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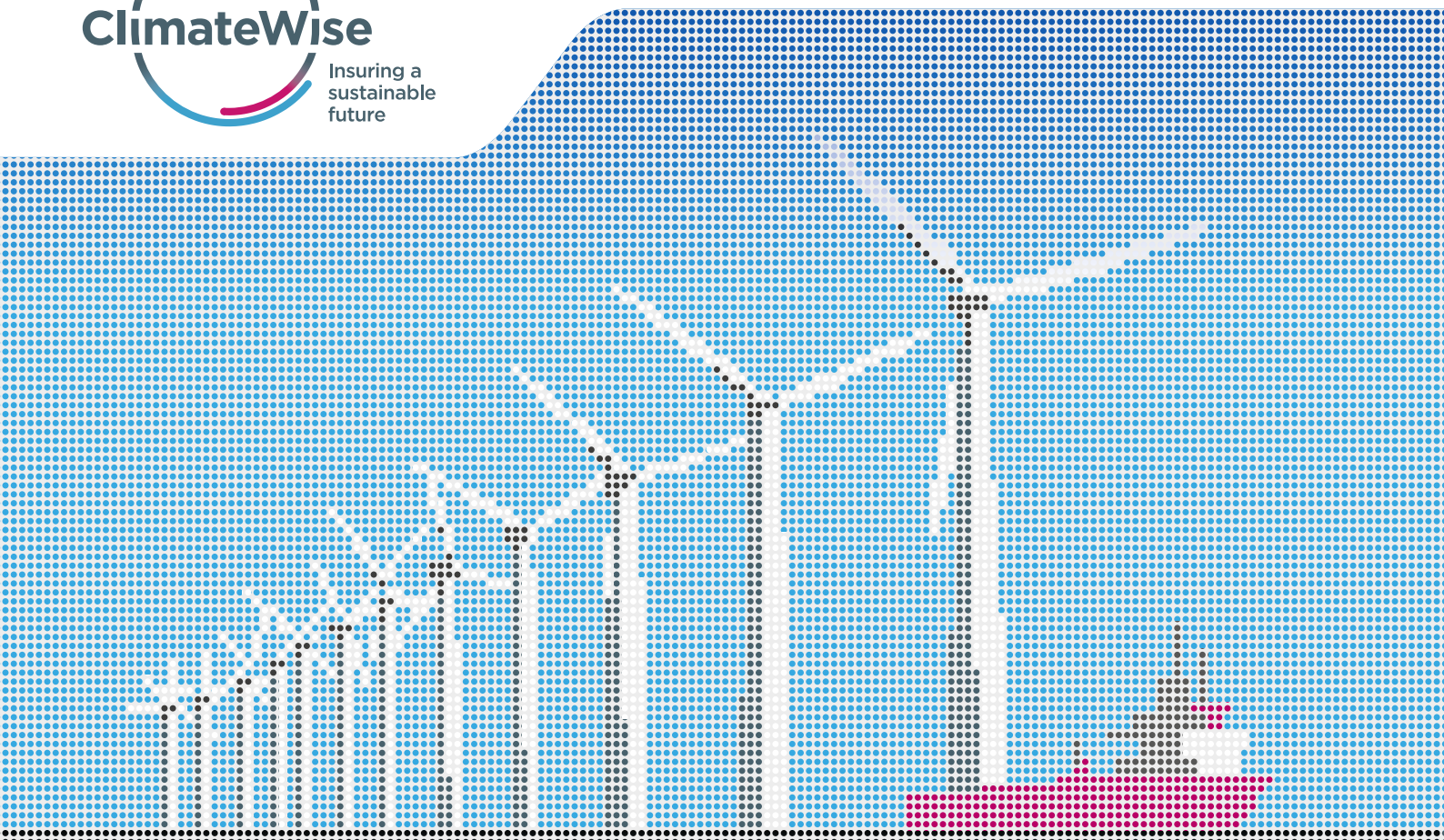

Insurers in Paris-aligned climate transition:

Practical actions towards net zero underwriting

UNIVERSITY OF CAMBRIDGE
INSTITUTE FOR SUSTAINABILITY LEADERSHIP

The University of Cambridge Institute for Sustainability Leadership

The University of Cambridge Institute for Sustainability Leadership (CISL) is a globally influential Institute developing leadership and solutions for a sustainable economy. We believe the economy can be 'rewired', through focused collaboration between business, government and finance institutions, to deliver positive outcomes for people and environment. For over three decades we have built the leadership capacity and capabilities of individuals and organisations, and created industry-leading collaborations, to catalyse change and accelerate the path to a sustainable economy. Our interdisciplinary research engagement builds the evidence base for practical action.

ClimateWise

ClimateWise supports the insurance industry to better communicate, disclose and respond to the risks and opportunities associated with the climate-risk protection gap. This is the growing divide between total economic and insured losses attributed to climate change.

Representing a growing global network of leading insurance industry organisations, ClimateWise helps to align its members' expertise to directly support society as it responds to the risks and opportunities of climate change.

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Executive summary

All parts of the economy must play an active role in delivering and supporting the transition to a net zero economy. Mitigation of the greenhouse gas (GHG) concentrations in the atmosphere that are driving the physical impacts of a warmer climate is needed if we are to keep global temperatures below 2°C above pre-industrial levels, and target no more than 1.5°C warming, which is the goal set in the Paris Agreement. We are already at 1.1°C and on a pathway to 1.8–2.7°C, even with the commitments made at the 2021 United Nations Climate Change Conference COP26 in Glasgow.[1] Urgent action is needed from all sectors, with the insurance industry a key contributor as a risk manager of the finance sector and society.

Net zero aligned commitments by the insurance industry have developed from own operations to investments and more recently underwriting, which should be grounded by policies and procedures that embed emission consideration in decision-making.[2] It is clear that the insurance industry could support and steward the transition to a low carbon, resilient society through incentivising stakeholders and taking practical action on underwriting activity. The insurance industry needs to draw further on its existing risk management knowledge and expertise, applying it to the transition problems posed by climate change.

To propel net zero underwriting practices, this report outlines key considerations of net zero underwriting, including:

- Setting emission scope boundaries for the insurance industry
- Measuring net zero alignment with carbon footprinting, transition pathway evaluation and temperature score
- Understanding the net zero implications for each insurance underwriting line of business
- Reacting to different insured clients, assets and activities.

These require a view across the insurance value chain and lines of business, along with clear emission scope guidance and robust measurement methodology, to enable meaningful target setting and anchor practical actions. Unpacking the insurance value chain is the necessary first step to understand what net zero means to each stakeholder associated with an underwriting activity. In particular, an insurer's scope 3 emissions include the activities building into and following on from the insurance policy, including emissions from firms in the underwriting and policy management supply chain, such as risk modellers, brokers, managing agents, lawyers, reinsurance and/or captive arrangements.

It is critical to engage insured clients strategically on the basis that each insurance line of business will be faced with different opportunities and challenges in the transition to net zero. Depending on the line of insurance and the business sector being insured, an insurer's approach could be different based on the insurance policy offered and insured assets or activities. Assuming the need to prioritise action in different sectors and geographies, we would expect insurers to begin with focusing on the most carbon-intensive industries in locations with relevant data and reporting. In response to the detailed assessment of a client's emissions and strategic alignment to a net zero transition pathway, an insurer can take a mixture of approaches to promote low carbon industries, engaging with key sectors to encourage transition and discourage delay.

A range of tools and practices are explored in the report to measure insured client and underwriting portfolio alignment with climate targets, and to understand an insurer's own capacity to manage alignment to net zero. Tools and practices that are transparent and open-sourced would enable and facilitate insurers to set, act on and achieve net zero commitments. Those that we engaged with further through the case studies with ClimateWise members, covering both the insured clients and insurance itself, were:

- The University of Cambridge Institute for Sustainability Leadership (CISL) Investment Leaders Group's Temperature Score Methodology converts emissions reporting data into an intuitive degree Celsius metric.
- Climate Transition Pathways (CTP) creates a practical solution that insurers, as well as other financial institutions, can utilise to help them meet their net zero commitments, enabling them to identify and support those insured organisations committed to executing robust transition plans.
- Milliman LLP (Milliman) and OneRisk Consulting Limited (ORC) worked in partnership to create an underwriting portfolio climate risk assessment tool.

For insurers, the report provides a summary of benefits and limitations with current approaches and tools to measure underwriting portfolio alignment with net zero and the Paris Agreement. In addition, policymakers and regulators, particularly global bodies such as the International Association of Insurance Supervisors, need to collaborate with the insurance industry to enable standardised assessment of climate risk and net zero alignment, as well as consistent boundaries of emissions reporting and understanding of transition pathway(s).

Further research and industry collaboration are needed to resolve issues of data availability and accuracy, especially for smaller clients and smaller insurers, boundaries of reporting emissions and consistent understanding of the transition pathway(s). A balance is needed to enable wide coverage of the economy, weighing a simplified, risk-based approach to enable participation and use for smaller clients or smaller insurers, with the ability to assess the aggregate risk to financial stability.

Building on this overview of net zero underwriting, we see the need for research to widen to impact underwriting, and particularly nature positive net zero aligned underwriting.

1. Introduction

Net Zero in the context of insurance

'Net zero' refers to when greenhouse gas (GHG) emissions, particularly carbon, from human activities balance with removals, giving total emissions of zero.[3] Net zero is the necessary condition to be reached to mitigate the increasing GHG concentrations in the atmosphere that are driving climate change. For business and finance, the importance of net zero pledges is becoming the norm. To translate pledges into actions, effective responses from the private sector are needed. From executive level to the shop floor and beyond to the supply chain,[4] thoughtful and systematic planning is required to inform strategy, operational practices and decision-making, and to limit carbon emissions.[5] Any remaining hard-to-mitigate emissions may need to be addressed via carbon removal or offsetting as the last resort. However, the technologies and credible certification systems for offsetting are not yet well proven.[3,6]

For insurance, the attention given to net zero commitments, principles and policies has progressed from the initial focus on operations, to investments and now finally to underwriting.[2] This need is now widely recognised, including by United Nations Secretary-General António Guterres, who stated at the Insurance Development Forum Summit in June 2021 that: "We need net-zero commitments to cover your underwriting portfolios."[7]

Yet, less than 10 per cent of the world's largest insurers have a net zero policy for underwriting activities in place.[8] Eight large European firms are the first movers looking to form the Net-Zero Insurance Alliance (NZIA), with an additional seven firms joining in November 2021.[9] The alliance was launched in July 2021 by the United Nations Environment Programme Finance Initiative (UNEP FI) Principles for Sustainable Insurance (PSI), with a Statement of Commitment.[10] As one of the members, Allianz forms underwriting policy that excludes utilities that plan new coal operations, generate more than 25 per cent of their electricity from coal or operate at least five gigawatts of installed coal-fired generating capacity from 2023.[11] Aviva will stop underwriting insurance for firms making more than 5 per cent of revenue from coal or unconventional fossil fuels, unless they have signed up to the Science Based Targets initiative from 2022.[12] Swiss Re has a new exit strategy in treaty (re)insurance to phase out thermal coal by 2030 in Organisation for Economic Co-operation and Development (OECD) countries and 2040 in the rest of the world.[13]

Alongside the NZIA, HRH the Prince of Wales's Sustainable Markets Initiative has launched an Insurance Taskforce chaired by Lloyd's with a focus on net zero underwriting,[14] adding significant momentum to the net zero underwriting landscape.

However, commitments alone are not enough to transform the insurance industry to be net zero. Practical and concrete actions by the insurance industry and enabling factors from the wider economy and regulators are vital to ensure that net zero targets are met

ClimateWise Net Zero Underwriting work

ClimateWise is a group of nearly 40 members from across the insurance value chain, including insurance, reinsurance, broking and firms associated with the insurance industry such as trade associations, loss adjustors and lawyers. Convened by CISL and sitting at the intersection of the insurance industry, academia and policymakers to address climate issues, ClimateWise conducts research that is designed to be practical through engagement with various actors.

The foundation of ClimateWise is the ClimateWise Principles ('the Principles'), designed to cover all aspects of the insurance industry's response to climate change. Since 2007, the Principles' annual reporting process has highlighted member progress to reduce the environmental impact of their business, to incorporate climate change into investment strategies and support climate awareness among customers. To complement the strengths and areas for improvement identified through the Principles and member input, a number of research projects are conducted to build capacity among members, the wider finance industry and society.

The earlier ClimateWise report *Climate product innovation within the insurance sector* highlights the particular opportunities and barriers for climate-related product development across the insurance value chain.[15] The recent CISL report *Risk sharing in the Climate Emergency* highlighted that the scope and scale of the climate transition will require insurance products and related risk management governance to support clean energy systems, new technologies, the safe decommissioning of brown assets and decarbonisation across industries and agriculture.[16]

ClimateWise also published the report *Policy opportunities of the road to net zero*[17], that highlights three key areas of policy opportunities to influence the insurance industry, serving as a springboard for this specific project on net zero underwriting. The above-mentioned report *Risk sharing in the Climate Emergency* goes on to call for assessment and disclosure of carbon emissions in underwriting portfolios.[16] Once effective carbon underwriting metrics and implementation are established in parallel with national net zero commitments, annual carbon underwriting budgets or guidance for insurers could be considered by regulators as part of risk management.

The ClimateWise Net Zero Underwriting Task Group was convened under the ClimateWise membership, aiming to enable the insurance industry to make and act on a commitment to net zero underwriting. To understand the nuance and essence of net zero targets, the group started off by working on the definition of net zero and its implications for underwriting business. In addition, with an emphasis on encouraging practical actions, the group focused on capacity building in the industry through developing practices, piloting tools and knowledge sharing among peers, as well as identifying the supportive role policymakers could play through prudential regulations. Highlighting the need for collaboration across sectors, the group builds on work already underway within insurance firms, CISL's community and the Principles that focuses on operational, investment and underwriting practices aligned with net zero.

The focus of the tools and practices explored in the project is on assessing the GHG emissions of a non-life insured client and their insured assets and/or activities. Specifically, the current carbon footprint and emissions reduction pathway of the insured client are the two key aspects to understand, as well as to enable comparisons between companies, within sectors and also over time. Analysis of these two aspects will allow a more robust risk assessment of a client and their insured asset or activities. In addition, this work could also benefit insurance firms as they evolve their internal strategy, policies and practices, and disclosure.

