analysis that is being, or about to be, asked for by Central Banks across Africa.

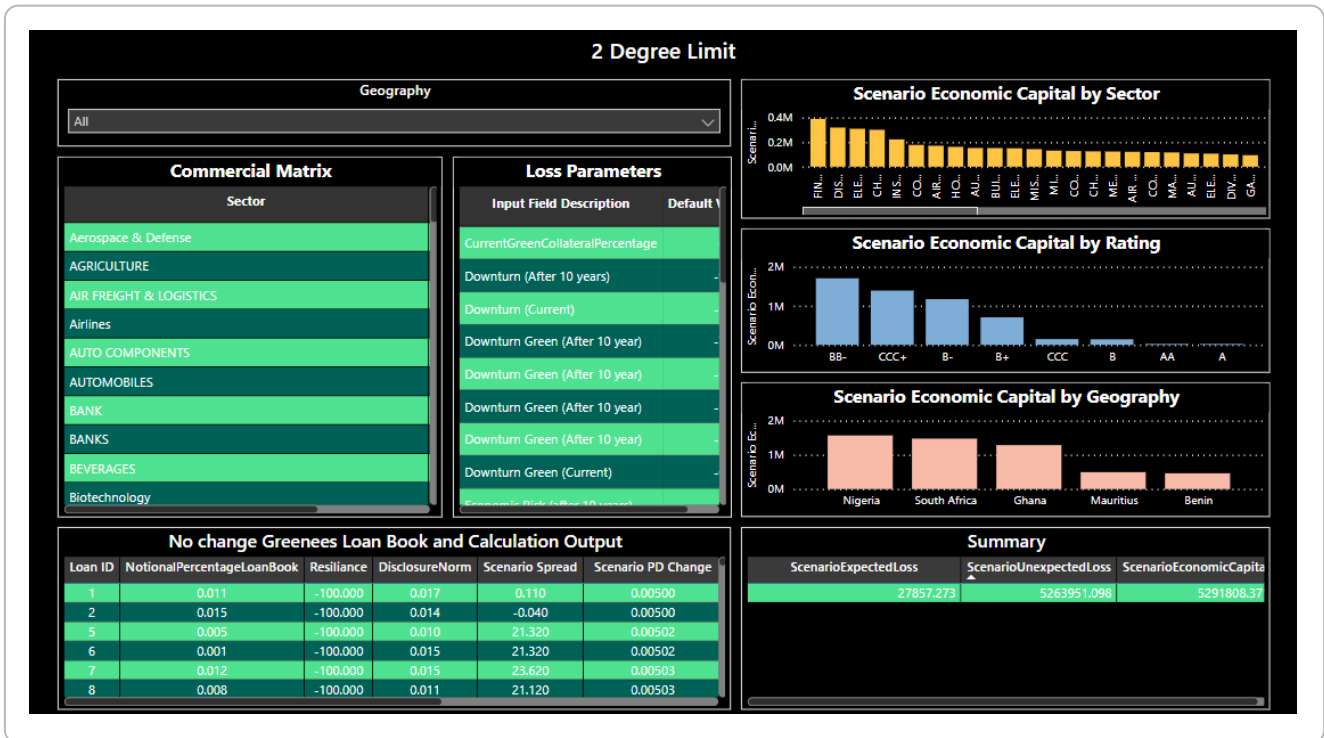
Africa system main page



Scenario



Scenario



GreenCap is designed to be used by banks of all sizes.

Visit [GreenCap.live](https://www.greencap.live) for more insights and resources designed to assist banks in navigating the challenges posed by climate change and policies introduced to mitigate it.



ABOUT GREENCAP

- › GREENCAP is a turnkey 'Risk as a Service' (RaaS) solution, designed for banks to include climate change as a category in their risk management frameworks.
- › The solution allows banks to replicate climate pathways within their scenarios for economic impact and risk analysis.
- › Using GreenCap, banks can modify pathways and scenarios to include the timing effects of delayed sustainability transition measures.
- › Loans and credit facilities are measured and monitored against risks arising from both 'physical' and 'transition' impacts.
- › GreenCap provides support for risk reporting and governance in the areas of 'Responsible Banking' and climate change.
- › With GreenCap, banks can ensure that their climate strategies are financially grounded, and loan pricing is optimized throughout the transition to a green global economy.



ABOUT GREENPOINT FINANCIAL

- › GreenPoint Financial is a division of GreenPoint Global, which provides software-enabled services, content, process and technology services, to financial institutions and related industry segments.
- › GreenPoint is partnering with Finastra across multiple technology and services platforms.
- › Founded in 2006, GreenPoint has grown to over 500 employees with a global footprint. Our production and management teams are in the US, India, and Israel with access to subject matter experts.
- › GreenPoint has a stable client base that ranges from small and medium-sized organizations to Fortune 1000 companies worldwide. We serve our clients through our deep resource pool of subject matter experts and process specialists across several domains.
- › As an ISO certified by TÜV Nord, GreenPoint rigorously complies with ISO 9001:2015, ISO 27001:2013, and ISO 27701:2019 standards.



Marcus Cree

MANAGING DIRECTOR AND
HEAD OF FINANCIAL TECHNOLOGY AND SERVICES

Marcus has spent 25 years in financial risk management, working on both the buy and sell side of the industry. He has also worked on risk management projects in over 50 countries, gaining a unique perspective on the nuances and differences across regulatory regimes around the world.

As Managing Director, Marcus co-heads GreenPoint Financial Technology and Services and has been central in the initial design of GreenPoint products in the loan book risk area, including CECL and sustainability risk. This follows his extensive experience in the Finastra Risk Practice and as US Head of Risk Solutions for FIS. Marcus has also been a prolific conference speaker and writer on risk management, principally market, credit and liquidity risk. More recently, he has written and published papers on sustainability and green finance.

Marcus graduated from Leicester University in the UK, after studying Pure Mathematics, Psychology and Astronomy. Since graduation, Marcus has continually gained risk specific qualifications including the FRM (GARP's Financial Risk Manager) and the SCR (GARP's Sustainability and Climate Risk). Marcus's latest academic initiative is creating and teaching a course on Green Finance and Risk Management at NYU Tandon School of Engineering.



Sanjay Sharma, PhD

FOUNDER AND CHAIRMAN

Sanjay provides strategic and tactical guidance to GreenPoint senior management and serves as client ombudsman. His career in the financial services industry spans three decades during which he has held investment banking and C-level risk management positions at Royal Bank of Canada (RBC) Goldman Sachs, Merrill Lynch, Citigroup, Moody's, and Natixis. Sanjay is the author of "Risk Transparency" (Risk Books, 2013), Data Privacy and GDPR Handbook (Wiley, 2019), and co-author of "The Fundamental Review of Trading Book (or FRTB) - Impact and Implementation" (Risk Books, 2018).

Sanjay was the Founding Director of the RBC/Hass Fellowship Program at the University of California at Berkeley and has served as an advisor and a member of the Board of Directors of UPS Capital (a Division of UPS). He has also served on the Global Board of Directors for Professional Risk International Association (PRMIA).

Sanjay holds a PhD in Finance and International Business from New York University and an MBA from the Wharton School of Business and has undergraduate degrees in Physics and Marine Engineering. As well as being a regular speaker at conferences, Sanjay actively teaches postgraduate level courses in business and quantitative finance at EDHEC (NICE, France), Fordham, and Columbia Universities.