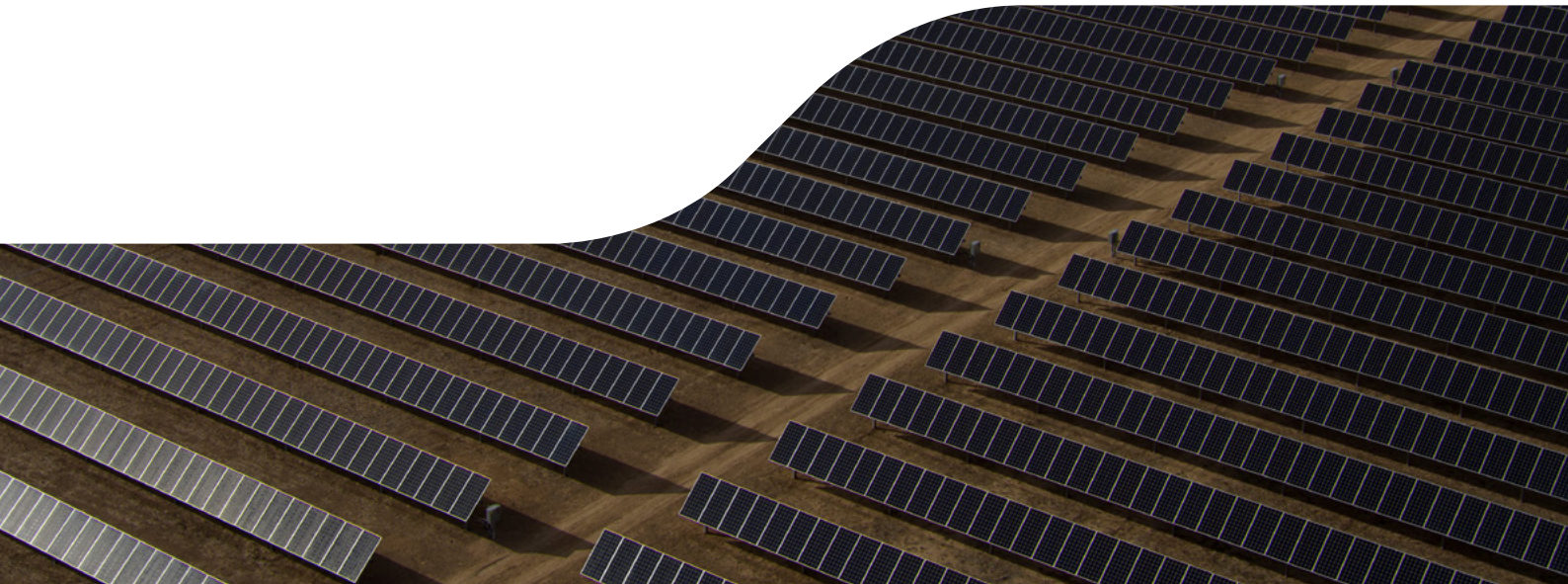
As this study aims to facilitate focused discussion on underwriting practices, the topics of investment and operational emissions of the (re)insurer and other companies in the insurance value chain are outside its scope. Actors within the insurance value chain include modellers, brokers and loss adjustors, as well as the claims process. These upstream and wider downstream activities, and any decarbonisation implications of sustainable claims, should be brought into future research as net zero tools and practices develop and refine.

Report outline

In the industry's pursuit of net zero, understanding the notion and defining features of net zero for the insurance sector is an important initial step. The first section of the report outlines the current definition of net zero and explores the implications for the insurance industry and policymakers. We then look into the tools and practices in the market developed for industry underwriting practitioners to identify, evaluate and measure net zero targets' robustness, actions' alignment with the target and outcomes of the actions. Challenges and areas for improvement and innovation are identified. This then leads us to three case studies run with ClimateWise members to test the tools and frameworks available in practice.

Methodology

This report is developed by a task group of the ClimateWise membership with additional input from consultation with a broad range of stakeholders from the insurance industry and beyond. The concept for the report was developed over a series of task group and technical meetings. The task group and the ClimateWise Secretariat are also supported by wider external and internal stakeholders through consultation and engagement. The three tools and practices presented in this report are selected, tested and reviewed by the task group.



2. Setting the target

2.1 Conceptualising net zero

All the available scientific evidence confirms that the world is warming at a faster rate than at any time since the end of the last ice age, and that this is predominantly due to human activity. A combination of scientific modelling and real-time alterations in weather patterns is bringing increasing clarity to the impacts of climate change on nature, people, economics, society and geopolitics, varying across timescales.[18,19,20]

This section seeks to explore the key elements constituting the concept of net zero. Aspects explored include its scientific foundation, the role of carbon offsetting, emission scopes and prioritisation of decarbonisation efforts.

Scientific foundation

The term 'net zero carbon emissions' refers to a state of equilibrium between the amount of carbon emitted into the atmosphere and the amount extracted from it, given that reducing GHG emissions in absolute terms is the surest way to mitigate the risk of catastrophe. Hitting the state of equilibrium is realistic, with concerted and ambitious effort. It is also necessary in order to achieve a stable climate and to keep global temperatures in check to avoid atmospheric carbon accumulating to such an extent as to irreversibly lock in climate change. The table below contains more detailed explanations of the two forms of net zero and the further progression needed to achieve 'climate neutrality'.

Term	Scope of climate forcers	Definition from IPCC SR1.5[3]
Carbon neutrality or net zero CO_2 emissions	CO_2 emissions	Net zero carbon dioxide emissions are achieved when anthropogenic CO_2 emissions are balanced globally by anthropogenic CO_2 removals over a specified period.
Net zero emissions	All GHG emissions[21]	Net zero emissions are achieved when anthropogenic emissions of greenhouse gases to the atmosphere are balanced by anthropogenic removals over a specified period. Where multiple greenhouse gases are involved, the quantification of net zero emissions depends on the climate metric chosen to compare emissions of different gases (such as global warming potential, global temperature change potential, and others, as well as the chosen time horizon).
Climate neutrality	All GHG emissions, regional or local biogeophysical effects of human activities, and, arguably, other radiative forces[22]	Concept of a state in which human activities result in no net effect on the climate system. Achieving such a state would require balancing of residual emissions with emission (carbon dioxide) removal as well as accounting for regional or local biogeophysical effects of human activities that, for example, affect surface albedo or local climate.

Table 1: Intergovernmental Panel on Climate Change (IPCC) definitions of net zero and climate neutrality

The role of carbon offsetting in net zero

The use of offsets, including sinks and credits, and projections for technology development around offsetting are important aspects of determining the credibility of the transition pathway to net zero. A carbon offset is an action that compensates for CO_2 emissions somewhere by reducing GHG somewhere else – relying on GHG removals or carbon credits, for example – to compensate for unavoidable residual emissions.[23] Another action resulting in offsets is increasing carbon stored in carbon sinks. This could be achieved by natural or geological measures such as carbon capture and storage (CCS), increasing tree coverage, land restoration or new geological carbon sinks.[24] Offsetting actions also have the potential for a company to deliver more than net zero reductions on point-in-time emissions, with net negative emissions compensating for historical emissions.

The focus of net zero, importantly, must be on the 'zero', rather than the 'net'. Carbon offsetting is the last resort, should come with conditionality and should be subject to regular review. According to the Science Based Targets initiative (SBTi), the use of offsets must not be counted as emissions reduction towards the progress of companies' science-based targets.[25] The SBTi requires companies set targets based on emission reductions through direct action within their own operations and/or their value chains. Offsets are only considered to be an option for companies wanting to finance additional emission reductions beyond their science-based targets,[26] which is contingent upon the availability and affordability of emissions reduction technology and systems. As outlined by SBTi, one of the conditions that businesses working towards net zero emissions need to comply with is to ensure the removal of carbon is permanent: "Neutralise the impact of any source of residual emissions that remains unfeasible to be eliminated by permanently removing an equivalent amount of atmospheric carbon dioxide."[5] Alongside SBTi, the Oxford Principles for Net Zero Aligned Carbon Offsetting also provide guidelines to help ensure offsetting helps to achieve a net zero society.[27]

In the context of insurance underwriting, it is worth noting the statement made by NZIA in July 2021, which emphasises the importance of recognising the role of offsetting with conditionality attached.

"In implementing and reaching targets for all Scopes of emissions, offsets can play a role to supplement decarbonisation in line with climate science. The reliance on carbon offsetting for achieving end-state net zero should be restricted to carbon removals to balance residual emissions where there are limited technologically or financially viable alternatives to eliminate emissions. Offsets should always be additional and certified."[10]

However, there remains the challenge of ensuring the quality and integrity of any certified offset and avoiding it becoming a licence to emit. The Taskforce on Scaling Voluntary Carbon Markets, launched by Mark Carney in 2020, aims to make carbon offsets more investible by standardising the market.[28] Regardless, more details need to be unpacked in the debate around carbon offsetting, including the carbon market design, credibility of carbon credit and the measures for offsetting.[29] Discussions and debates around Article 6 in the Paris Agreement during COP26 in Glasgow have gone some way towards providing a modicum of clarity, however more is needed. With all of these, ultimately the critical baseline must be to ensure that these market and certification mechanisms will lead us to an authentic lower carbon economy.

Emission scope in net zero targets

The exact category of GHG and the sources of emissions covered vary across net zero targets. A carbon emissions reduction target alone is not enough to curb global temperature rise, but delivery on a comprehensive transition plan for all GHGs would. For instance, methane is characterised by being highly potent but lasts only a short time in the atmosphere and requires little cost to cut. Thus, cutting methane emissions will help address not only future climate change but also current warming.[30] The Global Methane Pledge aiming to reduce methane emissions by 30 per cent by 2030 is an example of action being taken to address this at a global level.

In addition, the scope of activities included in an organisation's stock and flow of emissions should include direct and indirect emissions as defined by scope 1, 2 and 3 (as represented in Figure 1). As required under the SBTi: "Achieve a scale of value-chain emission reductions consistent with the depth of abatement achieved in pathways that limit warming to 1.5°C with no or limited overshoot."

Financial institutions will need to understand the upstream and downstream activities within their business model or supply chain, including advisors and consultants, as well as the clients they provide financial services to. Understanding clients' current carbon performance and transition pathway to net zero are important aspects. Lying at the core of the transition pathway, the development of technology and nature-based solutions are not only leverage points, but also require supportive actions in the wider system to address climate crisis.[31,32,33]

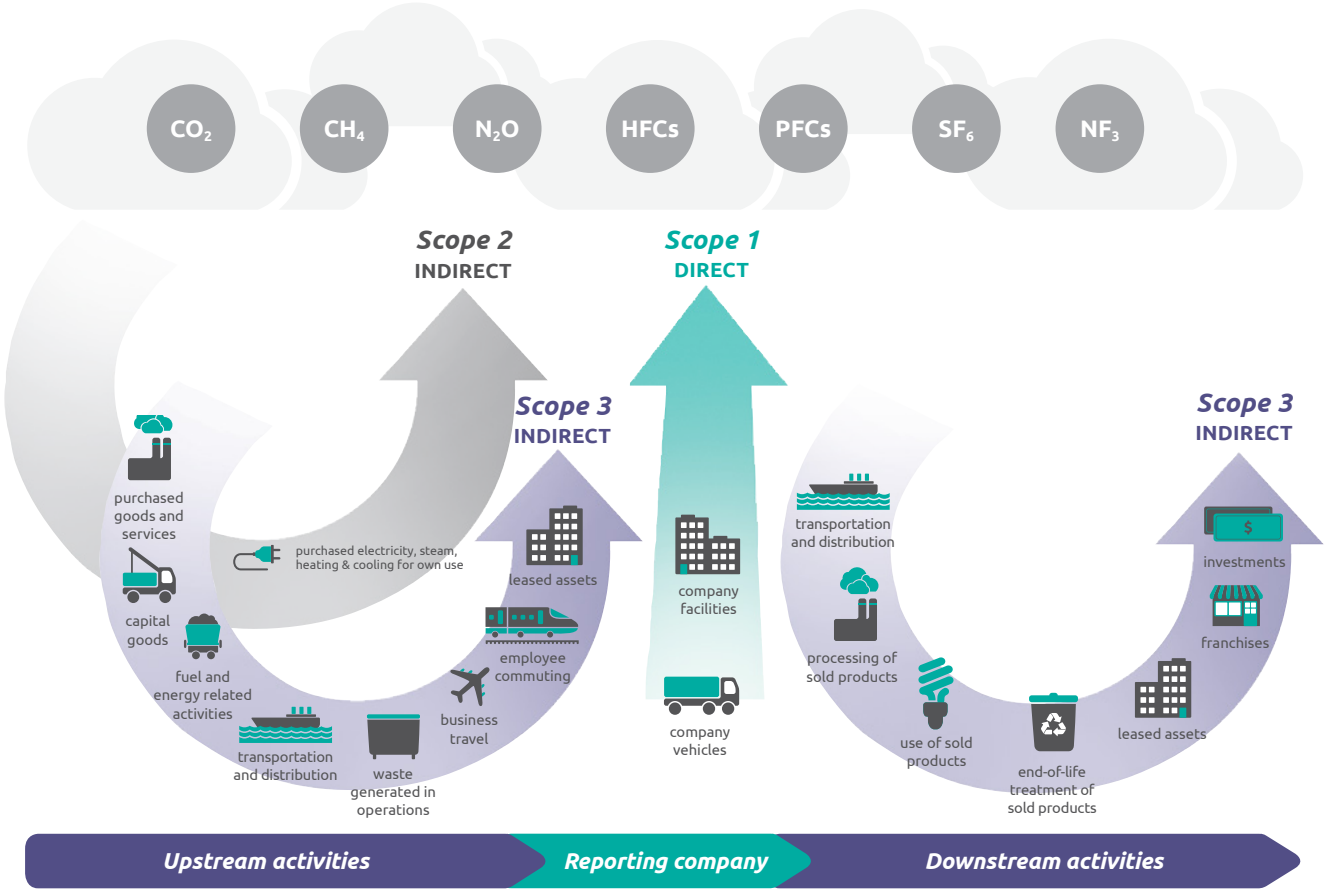


Figure 1: Overview of Greenhouse Gas Protocol scopes and emissions across the value chain[36]

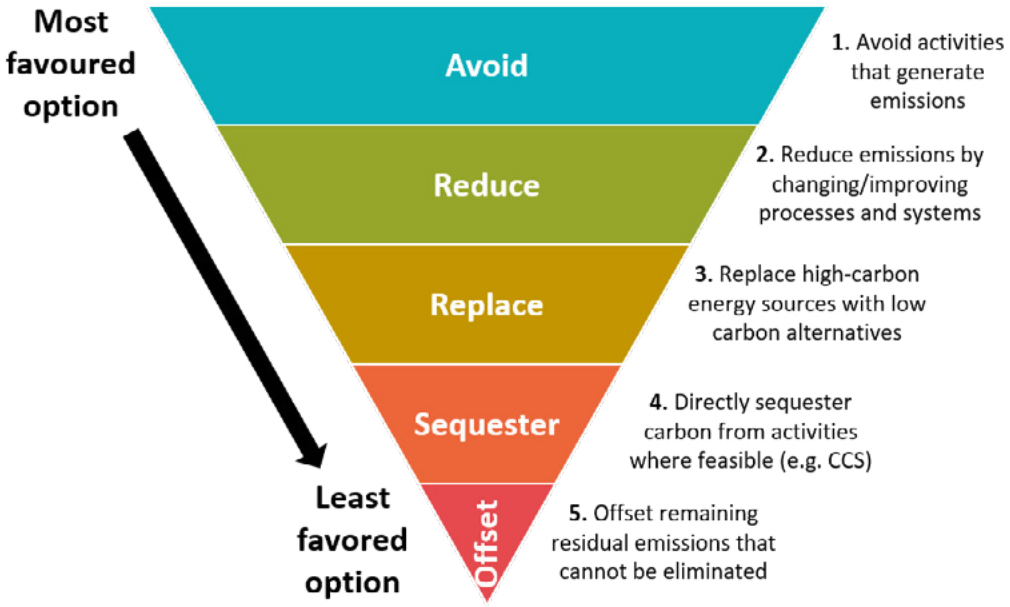


Figure 2: Carbon hierarchy

This leads us to the concept of carbon hierarchy (Figure 2), which provides a framework for understanding the prioritisation of efforts to decarbonise and achieve absolute reductions in GHG emissions throughout global value chains.

Prioritisation of net zero actions

In the pursuit of net zero targets, systematic planning and actions are required to entice a chain of effective responses to net zero.[4] Internally, executives' vision and decisions as well as practitioners' actions and activities are all vital attributes of a business's operational carbon performance. With the wider economics ecosystem in mind, businesses are well positioned to initiate actions and trigger responses across supply chains through innovating their business model, operational practices, decision-making and stakeholder engagement.

When it comes to engaging with real economy actors, it is suggested that financial institutions seek to target and prioritise clients in the most carbon-intensive sectors, as this is where the most urgent action is needed.[34] Development and employment of decarbonisation technology and nature-based solutions varies across sectors and geographies. Prioritising engagement where industrial technologies have ready alternatives, and research for industries where technology requires development would enable a more effective and efficient transition to net zero for investors and society.

The discussion focuses on the client company or financial institution on aligning to net zero to mitigate their impact on the climate. However, it is also important to note the climate will impact on the operations as well, known as double materiality.[35] It is therefore important to note the parallel climate-risk assessment and disclosure undertaken by firms that complements their actions to reduce impact on the climate and limit said climate-risk.

2.2 Net zero commitments and framework for public and private sectors

Building on the net zero concept above, the following section outlines the government and business elements of net zero targets as a foundation for understanding net zero transition in the context of insurance.

Government commitments to a 1.5°C future

Under the Paris Agreement, governments commit to "achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century".[37] To demonstrate government intent and to clarify policy trajectory, Nationally Determined Contributions (NDCs) are required to be in line with the accord's objective, which is to keep global temperature rises from increasing above 2°C and aim to keep below 1.5°C.

NDCs' linkage with net zero, the binding power of the subsequent legislation, and timeframe are three key criteria to evaluate the quality of jurisdictional-level commitment to net zero. More than 140 governments have announced or are considering setting net zero goals coming out of COP26, covering 90 per cent of global emissions. Despite this, if every national signatory to the Paris Agreement were to deliver on their NDCs, then global temperatures would still rise by an estimated 2.4°C above pre-industrial levels by 2100, according to the independent Climate Action Tracker (CAT).[38]

Some frontrunner countries have laid down the gauntlet, tying their NDCs to a net zero future and making these targets binding in national legislation. Currently, this group includes the UK, France, Germany, Sweden, Norway, Canada and Japan, four of which are economies among the G7 (Group of Seven).[39] The UK is noteworthy as it was the first major economy to set a net zero goal in legislation after the revision of its 2008 Climate Change Act passed in April 2019.[40]

If countries that have committed to net zero but not yet legislated are taken into account, such as China and India, the number expands to cover the majority of the world's economy. In some cases, governments have made commitments to hit net zero carbon ahead of 2050.[41] Norway leads the pack with a binding target date of 2030,[42] and Sweden[41] and Scotland[43] have both set 2045 as the target date for balancing their emissions.

Business commitments to net zero

Drawing on the Race to Zero criteria[44] and recent assessments of net zero targets,[45] Table 2 outlines the key stages of a net zero commitment for a business that receives investment, vending or insurance products from the financial sector. The coverage and scope terms are described in more detail earlier in the report.

Key sector and firm-level assumptions and propositions of net zero commitments remain to be understood, and consensus agreed or set.[27] As an initial attempt, six questions and expectations are set by Race to Zero to recognise a credible net zero commitment for a business[48] (below). These questions are guidance to financial institutions' assessment of their client net zero plans:

- **Is it about right now?** An interim target, which supports the global goal to halve emissions by 2030.
- **Is there a plan?** A plan, with interim and end goals, that's focused on the next five years.
- **Is it fast enough?** The end goal is before 2050, by continuing to prioritise reduction.
- **Can you see progress?** Publicly reporting progress clearly, against all scopes, without having to dig for it, and there are strong governance arrangements in place.
- **What does it cover?** All emissions sources are discussed, even if the plan is to manage them together with other partners.
- **Is it just offsetting?** Offsets do not substitute for or delay decarbonisation and by the net zero target date, credits and sinks are only used to balance the hardest-to-abate emissions.

Insurance commitment to net zero

As the NZIA highlights, interpretation and implementation of net zero underwriting remains individual to each (re) insurance firm. Unpacking net zero raises particular issues for insurers and the insurance industry:

1. Expectations of governments' own net zero commitments and dependence on action by the insurance industry, policyholders, and insurance and financial regulators and supervisors.
2. Expansion of scope 3 measurement, initially from the insured client, then upstream activities of brokers and modellers or downstream activities of claims management and reinsurance.

Stages	Business as usual	Transition	Institutionalisation
Net zero target status	In consideration	Commitment drafted	Commitment statement
Governance and timing	Reach net zero by 2050 in line with economy	Internal interim targets and plan	Interim targets and annual reporting against published plan
Coverage	Carbon dioxide	Carbon dioxide Key dependencies on hard-to-abate sectors addressed specifically, such as international aviation and shipping	Seven GHGs covered in Greenhouse Gas Protocol,[46] including consumption emissions[47]
Scope	Scope 1	Scope 1, 2	Scope 1, 2, 3
Use of offsets	Offsets allowed	Conditions set	Limits on offsets

Table 2: Stages of net zero alignment

3. Understanding client emissions as well as the activity(ies) being insured, including to avoid double counting of emissions through multiple policies, as well as recognising underwriting and asset exposure.
4. Responsibility and validation of carbon offsetting as carbon removals to balance residual emissions where there are limited technologically or financially viable alternatives to eliminate emissions.
5. The role of different lines of business, such as for construction, workers' compensation and decommissioning, and the just transition.

The aggregated trajectory of net zero commitment

The aggregation of government and business commitments leads to a number of possible trajectories or pathways for carbon emissions over the coming decades. The figure below highlights the view from the commitments made to date and the gap to a 2°C or 1.5°C path.

The Financial Stability Board's Task Force on Climate-related Financial Disclosures (TCFD) recommends[50] disclosures on governance, strategy, risk management, metrics and targets that are adoptable by all organisations, included in financial filings, designed to solicit decision-useful, forward-looking information on financial impacts, and have a strong focus on risks and opportunities related to transition to a lower carbon economy. As disclosures aligned with the TCFD's recommendations become mandatory across the G7 major economies,[51] insurers will use this information to inform, determine and disclose firms' net zero alignment.

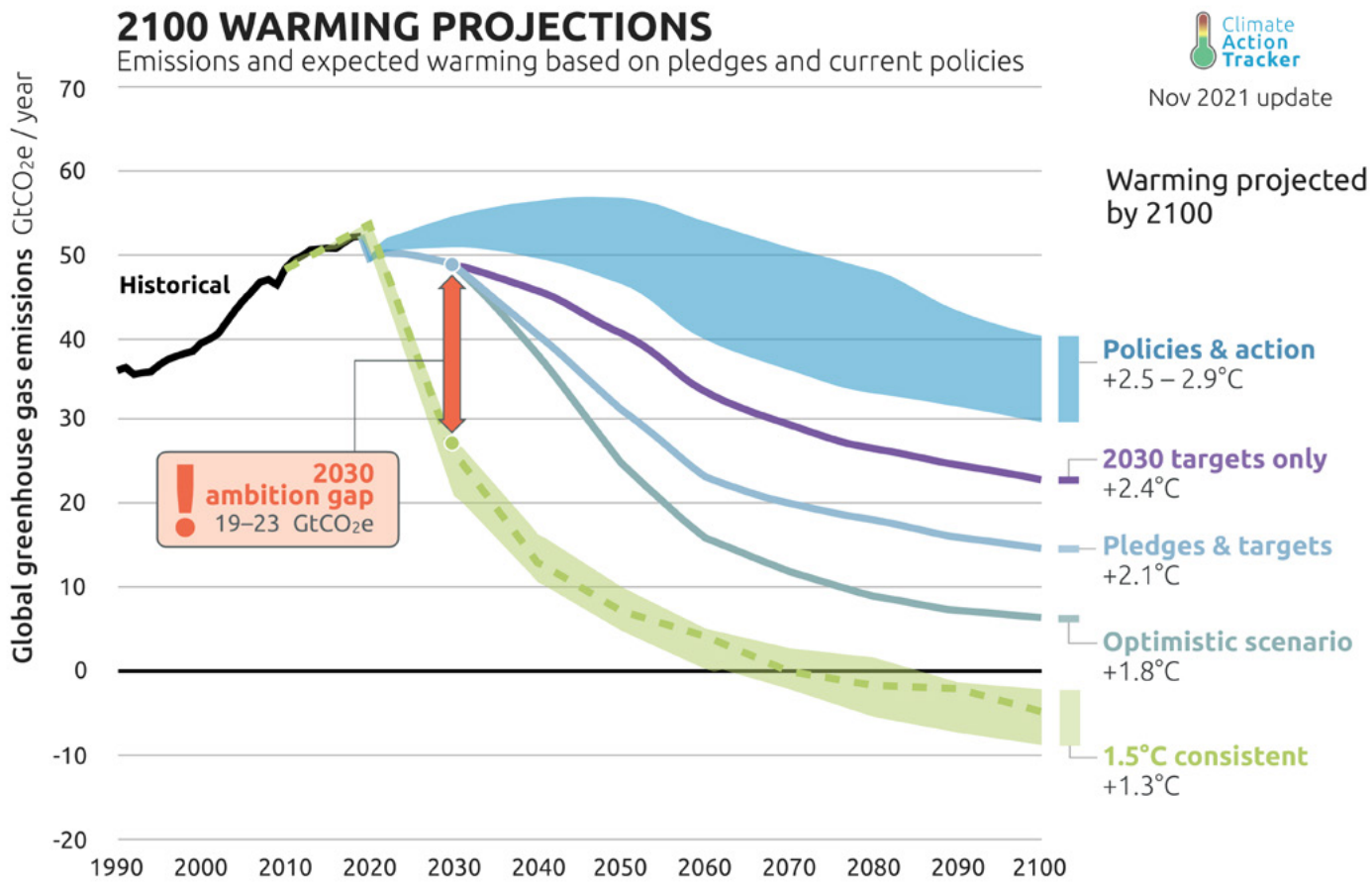


Figure 3: Current trajectory against Paris pledges, 1.5°C and 2.0°C trajectories[49]

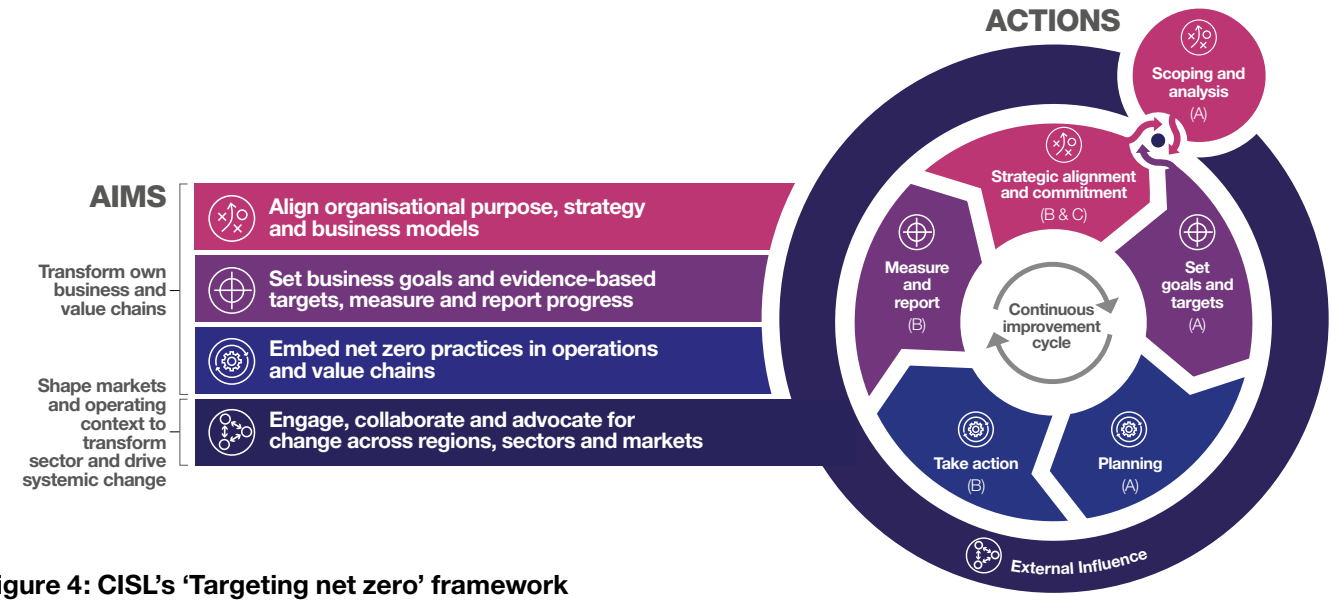


Figure 4: CISL's 'Targeting net zero' framework

Net zero framework

A net zero framework is designed to enable companies tasked with delivering net zero in a business context, and/or influencing the societal transition towards this ambition, to understand the key tasks that need to be set in place to align with net zero. The CISL framework,[4] which derives from CISL's *Rewiring the Economy* plan, sets out the core components that we believe are essential for any company looking to be fully aligned with net zero by 2050 at the latest (Figure 4). Companies using the framework should start by undertaking a gap analysis to determine where the business is least or most advanced. By building on areas of strength, they should initiate an iterative, continuous improvement process in keeping with a typical Plan–Do–Check–Act model. Some organisations may begin by ramping up the strategic commitment, whereas others may use the results of more comprehensive measurement and reporting to catalyse increased strategic commitment, for example. They should use scoping and analysis to ensure that commitments and the associated goals and targets are based on the best available science and address the material risks and impact areas.

2.3 Considerations for net zero underwriting

Drawing on the five actions for an organisation in the CISL 'Targeting net zero' framework, this report considers the strategic alignment, goals and targets, planning, action, and measurement and evaluation an insurer undertakes. Intending to serve as a starting point for further discussion and facilitate practical actions, the four considerations, suggested by the ClimateWise Net Zero Underwriting group, include emission scope, net zero measurements, implications of lines of business and actions taken by (re)insurance.

Net zero insurance landscape

The 2021 United Nations Climate Change Conference (COP26) attracted a great amount of attention from the private sector. A number of initiatives were launched before and after the event to both promote and assist the finance sector in aligning with a low carbon economy. The Glasgow Financial Alliance for Net Zero (GFANZ), highlighting the key role of private finance in achieving the Paris Agreement objectives, will drive the collective commitment to net zero, engagement with stakeholders, investment in the transition to net zero and alignment with the target, measured by tools and metrics.[52] The COP26 Private Finance Hub, led by Mark Carney in his capacity as UN Special Envoy and Adviser to the UK Prime Minister, focused on building a system that mobilises private finance to support the re-engineering of our economies for net zero.[53]

Insurance-specific initiatives include the Insurance Task Force under the Sustainable Markets Initiative (SMI) and the UN-convened Net-Zero Insurance Alliance (NZIA). Chaired by Lloyd's, the Insurance Task Force under the SMI supports the global transition through five initiatives that will provide innovative insurance products and services, and financial and risk management support across industries and geographies.[54] With a focus on underwriting portfolios, the NZIA brings together global insurers and reinsurers committing individually to transition their underwriting portfolios to net zero GHG emissions by 2050, consistent with a maximum temperature rise of 1.5°C above pre-industrial levels by 2100.[10] Particular issues for the insurance industry are raised amid NZIA's attempt to unpack net zero, as listed above in Chapter 2.2.

Emission scope for insured assets and activities and the insurance industry

In 2020, while the majority of ClimateWise members disclosed scope 1 and scope 2 GHG emissions, the disclosure of scope 3 GHG emissions was restricted to operations. Only one member included emissions embedded in investments and none for underwriting.[55] This not only showcases the limitations of data availability but more fundamentally, highlights the difficulty to clearly define scope 3 emissions in underwriting activities.

Understanding the insurance value chain is necessary to grasp the level of difficulty in drawing the scope 3 boundary. The business model and operations include underwriting and policy management as well as, potentially, claims management (Figure 5). An insurer's scope 3 emissions include the Greenhouse Gas Protocol upstream activities in Figure 1 above, and also emissions from firms in the upstream underwriting and policy management supply chain where insurers have a direct contract, such as risk modellers, brokers, managing agents, lawyers, reinsurance and/or captive arrangements. However, the nature of multi-stakeholders and high complexity of the industry make it challenging to have consistent and robust definition and measurement of scope 3.

The insured client assets or activities would be considered equivalent to the 'financed emissions' noted as downstream activities in Figure 1, covering the asset and/or individual activities that the insurance company provides insurance for. Though data and information on the carbon intensity of a specific insured asset or activity is limited, the client's emissions overall may also be considered by the insurer as a proxy. Moreover, taking this approach would also provide a wider understanding of transition exposure. For example, an insurance policy provided to Ford may only cover an electric vehicle manufacturing site, while an understanding of Ford's overall alignment to net zero is helpful for the context and broader net zero strategy of the insurer.

The classification of the claim management process as Greenhouse Gas Protocol scope 1 or scope 3 depends on the insurer's business model to provide claims services directly (scope 1) or indirectly (scope 3). 'Directly' is where the insurer has a contractual relationship as a procurer with oversight of claims assessors/loss adjustors, and for general insurance (the repair or replacement of items) or for life and health (the medical or health services provided). Indirect claims management is where customers will choose their own goods and services for replacement and repair, for the insurer to pay the bills, and/or where the claimant may be a third party with legal entitlements to settlement.

Incorporating the carbon hierarchy of Figure 2 and carbon intensity of each industry, the prioritised focus to speed up transition for a general insurer is clients:

- in higher carbon emission or intensity sectors such as energy and transport
- in higher carbon emission or intensity supply chains such as those relying on agriculture
- with a higher scope for increasing sustainable behaviours.

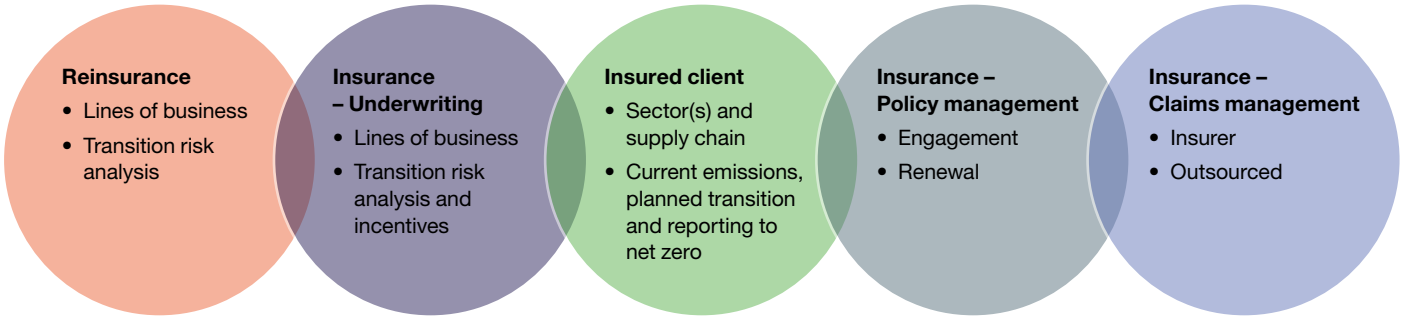


Figure 5: Insurance layers and key aspects of operations
(for a more detailed diagram of the insurance system please refer to Icebreaker One mapping[56])

Measuring net zero with carbon footprinting, transition pathway evaluation and temperature score

Once the scope is defined, there are different types of metrics to assess to what extent a client and its insured asset or activities are in line with its climate ambitions. At present these are carbon footprint, temperature score, position on a science-based transition pathway and value-at-risk. Below is an outline of each, followed by case study examples to demonstrate the inputs available for net zero underwriting tools. The climate value-at-risk metric, as one of the significant methodologies for investment, is not suitable for insurance for public reporting purposes as the approach could potentially disclose price and/or insurance availability information, or the type of information that may distort competition in the markets concerned.

The carbon footprinting methodology for underwriting portfolios developed by the CRO Forum[57] focuses on Weighted Average Carbon Intensity (WACI) methodologies and metrics. It highlights that intensity measures of CO_2 emissions help insurers to identify and understand where the risk is in underwriting portfolios, in contrast to investment asset portfolios which utilise absolute CO_2 emissions metrics. That is, to make the measurement fit for purpose, carbon intensity and absolute CO_2 metrics of the insured should be considered separately.

The carbon footprinting methodology is:

$$\sum_{n}^{i} \frac{\textit{gross written premium of insurance transaction(i)}}{\textit{total GWP volume of insurance portfolio}} * \frac{\textit{insured's Scope 1 and Scope 2 GHG emissions (i)}}{\textit{insured's \$M revenue (i)}}$$

As an overly simplified worked example, if the insurer's entire portfolio of written premium was 50 per cent Royal Dutch Shell and 50 per cent Ford assets, the carbon footprint would be estimated as below. The individual firm and portfolio WACI are then used as a key performance indicator (KPI) for internal and external monitoring, evaluation and reporting.

Total	Royal Dutch Shell	Ford Motor Company[58]
Insured client's scope 1 and 2 GHGs ((million metric tonnes of CO_2e)	80[59]	2.96
Revenue ($ billion)	344.9 billion[60]	127.1 billion
Ratio scope 1 and 2/Revenue	0.000232	0.0000312
Gross Written Premium proportion	50%	50%
WACI	0.000116	0.0000156
WACI insurance portfolio	0.000132	

Table 3: Carbon footprinting methodology: example with Royal Dutch Shell and Ford Motor Company

Carbon footprinting alone, however, does not indicate the degree of alignment with the net zero transition pathway as there are multiple pathways that could lead us to net zero and a below 2°C temperature rise. Transposing from investments, it could be useful to consider approaches to measuring net zero alignment on a spectrum of sophistication: the percentage of a portfolio with net zero targets; deviation of a company or portfolio from a target or benchmark; and degree warming metrics.[61]

Furthermore, when the GHG emissions and business strategy of an insured entity are understood and measured, they can be assessed for alignment with the net zero pathway. For example, the Climate Action 100+ initiative produces a Net Zero Company Benchmark[62] for major firms in the oil and gas, electric utility and auto industries for performance on reducing GHG emissions, improving governance and strengthening climate-related financial disclosures.

Continuing the example of an insurance portfolio of Royal Dutch Shell and Ford, the Climate Action 100+ Benchmark shows the following[62]:

Disclosure assessment indicators	Royal Dutch Shell	Ford Motor Company
1 Net zero GHG emissions by 2050 (or sooner) ambition	Partial	Partial
2 Long-term (2036–50) GHG reduction target(s)	Partial	Partial
3 Medium-term (2026–35) GHG reduction target(s)	Partial	Partial
4 Short-term (up to 2025) GHG reduction target(s)	Partial	Partial
5 Decarbonisation strategy	Partial	Partial
6 Capital allocation alignment	No	No
7 Climate policy engagement	Yes	No
8 Climate governance	Yes	Partial
9 Just transition	N/A	N/A
10 TCFD disclosure	Partial	Partial

Table 4: Climate Action 100+ Benchmark: example with Royal Dutch Shell and Ford Motor Company

The World Benchmarking Alliance also produces an aggregate company score:[63,64]

Disclosure assessment indicators	Royal Dutch Shell	Ford Motor Company
Ranking position	#10/100	n/a
Total score	34.3/100	9.2/20
Performance score	3.4/20	n/a
Narrative score	C	n/a
Trend score	=	n/a

Table 5: The World Benchmarking Alliance Company Score: example with Royal Dutch Shell and Ford Motor Company

As discussed among possible ways to measure pathways to net zero, the use of a temperature score metric is a viable way to assess the conformity of a client asset with the ambitions of the Paris Agreement. Temperature scores for investments are a developing space and also offer insights for underwriting portfolio assessment.[65,66] This is exemplified with Arabesque, MSCI, the Paris Agreement Capital Transition Assessment (PACTA) and Trucost. Nevertheless, due to a lack of transparency and links between them, comparing results can be difficult.

Below we showcase the temperature scores of Royal Dutch Shell and Ford assets, estimated with the methodology developed by CISL's Investment Leaders Group. The proposed temperature score method is aligned with the carbon footprinting method developed by the CRO Forum, where the emissions intensities of the companies insured are measured and weighted according to the premium earned. The difference between the temperature score and the WACI is that the temperature score translates the carbon intensity of the portfolio to a level of global warming measured in degrees Celsius (°C). This is achieved through the Transient Climate Response to Cumulative Carbon Emissions (TCRE) – a conceptually simple and scientifically robust metric of climate warming. TCRE can be defined as the transient warming of the climate system per unit of CO_2 emitted. For further details, please refer to Annex E – TCRE and the warming function in CISL's report: *Understanding the climate performance of investment funds. Part 2: A universal temperature score method*.[67] A simple, transparent and robust reporting metric in degrees Celsius is readily understood by specialists and non-specialists alike, including underwriters, clients and the general public.

Table 6 illustrates this method. Scope 1 and 2 emissions of Shell and Ford were downloaded from Refinitiv Eikon, alongside other financial data.[68] The input data can be retrieved from other data providers – we recommend financial institutions take every effort to disclose the data sources transparently. Details of the adaptation to underwriting portfolios will be elaborated in the case study section.

	Royal Dutch Shell	Ford Motor Company
Revenue (million US$)	344,900	127,100
Scope 1 GHGs (tCO_2e)	70,000,000	1,451,947
Scope 2 GHGs (tCO_2e)	11,000,000	3,195,704
Emissions intensity (tCO_2e/million US$)	234.85	36.57
Equivalent global emissions ($GtCO_2$)	47.45	7.39
Cumulative CO_2 emissions ($GtCO_2$)	3,843.48	598.44
Temperature score (°C)	3.27	1.56

Table 6: Temperature Score Methodology: example with Royal Dutch Shell and Ford Motor Company

An equally weighted portfolio (ie the same amount of premium income earned) consisting of the companies above would yield a temperature score of 2.4°C.

Unpacking Implications for Lines of business

All actions affecting the insured are built on insurers' own understanding of their underwriting business. To identify the key insurance activities related to emissions, insurers should review and analyse their own business model, current insurance policy terms and claim coverage. Subsequently, insurers could focus on and prioritise specific sectors and activities that are key to the transition to a low carbon economy by employing the concepts of carbon hierarchy and carbon intensity. Building on the previous understanding of the policy and claim structure, insurers could then leverage the claims that will likely give the most scope to influence behaviour.

Each insurance line of business will be faced with different opportunities and challenges in the transition to net zero. The need to unpick interaction and implications of lines of business across sectors shines through the ongoing discussion on the narrative of net zero underwriting. Insurers offer a number of underwriting lines of business across general, life and reinsurance. Lines of business can be compared to the asset classes for investors, such as the Partnership for Carbon Accounting Financials' (PCAF) Standard[69] six asset classes: listed equity and corporate bonds, business loans and unlisted equity, project finance, commercial real estate, mortgages and motor vehicle loans.

On insurance demand, Lloyd's highlights the various net zero transition impacts for existing and new contracts across sectors (see Figure 6).[70]

Research into similar details of impacts on each line of business by sector will be required, as well as the role of independence of assessment and verification. The ClimateWise Net Zero Underwriting Task Group has tested three tools and practices for engagement with clients to assess their alignment with net zero and understanding of the implications for their portfolio.

(Re)Insurance approaches for insured client, asset and activities

Decarbonisation of the insurance sector can be seen as occurring through three 'impact channels': 1) activities within sectors (production and competition), 2) relationships between sectors (supply chain and customer interactions) and 3) interactions between sectors and the legal system (litigation and liability).[70] Using this classification sheds some light on what actions must be taken, such as understanding a client's business model and transition plans, robust risk analysis and benchmarking to sector standards, as well as terms of business that promote consideration of climate issues.[71]

Given the understanding of lines of insurance offered, the business sector being insured and the detailed assessment of a client's emissions, as well as strategic alignment to a net zero transition pathway, insurers can take a mix of approaches to promote low carbon industries, engaging with key sectors to encourage transition and discourage delay. In Table 7, we hypothesise prioritising understanding and engagement for insurance associated with expansion and governance of carbon-intensive industries. The combined carbon intensity of business sectors and risk exposure of insurance lines or types of insurance offered leads to a hierarchy of engagement and assessment with clients.

Class of business	Existing contracts		New contracts		Insurance demand and size	
Energy – fossil fuel	Asset stranding and liabilities from production sites will have impact		Introduction of carbon capture storage S and co firing with biomass		Decline in sectoral size due to product demand contractions	↓↓↓
– renewables	Evolving regulations and business models		Risks in power purchase agreements can be better insured		Growth in sectoral size due to move away from fossil fuels	↑↑↑
Aviation	Performance of new fuels unclear		Limited change in technology pre 2030		Sectoral slowdown due to modal shift	↓↓
Marine	Risks from retrofitting ships, new fuels and cargo types		Handling of new fuels and cargo types		Unclear: slowdown but risks emerge with new fuels and cargo	-
Motor	Internal combustion engine driven more in rural areas		New business models involving electric vehicles and pay per use		Unclear: growth varies across vehicle types and usage	-
Construction	Perils change, but impact on claims is unclear		Tighter building standards and energy efficiency requirements		Retrofits and new materials; but offsite construction lowers risks	↑
Credit, financial guarantee and M&A	Profits and business interruption		New sources of revenue risks faced by various businesses		New technical and business environments require insurance	↑↑
Property	Perils change, but impact on claims is unclear		Changes in supply chains require insurance for properties		Unclear: changes in exposure vary a lot by property type	-
Product liability and recall	Liabilities from energy efficiency and sustainability standards		New liabilities associated with low carbon products		New technologies and fuels require insurance	↑↑
Other liability	Increasing pressure from climate change litigations		Provide cover for climate change related settlements and litigation		Magnitude of risks increases expected to result in growth	↑↑↑

Figure 6: Heatmap of impact on major business insurance classes by 2023[70]

The table marks in red those high carbon intensity business sectors and lines of insurance where transition risks of market and technology shifts, policy and legal changes and reputational impact would be higher. Orange represents more moderate carbon intensity and lines of insurance potentially less exposed to transition risk, and green low carbon intensity and lower transition risks. Insurers would adjust the thresholds for their own client base, underwriting portfolio of products and services and climate risk appetite position.

As noted in the net zero commitments referenced earlier, specific sectors may be assessed or even excluded by the (re)insurer or individual underwriter, based on the risk consideration of the understanding and due diligence of the client's and activity's alignment with the low carbon transition. Basic screening and exclusion policies, such as the exclusion of companies with more than 5 per cent of revenues from fossil fuels, offer a simple method to reduce the carbon intensity of an insurance portfolio. Exclusion policies can also be expanded to other environmental, social and governance (ESG) aspects such as weapons, tobacco, alcohol, gambling or pornography.

However, exclusion has potential significant ramifications for the diversification and resilience of the insurance portfolio. In addition, consideration of a just transition for communities based around hard-to-abate sectors are important.

Consequently, insurers should:

- look to offer a best-in-class solution for sectors and facilitation of a low carbon economy
- explore exclusion for certain lines of business and products, linked to performance of the firm against a realistic transition plan
- leverage client understanding for ESG analysis and wider social benefits beyond climate.

Engagement with insured clients could range from due diligence to policy pricing and terms. This variation of responses is contingent upon the degree of the clients' alignment with net zero transition. The Client Engagement tool designed by CISL's Banking Environment Initiative outlines a five-phase process for relationship managers in a bank to work with clients in developing, monitoring and responding to the progress against net zero (see Figure 7). In the context of the insurance industry, insurers could tailor this five-phase process to engage with insured clients. A set of questions for a scorecard for engagement with insured clients is detailed in section 3.3.

		Line of insurance						
		Construction	Liability	Property	Auto	Credit	Directors & Officers	Workers compensation
Business sector	Energy – Coal							
	Energy – Renewables							
	Fuel distribution							
	Agriculture							
	Real estate							
	Transport							
	Water							
	Other							

Table 7: Draft concept of (re)insurance actions based on red/ high, orange/ medium and green/ low transition risk of business sector and lines of insurance

Complementary to client engagement are the products and services offered by an insurer. The ClimateWise paper *Climate product innovation within the insurance sector*[15] highlights the current market state and further aspects for development across nine key opportunity areas for insurance product innovation to support climate mitigation, with a focus on commercial lines that will drive the transition: [18]

1. Enabling and incentivising low carbon choices
2. Mainstreaming the encouragement of climate mitigation through efficient and resilient reinstatement
3. Implementing environmentally sustainable claims servicing
4. Enabling capital flows towards green solutions through risk transfer solutions
5. Creating removal-based carbon offsets through natural capital protection
6. Scaling emerging and existing low carbon and net-negative technologies and start-ups
7. Supporting the sustainable decommissioning of carbon-intensive assets
8. Developing risk advisory services to support clients' climate mitigation understanding and approach
9. Developing solutions for increasing climate legal liability and environmental litigation

Laying out the net zero definition at a theoretical level and examining the coverage within government and private sector net zero pledges helps us better unpack various aspects of net zero underwriting. With emission scope being a key consideration in net zero pledges, a cohesive standard and definition for insurance downstream and upstream activities would allow boundaries to be set for the emission associated with an insurance product or service. This would give the advantage of understanding the insurance value chain amid the complexity of the insurance risk-sharing system. Once the emission scope is determined, measuring the carbon performance of the insured within the scope, as well as the robustness of the transition pathway, could enable an insurer to evaluate whether the actions taken and the future plan are on track to achieve net zero ambitions. Furthermore, each distinct line of business would be evaluated differently, highlighting the importance of a more granular-level analysis. Insurers could then adapt their approaches and engagement strategies with the insured based on the above-mentioned measurement and analysis.

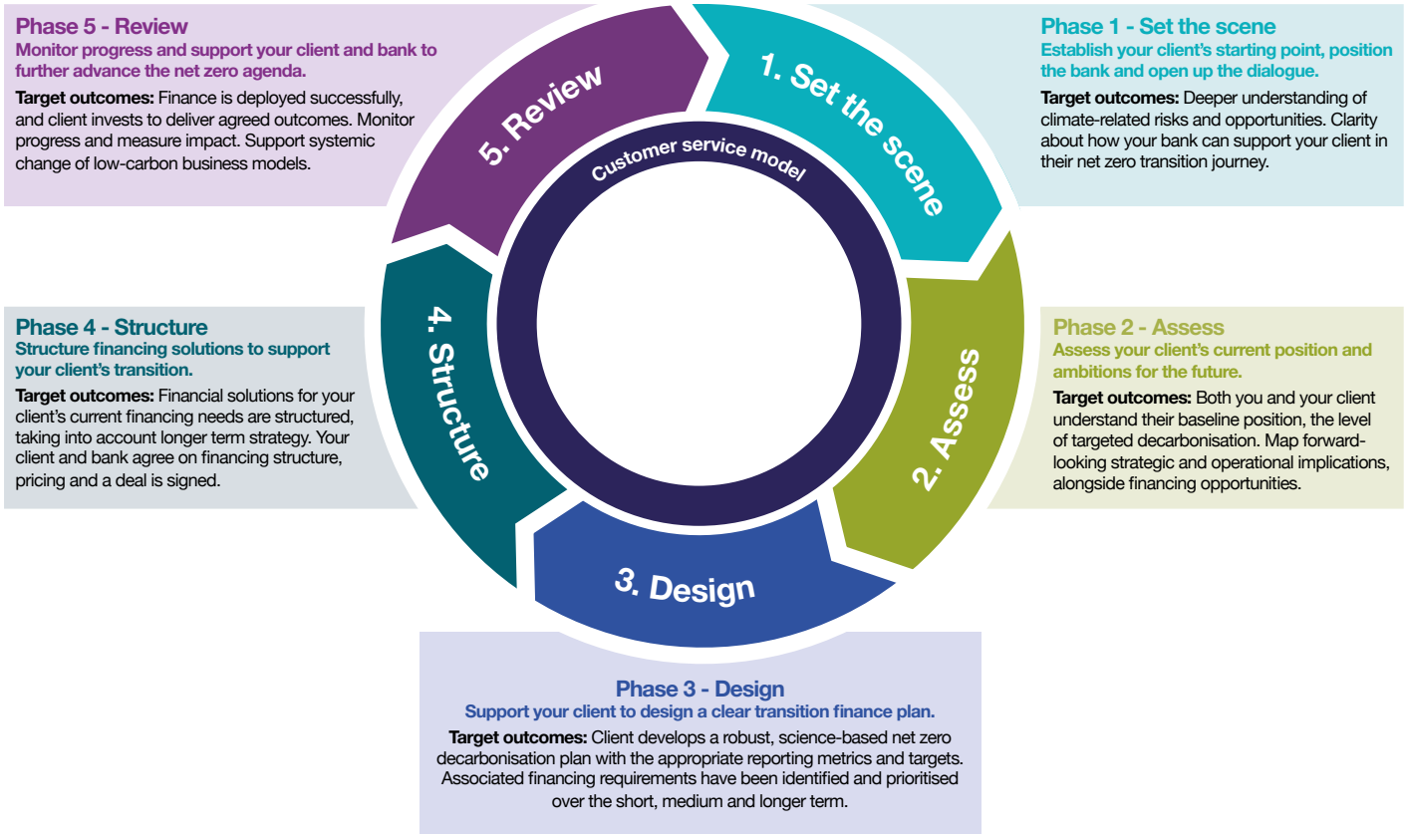


Figure 7: Guide to client engagement from CISL's Banking Environment Initiative[23]

3. Acting on the target

To translate the net zero targets for underwriting into practical actions, it is vital to recognise the type of enabling technical support that is needed, identify the existing capacity in the market, highlight the gaps, and navigate the development of tools and practices to ensure they are actionable, innovative and robust. In this section, we seek to explore the practical elements of enabling net zero actions in insurance underwriting. These then lead us to test and trial three tools and practices that help industry practitioners embed, assess, manage and disclose transition risks in the insurance underwriting process and portfolio analysis.

3.1 The insurance industry collaboration to act on climate ambition

Within the broad context of the ClimateWise Principles and TCFD-aligned disclosure and regulation, the key recommendations to effectively disclose a firm's climate-related financial risks and opportunities are governance, strategy, risk management, and targets and metrics. Within not only the insurance industry but also the wider finance sector, data, methodology, tools, benchmarks and practices are evolving to refine the detail for each of these in-house, with external independent parties and in research collaborations.

In the insurance industry in particular, it has become clear that the growing interest and support needed to align underwriting liabilities with a net zero ambition must be backed by actionable tools and frameworks that cover the entire insurance supply chain seen in Figure 5 above. Technical support ranges from accounting standards for emission scope, to methodology and tools to measure carbon performance, evaluate alignment with the transition pathway to net zero and assess the financial materiality of climate-related risk. These areas could benefit from better internal management of net zero alignment and enhanced in-house capacity building.

Externally, contributing factors are wider market data and metrics standardisation, third-party independent certification and also transparent and open source tools enabling in-house capacity building and facilitating research collaboration across the financial industry. Lastly, the role of the public sector in facilitating, convening and nudging the private sector through policy and regulatory instruments is equally critical.

3.2 Current landscape of tools for net zero underwriting

With the investment community being a step ahead of insurance, many initiatives and tools exist for alignment of investment holdings with science-based targets for the transition to a low carbon economy. They could now serve as a solid foundation for the tools and practices developed for insurance underwriting. As for emission scope accounting, PCAF's Global Accounting and Reporting Standard provides accounting standards for financed emissions covering investment and lending portfolios. The partnership between PCAF and NZIA is looking to develop a standard to measure insured emissions.[72] The SBTi provides frameworks and best practice for companies to set emission reduction targets. Financial institutions, including banks, investors and insurers, can draw reference from these and take direct action within their own operations and/or their value chains.

Nonetheless, in the field of climate-related assessment there have been limited attempts to adapt these tools to suit the insurance community. This is because the tools and metrics for the investor community are still in the development stage, for example with limited data, procedures and reporting standards to calculate finance-related emissions. Secondly, the investor view only gives an overall indication of listed client and portfolio alignment with net zero, rather than informing insurers of an underwriting decision for an asset or activity. For instance, a number of commercial firms provide climate-related risk assessment of listed firms and equities such as the Dow Jones Sustainability Index and MSCI, and a limited number are open source, such as the 2° Investing Initiative (2DII).[73] Products designed for a specific industry or area are emerging, such as CarbonChain focusing on commodity trade finance portfolios.[74]

3.3 Tools and practice case studies with ClimateWise members

The group set out to investigate the methodology, tools, practices or frameworks in the market that could refine how transition risks are embedded, assessed, managed and disclosed in the insurance underwriting process. During the shortlisting process, the group outlined the following criteria and explored five options in depth through a questionnaire and workshops, three of which were then selected to be trialled. Two important considerations for the study were:

1. **Scope:** To support a structural and meaningful change, tools and practices shortlisted should ideally address different parts of the underwriting business line, from policy design and pricing to risk management and strategic practices by the insurer and the client, as well as claims management.

2. **Transparency:** To ensure reliability, credibility and comparability of the assessment, the tools and practices should rely on transparent scenarios and assumptions and publicly available data sources.

The three case studies detailed in the last section of the report are tools currently available to measure client and portfolio temperature alignment and to evaluate insured clients' transition pathways through a third-party accreditation mechanism. The third tool shifts the perspective from outward-facing with clients to inward-looking, to understand the insurer's own capacity to utilise the assessment results and manage alignment to net zero.

The CISL Investment Leaders Group's (ILG) Temperature Score Methodology converts emissions reporting data into an intuitive degree Celsius metric. The methodology presented here is adapted and tailored for insurance, enabling underwriters to assess the emissions performance of underwriting portfolios. The quantitative methodology is outlined below and demonstrates a test run of underwriting portfolios provided by the ClimateWise Net Zero Underwriting members. A working Excel tool was developed within the group, aiming to guide underwriters to employ the methodology internally.

Climate Transition Pathways (CTP) creates a practical solution that insurers, as well as other financial institutions, can utilise to help them meet their net zero commitments, enabling them to identify and support those insured organisations committed to executing robust transition plans. CTP provides assessment of a company and its alignment with the Paris Agreement. Companies undertaking the CTP process gain accreditation if their transition plans and performance meet Paris-aligned thresholds. Insurers can then use the output of the assessment and accreditation in their risk assessment process. This enables them to measure portfolio alignment to net zero and the transition to climate targets.

Milliman LLP (Milliman) and OneRisk Consulting Limited (ORC) worked in partnership to create a climate risk assessment tool for underwriting portfolios. The tool was designed to help understand the impact of climate change on the underwriting portfolio of non-life insurance companies. It covers the high-level assessment of an organisation's underwriting strategy, as well as the measurement of the transition to a low carbon economy, whereby it looks at the main root causes and drivers of claims and premiums across multiple time horizons and across physical, transition and liability risks.

	ILG Temperature Score	Climate Transition Pathways	Milliman/ORC
Area of focus	Measurement of the insured carbon performance	Accreditation for transition pathway	Management of internal net zero alignment
Type	Quantitative methodology	Market mechanism and practice adopting ACT (Assessing low-Carbon Transition) methodology	Framework
Level of analysis	Underwriting portfolio	Individual insured company	Insurance firms
Transparency	Open source methodology	Run by an independent committee	Adaptable framework

Table 8: Case studies overview

The three case studies show both the nascent state and pace of development of tools to enable insurers to become aligned to net zero. The tools recognise the differing and distinct needs of insurers compared with investors and banking. The tools also clearly recognise the importance of independent, rigorous and comparable assessment of client and portfolio. Furthermore, the collaboration across the entire insurance value chain, including modellers, brokers, lawyers and loss adjustors, shines through the case studies, which is vital to effectively and efficiently align the insurance industry to net zero and the Paris Agreement.

There are also common challenges shared between case studies that limited the accuracy and so acceptance of net zero informed underwriting decisions – in particular, the limited data available to inform the assessment – which further highlights the critical role of the TCFD regime and the need for insurers to engage with their insured clients. Mandatory TCFD-aligned reporting, as the key driving force for increasing data availability, will enable stronger and more consistent inputs to the tools. Standardisation and consistency within and between measures would enable integration into underwriting processes and an insurer's own reporting.

Clients, insurers and the insurance value chain are constrained by resourcing and capacity to deliver and analyse the climate-related data. Clients may be unwilling to engage voluntarily and provide ad hoc information to multiple insurers. Smaller insurers will rely on the steps to standardisation and sharing taken by leading groups such as ClimateWise and NZIA to develop their own measures. The box below highlights steps being taken by MS Amlin and the Joint Rig Committee of the Lloyd's Market Association to promote a consistent approach to gathering and measuring net zero with energy clients.[75]

Insurers' engagement with insured clients

MS Amlin, in consultation with the Joint Rig Committee of the Lloyd's Market Association, has developed a client transition questionnaire and portfolio net zero carbon transition scorecard to obtain and track initial quantitative and qualitative measures of energy clients. Recognising the nascent state of energy underwriter knowledge and capacity for net zero measurement and evaluation, the 12 questions are purposefully simple, to be practicable, scalable and usable now. Over the coming years the questions and scorecard will be reviewed and revised, to support all parties in the insurance value chain for energy to learn together about the measurement of carbon intensity.

1. Has your company scientifically measured your greenhouse gas emissions for your scope 1, 2 and 3 activities? Please include some brief details.
2. Do you have an evidence-based plan to reduce scope 1 greenhouse gas emissions? Please attach.
3. What operational performance benchmarks do you currently use to track greenhouse gas emissions and progress to reduce them?
4. Which metric do you intend to use to assess your transition progress?
5. Have you engaged with an independent third party to assist and verify your transition process?
6. Is your plan aligned with the Paris Agreement for your short, medium and long-term targets? If not, please give further details..
7. Has your timeline changed since you first started this process?
8. What transition milestones have you identified in your plan?
9. Do you have an allocated budget for transition? What is this as a percentage of your CAPEX?
10. Do you have a nominated board member responsible for transition progress and is it an ongoing agenda item for board meetings?
11. Is your future company strategy aligned with your transition goals?
12. Can you provide some narrative around your progress to date? Please include any other relevant information, including your ESG framework as applicable.

Note: (a) CISL and MS Amlin are not recommending its use; (b) It is for informational purposes only; (c) The purpose of the scorecard is solely our subjective means by which to facilitate open discussions with our clients in order to encourage positive changes to help support our clients on their 'net zero' journeys.

3.4 Areas of improvement and innovation

As underlined in the Association of British Insurers' (ABI) *Climate Change Roadmap*, meeting net zero by 2050 focuses on the sector's 'financed emissions' across its investment and underwriting portfolios. A clear 2025 milestone, an interim 2030 target of 50 per cent reductions and transparent reporting sit alongside the 2050 net zero goal in order to mark progress.[76]

The CISL ILG Temperature Score Methodology provides a proxy for the distance between a company's or a portfolio's current climate performance and scientifically defined climate benchmarks (ie, the Paris ambition) (Figure 9). If companies translate their commitments into action by decreasing their emissions intensity in the future, those efforts will be translated into lower temperature scores year-on-year as they are updated with more recent data. This highlights the importance of accurate and timely TCFD-aligned reporting by all firms to enable insurers to understand and act to align underwriting portfolios with net zero.

Climate Transition Pathways sets expectations of clients to align with net zero to achieve the insurer's expectation of net zero underwriting. CTP accreditation can give insights to insurers to identify those companies that have robust transition plans and performance in high carbon sectors. Insurers in the scheme are aligning open market capacity to be able to provide (initially) property and casualty underwriting terms. CTP will then expand to other insurance products.

Additionally, the information collected in the ACT (Assessing low-Carbon Transition) assessment (Figure 10) could be used by the insurer to integrate into the risk profile, incorporate into their own ESG assessments and policies, and then use this as a metric to assess and manage their own portfolio alignment with the transition goals of the Paris Agreement. An example aggregation of results for comparison and action is below.

The Milliman ORC case study developed a framework to articulate and deliver practical approaches for insurance companies to achieve net zero underwriting (Figure 11). The key insurer capacities to be developed to achieve net zero underwriting are risk appetite statement, tactical implementation levers and product innovation.

Building on the insights of the case studies, to achieve the targets for the insurance industry, key areas for improvement are capacity building for insurers, setting client expectations and engaging the full insurance value chain. Measuring and evaluating scope 3 emissions of insurers beyond their clients to the insurance value chain of modellers, brokers and claims (Figure 5), will require industry collaboration and co-ordination. Policy and regulation also have a roll to enable data availability and standardisation for analysis and reporting. Altering client expectations of both making and action on low carbon transition plans as well as insurance industry support for their transition is also key to a smooth insurer and client net zero alignment.

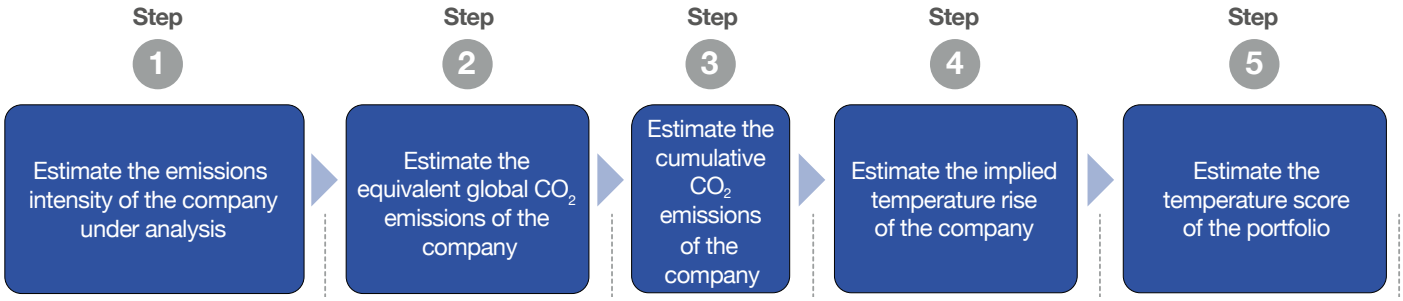


Figure 9: Diagram explaining how temperature scores are estimated based on portfolio-level data, global GDP and the TCRE function.

Not Paris-aligned	Marginal cases or improving towards Paris alignment	Paris aligned
28 need to start or aggressively revise plans to meet Paris ambitions	12 need to improve short, medium and/or long-term plans/targets	10 are provisionally assessed as potential CTP passes

Figure 10: Summary of illustrative results using July 2020 ACT assessments of 50 utilities globally.

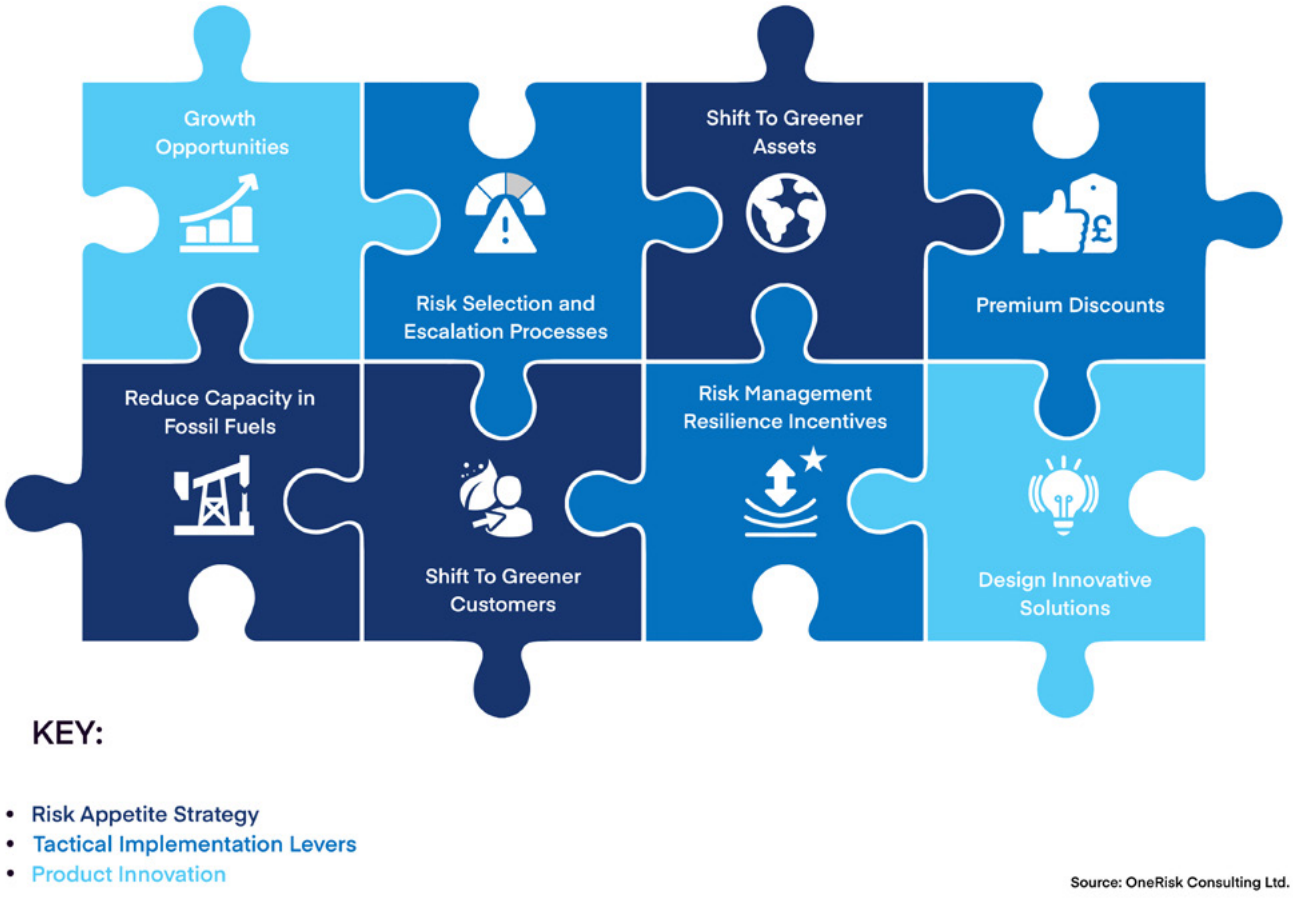


Figure 11: Conceptual net zero underwriting framework

4. Conclusion

This paper serves as an introduction to further insurance industry understanding of how to support and steward the transition to a low carbon, resilient society, through action on their underwriting activity. We have explored the initial steps insurers can take to align underwriting practices with net zero by drawing on their existing knowledge and expertise and applying it to the problems posed by climate change.

In recent years, significant attention has been given, by policymakers, central banks and regulators, to climate-related risks facing the insurance industry and financial services in general. It is increasingly apparent that a step-change in risk management is required on the part of insurance market participants if they are to better understand, assess and mitigate these risks. Risk management, in this context, refers not only to the impact of climate change on specific risks being underwritten by insurers – the focus of this paper – but also to the systemic risks facing insurers from climate change and the transition.

Convened to propel net zero underwriting practices, the ClimateWise membership has been working over the course of 2021 on defining the definition of net zero for underwriting, and investigating tools and practices that would enable insurers to set and achieve net zero commitments. The group focused on selected tools and practices to assess the GHG intensity and pathway alignment of a non-life insurance client as well as the insurer's integration of these insights. The report highlights to policymakers, regulators and the insurance industry the ability of insurers to perform basic assessment of underwriting portfolio temperature alignment and engagement with clients on alignment to net zero and the Paris Agreement.

For insurers, the report provides a summary of benefits and limitations with current approaches and tools to measure underwriting portfolio alignment with net zero and the Paris Agreement. With regulatory pressure to ensure financial stability and policy focus on achievement of national net zero commitments, the insurance value chain will need to collaborate to enable insurance design and client engagement, as well as the claims process and outcomes, to align with the net zero economy. Broader insurance underwriting partners and supporting activities such as brokers, actuaries and lawyers, need to be brought closer into the conversation on planning the approach to net zero.

However, a detailed approach could be burdensome for smaller clients and/or smaller insurers. There is a balance to be struck between a simplified, risk-based approach to enable participation and use for smaller clients and/or smaller insurers, and assessing the aggregate risk to financial stability. Simplified rules can be complemented by aggregation to evaluate and track coverage gaps. Insights from the European Insurance and Occupational Pensions Authority's (EIOPA) insurance protection gap analysis for natural catastrophes[89] highlights how understanding this could be valuable for client sectors as well as locations.

Policymakers and regulators, particularly global bodies such as the International Association of Insurance Supervisors, need to collaborate with the insurance industry to enable standardised assessment of climate risk and net zero alignment, as well as consistent boundaries of reporting emissions and consistent understanding of the transition pathway(s). At the same time, the insurance industry should actively inform and promote to policy makers and regulators the areas of collaboration and progress. Mandatory TCFD-aligned reporting with specified scenarios and supporting data would be beneficial for policy makers, regulators and insurers. Aggregation of risk exposure would improve understanding of financial stability across firms, industries and the macro economy.

This report serves as a foundation for future research to assess the alignment of a client's specific assets and/or activities insured and incorporating other considerations in net zero transition. For net zero, further research and industry collaboration is needed to resolve issues of data availability and accuracy (especially for smaller clients and smaller insurers), boundaries of reporting emissions and consistent understanding of the transition pathway(s).

Wider next steps are to take a more comprehensive approach to understanding the societal and broader environmental impacts of underwriting practices. Particularly, the linkage between climate change and nature "may lead to taking actions that inadvertently prevent the solution of one or the other, or both issues. It is the nature of complex systems that they have unexpected outcomes and thresholds, but also that the individual parts cannot be managed in isolation from one another."[77]

Tools and practices case studies

Case study A:
Temperature Score Methodology for Underwriting Portfolios
CISL Investment Leaders Group

See page 27

A

Case study B:
Climate Transition Pathways
Willis Tower Watson

See page 37

B

Case study C:
Underwriting portfolio climate risk assessment tool
Milliman and OneRisk Consulting

See page 48

C

Case Study A: Temperature Score Methodology for Underwriting Portfolios

A.1 Summary

The Temperature Score Methodology for Underwriting Portfolios creates a simple, transparent and robust approach for insurance underwriters to understand the alignment of their portfolio emissions with the Paris Agreement, using an intuitive metric expressed in degrees Celsius (°C). The approach provides an accountability tool, enabling underwriters to easily determine the emissions performance of insured organisations with a portfolio, and the overall temperature alignment of a portfolio in aggregate, to enhance understanding of portfolio climate risk.

The methodology discussed in this case study is built upon a method developed by CISL's Investment Leaders Group, to convert corporate GHG emissions data into a metric expressed as degrees Celsius, allowing investors to intuitively understand the alignment of their invested emissions with the Paris Agreement. The method presented here has been adapted and tailored for insurance underwriters' use, and translates emissions from insured companies in underwriting portfolios into a metric expressed in degrees Celsius, or global implied temperature rise.

In the following sections, the tailored methodology for insurance underwriters is outlined and the variations are highlighted. Section A.6 demonstrates the application of the tailored methodology to a fictitious underwriting portfolio provided by the Net Zero Underwriting Task Group members to prove the robustness, relevance and applicability of the methodology. In addition, a working Excel tool has been developed with the group, to enable underwriters to employ the methodology within their organisations.

Over the past year, numerous temperature score methodologies have appeared in the market.[65,66] However, a lack of transparency and comparability across methods makes it difficult to compare results, or for non-experts to understand and adopt approaches. To address this, the methodology behind the temperature score presented here was introduced as a simple and transparent method to enable underwriters to assess the alignment of their portfolios with the Paris ambition.

The implied temperature rise (or temperature 'score') methodology seeks to answer the question:

"What is the temperature alignment of this underwriting portfolio, if the entire economy operated at the same emissions intensity as the companies insured?"

In the context of insurance underwriting, this methodology enables underwriters to:

- compute the temperature score of their insured clients
- aggregate the score of the underwriting portfolio based on the weight of each client
- report the climate performance of underwriting portfolios to stakeholders.

A.2 Background

Simplicity, transparency and robustness are the three guiding principles behind the methodology. It translates portfolio emissions into a metric expressed in degrees Celsius using the near-linear relationship between cumulative carbon emissions and global warming, known as the *transient climate response to cumulative carbon emissions*, or TCRE.[78] Through estimating the performance of a portfolio based on the current emissions from the companies, users could report portfolio alignment with the Paris ambition.

For this case study with insurance underwriters, the same principles are maintained but with few changes introduced to fit the industry characteristics. Changes made are listed in the sections below.

We understand that a simple and universal method of assessing climate performance will not suit all purposes. Not all companies will, by default, disclose their emissions data. Those without data or where data is insufficiently robust have been removed from the assessment to normalise the results for the rest of the portfolio, instead of using proxy data. We found that the use of proxies is not in line with the principles of simplicity and transparency due to the additional modelling required.

A.3 Temperature Score Methodology for Underwriting Portfolios

The method developed by the Investment Leaders Group is characterised with the following three principles:

- **Simplicity:** an intuitive method that is easy to understand and communicate, aiming to maximise engagement among the insurance underwriters and the insured clients.
- **Transparency:** complete disclosure of method and assumptions, to aid understanding, discussion and replication by non-experts. The method does not include 'black boxes' or depend on complex modelling platforms and scenarios.
- **Robustness:** based on the latest scientific evidence of the relationship between cumulative CO_2 emissions and global mean temperature increase.

To drive greater adoption, the method requires a minimal amount of data input. This has the dual benefit of minimising the reporting burden for underwriters. The method is also completely transparent and, unlike other temperature scoring methods, does not include hidden assumptions or complex modelling (black boxes) to correlate emissions, with an implied temperature rise. This transparent approach is also designed to increase adoptability by underwriters and their clients. The method is aligned with the carbon footprinting methodology developed by the CRO Forum. The temperature score method translates the carbon intensity of the insured clients to a level of global warming measured in degrees Celsius.

It is readily understood by specialists and non-specialists alike, including underwriters, clients and the general public.

In terms of data, the temperature score method requires:

- The written **premium income** earned from the clients, ie the total premium the underwriters earned from the clients in the calendar year
- The **revenue** of the insured client (eg disclosed in the client's annual financial reports or from financial data providers such as Bloomberg or Refinitiv Eikon)
- The **scope 1 and 2 GHG emissions** of the client (eg disclosed directly to the underwriters or accessible from sources in the public domain such as CDP (www.cdp.net)).

The inclusion of scope 3 emissions data, in theory, is possible but depends on the accuracy of the data. Research by CISL found that, based on serious inconsistencies of both estimated and company-reported scope 3 data, currently it is not possible to create a robust metric based on it, and that this is an essential area of research focus to progress emissions reporting.[78,79] The significant modelling assumptions required to provide scope 3 data mean it is currently incompatible with the principles of transparency and simplicity.

To ensure the accuracy of the method, the Excel tool developed based on the methodology in this project, should be updated annually with the latest data figures provided by clients, as listed above. Several parameters in the method, such as global gross domestic product (GDP), should be updated with publicly available sources (eg World Bank data). The availability of corporate data is crucial; therefore, all clients should be encouraged to disclose the required information.

A.4 Step-by-step guidance to applying the methodology

For a step-by-step guide on how to use the spreadsheet see the example in section A.6.

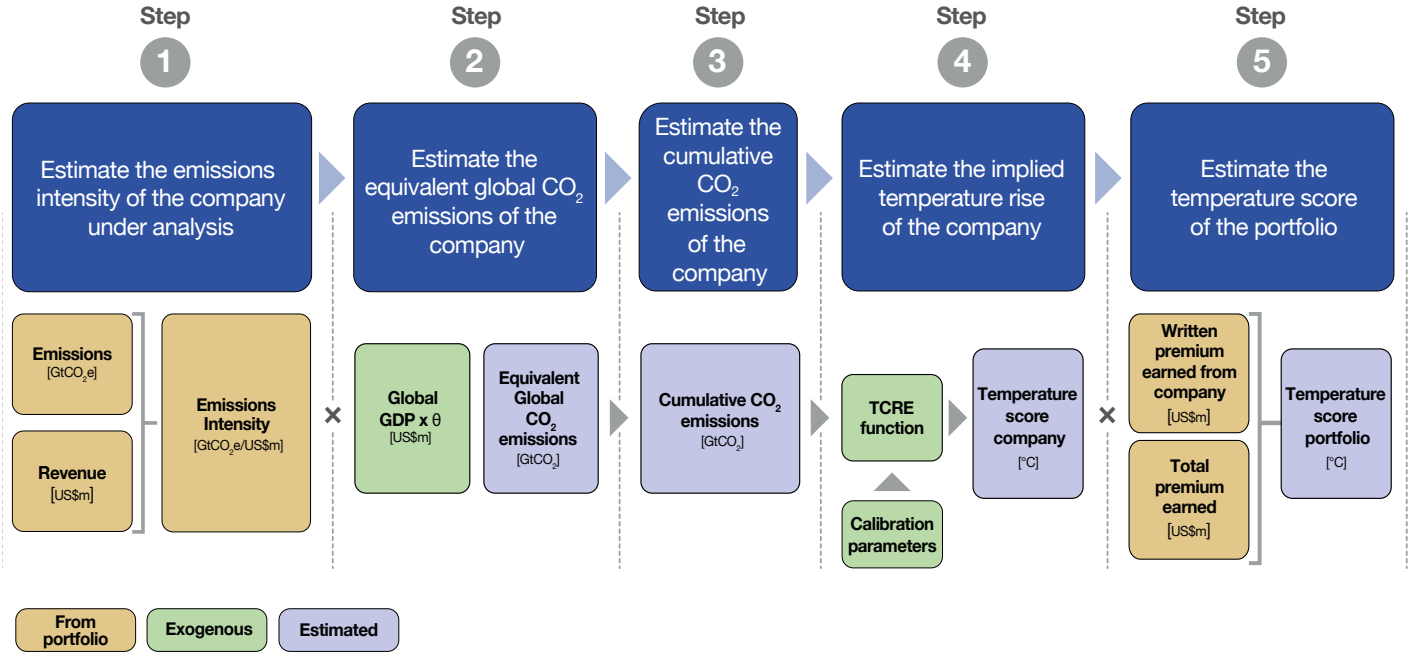


Figure A.2: Diagram explaining how temperature scores are estimated based on portfolio-level data, global GDP and the TCRE function.

Step 1: Estimate the emissions intensity of the insured companies in the portfolio

When comparing the emissions performance of companies and portfolios, normalised indicators may be used for comparison across different sizes and against global benchmarks. This is best captured by an emissions intensity indicator, which measures emissions per unit of value added. The company-level benchmark for emissions intensity is commonly estimated using scope 1 and scope 2 emissions defined by the Greenhouse Gas Protocol, and revenue, two time series that are frequently updated and widely available.

$$Emissions\ intensity_i = \frac{Insured'\ s\ scope\ 1\ and\ 2\ GHG\ emissions_i}{Insured's\ revenue_i} \quad 1$$

The emissions intensity indicator provides a measure of emissions intensity based on scope 1 and scope 2 emissions (numerator), normalised by sales revenue (denominator).

Step 2: Estimate the equivalent global CO_2 emissions of the companies in the portfolio

Emissions intensity is a normalised indicator, designed for comparing emissions performance at different scales. Normalising emissions per unit of economic output allows for the comparison of companies of different sizes. To estimate global warming, however, an absolute measure of emissions is required. This is due to the fact that global warming is proportional to the total CO_2 accumulated in the atmosphere. A proxy for global CO_2 emissions is obtained through multiplying the emissions intensity of a company with global GDP, which is illustrated as follows.

$$\textit{Equivalent Global } CO_2 \textit{ Emissions} = \textit{Emissions intensity}_i * \textit{Global GDP} * \theta \qquad 2$$

where $\theta = 2.39$ is a scaling factor explained below. The equivalent global CO_2 emissions described in equation (2) represents total global emissions if the entire economy had the same emissions intensity as the company under analysis.

It should be noted that asset-level indicators from Step 1 are an imperfect proxy of global indicators. Neither global CO_2 emissions nor global GDP have a perfect counterpart at the company or portfolio level. Instead, carbon emissions, including scope 1 and scope 2, and economic output, exemplified by sales revenue, are employed in this method. They are the best portfolio-level indicators available, albeit imperfect. An additional factor θ is used to compensate for the difference in scale between the company-level indicator and the global-level indicator (global emissions intensity). θ is defined as the ratio between the global-level emissions intensity benchmark (global CO_2 emissions over global GDP) and a company-level emissions intensity benchmark.

$$\theta = \frac{\textit{Global benchmark for emissions intensity}}{\textit{Portfolio benchmark for emissions intensity}} \qquad 3$$

Ideally, the portfolio-level benchmark is constructed using a portfolio that is representative of the global economy. Naturally, such a portfolio does not exist, but some indices provide a reasonable approximation. In this case, we use the MSCI ACWI index, which represents companies across 23 developed and 27 emerging markets. The Annex provides a more detailed description of the calculation of θ.

Step 3: Estimate the cumulative CO_2 emissions of the companies in the portfolio

Steps 1 and 2 provide a snapshot of the companies' emissions performance: their emissions intensity and equivalent global CO_2 emissions at a given time. To estimate the effect of the companies on global warming in the years ahead, cumulative emissions of the companies must be calculated by projecting them forward into the future. This is simply the cumulative sum of equivalent global CO_2 emissions over time.

There are several ways to project emissions into the future, including:

- maintaining emissions at a constant level over time
- projecting historical trends
- projecting emissions based on companies' disclosed targets
- using an external emissions trajectory as a reference.

The choice of projection method has a profound impact on the temperature score, as it shapes the emissions trajectory and therefore the cumulative sum of CO_2 emissions. Depending on the aim of the temperature score, different emission projection approaches may be used. For instance, if the goal is to evaluate the current climate performance of companies and portfolios, then maintaining current emissions at a constant level is an appropriate option. This reveals the climate performance of a company in a scenario based on today's emissions figures.

The temperature score metric developed by CISL is a component of CISL's wider Sustainable Investment Framework, which was designed to report the current alignment of portfolios with the United Nations (UN) Sustainable Development Goals (SDGs) rather than performance based on future intentions.[80] For this reason, the projection approach adopted here is to maintain emissions at a constant level over time, which we believe is best suited to general stakeholder reporting. This approach provides a realistic snapshot of the current climate performance of the portfolio, without taking a bet on the likelihood of companies delivering their future commitments or following arbitrary reference scenarios. Moreover, a constant projection of emissions is fully transparent as it does not include any assumptions embedded in external scenarios or targets, and it is simple to implement.

Using a constant projection of emissions, the cumulative sum of equivalent global CO_2 emissions over time can be estimated as follows:

$$\text{Cumulative } CO_2 \text{ Emissions} = \sum_{t=t_0}^{T} \text{Equivalent Global } CO_2 \text{ Emissions}_t \quad (4)$$

where

$$\text{Equivalent Global } CO_2 \text{ Emissions}_t = \begin{cases} \text{Emissions intensity company}_t * \text{Global GDP}_t * \theta & t < t_1 \\ \text{Emissions intensity company}_{t1} * \text{Global GDP}_{t1} * \theta & t < t_1 \end{cases} \quad (5)$$

where the interval $[t_0 T]$ is an arbitrary time window. The warming function (to be introduced in Step 4, below) is calibrated from 2020 onward, so $t_0 = 2020$. The current scientific convention requires us to compare global warming on different scenarios to the end of the 21st century (2100), thus T=2100. Other values for T can also be used (e.g., 2050), but the global warming level should be estimated to 2100 if the score is to be compared with the Paris ambition. Regarding t_1, this is the latest year for which data is available. As time passes, newer data points become available and t_1 will change. The sum will include historical data between the year 2020 and t_1, and a constant projection of emissions between t_1 and the end of the period (2100).

Step 4: Estimate the implied temperature rise of the companies

Step 4 requires the translation of cumulative CO_2 emissions into global warming. The latest scientific evidence from Earth system models suggests the existence of an almost linear relationship between cumulative CO_2 emissions and global warming.[81,82] This relationship is known as the transient climate response to cumulative CO_2 emissions, or TCRE.

TCRE expresses the proportionality between global warming and cumulative CO_2 emissions. Thanks to its simplicity of being an almost linear relationship, it has shown to be both conceptually clear and a robust metric for anticipating global warming.[83]

$$TCRE = \frac{\text{Warming } [°C]}{\text{Cumulative Emissions } [GtCO_2]} \quad (6)$$

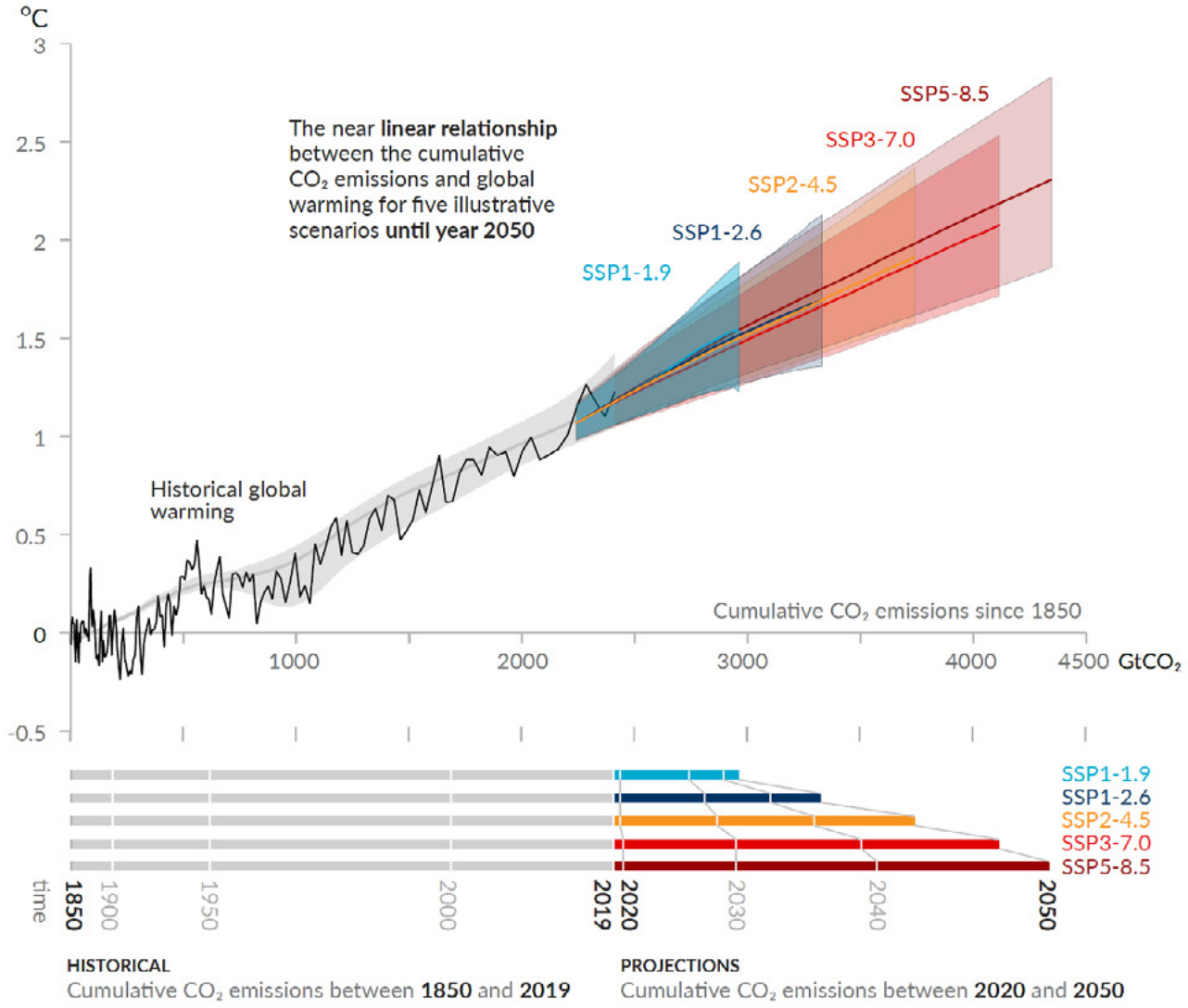


Figure A.3: Historical data (black) and future scenarios (coloured) of global mean temperature increase as a function of cumulative CO_2 emissions. Source (IPCC, 2021).[8]

As shown in Figure A.3 and explained in detail in CISL's report: *Understanding the climate performance of investment funds. Part 2: A universal temperature score method* Annex E – TCRE and the warming function,[67] it is possible to derive a linear warming function f that connects carbon budgets (eg, cumulative CO_2 emissions) with global warming. This linear warming function can be described as follows:

$$\textit{Global Warming} = f(\textit{Carbon budget}) = \alpha * \textit{Carbon Budget} + \beta \qquad 7$$

Given a carbon budget, it is possible to estimate the extent of global warming associated with it. The warming function f has parameters α and β, which depend on a number of factors, such as anthropogenic effective radiative forcing, unrealised warming or cooling from past CO_2 emissions, among others.

Several scientific studies have estimated the probability density functions for the TCRE parameters α and β.[67]
We draw here on a recently published study from Matthews et al.,[79] which parameterised the TCRE function to work with the carbon budget from the year 2020 onwards. By using the mean values of the input distributions to estimate α and β, it is possible to estimate the additional warming from 2020 onwards as a linear function of the cumulative CO_2 emissions since 2020.

$$Global\ Warming_{Since\ 2020} = \alpha * Cumulative\ CO_2\ Emissions_{Since\ 2020} + \beta \qquad 8$$

where $\alpha \approx 5{,}29 \cdot 10^{-4}$ [°C/GtCO$_2$] and $\beta \approx 1.24$ [°C]. By connecting equations (4) and (5) with equation (8), the warming function can straightforwardly estimate the global warming associated with the equivalent global CO_2 emissions of a portfolio. In other words, the warming function can be used to estimate the temperature score of the companies in a portfolio.

$$Global\ Warming_{Company,Since\ 2020} = \alpha * \left[\sum_{t=2020}^{2100} Equivalent\ Global\ CO_2\ Emissions_t \right] + \beta \qquad 9$$

Step 5: Aggregation of the insured company's temperature score in the portfolio

The final step requires an estimate of the temperature score of the portfolio as the weighted average temperature score of the companies. Weight of companyi is determined by the amount of premium earned divided by the total premium earned in the underwriter's portfolio in a calendar year.

$$Weight\ of\ company_i = \frac{Written\ premium\ earned\ from\ company_i}{Total\ premium\ earned} \qquad 10$$

A.5 Alterations to the method, for use by underwriters

To adapt the method for use by insurance underwriters, the case study group has suggested replacing enterprise value including cash (EVIC) as the denominator in the method, with premium income, for the following reasons:

1. Climate risks are attached to underwriting activities, rather than the insured asset:
Underwriting contracts are held against revenue of the professional line in question, rather than the size of the insured asset, measured by asset value. This means the premium of underwritten activities, and therefore the risk attached, may be valued irrespective of the size of the asset. To accurately indicate the climate risk of the underwritten business line – which is one of the purposes of the temperature score – it is therefore necessary to replace EVIC in the temperature score method with premium income, which represents the revenue of the professional lines underwritten.

2. Data accessibility: Premium income is commonly used across all underwriting contracts; therefore, this data is easily accessible to populate the model. Its common use also makes it useful to draw comparison based on temperature scores across underwriting businesses. By comparison, data on the value of the assets insured is hard to obtain, making asset value as an alternative to premium income a less appealing option for underwriters.

It should be noted that the use of premium income in the method is more suitable in the use case where the temperature score is used to assess climate risk. However, if underwriters intend to use the temperature score to report the climate impact of those companies to the financial sector, face value may be a more appropriate metric since this provides a picture of the company's value within the real economy. The temperature score of each company is then aggregated based on the weight to obtain the portfolio's temperature score.

A.6 Applying the method to an example underwriting portfolio

The proposed temperature score has been tested on a fictitious portfolio provided by a member of the Net Zero Underwriting Task Group. The analysis follows the five steps (and associated equations) outlined above. Data is entered into the temperature score Excel sheet provided.

The underwriting portfolio includes 13 companies from an array of sectors. Some companies have disclosed their scope 1 and 2 greenhouse gas emissions, and some have not.

The results are presented below in Figure 3.

The Excel screenshot shows the 'Entry' tab of the temperature score tool. To use the tool, the name of the company in the underwriting portfolio has been entered in column A, their sector in column B, earned premium (Million US$) in column C, the share (percentage) of the company in the underwriting portfolio in column D, the company's revenue (Million US$) in Column E, and the scope 1 and 2 emissions in columns F and G.

The spreadsheet, with functions built in, automatically calculates all steps described in Section 4 for the user, including cumulative CO_2 emissions, and displays the temperature score for each company as well as the combined portfolio score. The intermediate steps are performed using equations in the 'Formula' tab of the tool (see Figure A.4).

	A	B	C	D	E	F	G	H	I	J
1	Company Name	Sector	Premium earned	Weight (%)	Revenue	Scope 1	Scope 2	Scope 1+2	Temperature Score	Portfolio temperature score
2			Million US$	52.00%	Million US$	tCO2e	tCO2e	tCO2e	°C	5.00
3	Example	Mining	3,5	4%	3.547	1100000	512000	1.612.000	5,17	
4	Example	Mining	3,5	4%	1.400	32817,49	131924,24	164.742	2,26	
5	Example	Chemical	3,5	4%	4.221	N/A	N/A	-	N/A	
6	Example	Infrastructure	3,5	4%	1.727	N/A	N/A	-	N/A	
7	Example	Mining	3,5	4%	640	135359	10647	146.006	3,22	
8	Example	Infrastructure	3,5	4%	2.190	N/A	N/A	-	N/A	
9	Example	Mining	3,5	4%	9.740	1730669,8	1823336	3.554.006	4,40	
10	Example	Mining	3,5	4%	1.370	308504	142099	450.603	4,09	
11	Example	Oil & Gas	3,5	4%	4.271	N/A	N/A	-	N/A	
12	Example	Steel	3,5	4%	232	N/A	N/A	-	N/A	
13	Example	Infrastructure	3,5	4%	1.961	N/A	N/A	-	N/A	
14	Example	Mining	3,5	4%	1.743	N/A	N/A	-	N/A	
15	Example	Energy	3,5	4%	16.292	16981198	1083896	18.065.094	10,84	
16									N/A	
17									N/A	

... Entry Formula Example Numbers

Figure A.4: 'Entry' tab of the temperature score tool (Excel spreadsheet) with anonymised underwriting portfolio, including temperature scores for the companies and whole portfolio

	A	B	C	D	E	F	G	H
1	Weight_Scope	Normalised Weight	Intensity	Global GDP (2020)	θ	Equivalent Global Emissions	Total No. of Years	Cumulative CO2 Emissions
2	24,00%	100,00%	tCO2e/Million US$	Million US$		GtCO2e		GtCO2e
3	4,00%	16,67%	454,48	84.537.700	2,39	91,82	81	7437,81
4	4,00%	16,67%	117,71	84.537.700	2,39	23,78	81	1926,38
5	0,00%	0,00%	0,00	84.537.700	2,39	0,00	81	0,00
6	0,00%	0,00%	0,00	84.537.700	2,39	0,00	81	0,00
7	4,00%	16,67%	228,29	84.537.700	2,39	46,13	81	3736,20
8	0,00%	0,00%	0,00	84.537.700	2,39	0,00	81	0,00
9	4,00%	16,67%	364,89	84.537.700	2,39	73,72	81	5971,62
10	4,00%	16,67%	328,92	84.537.700	2,39	66,46	81	5383,06
11	0,00%	0,00%	0,00	84.537.700	2,39	0,00	81	0,00
12	0,00%	0,00%	0,00	84.537.700	2,39	0,00	81	0,00
13	0,00%	0,00%	0,00	84.537.700	2,39	0,00	81	0,00
14	0,00%	0,00%	0,00	84.537.700	2,39	0,00	81	0,00
15	4,00%	16,67%	1108,80	84.537.700	2,39	224,03	81	18146,22
16								
17								
18								

... Entry Formula Example Numbers

Figure A.5: 'Formula' tab of the temperature score tool (Excel spreadsheet) including all calculation steps – this tab does not need any input by the user

Seven of the companies in the underwriting portfolio have not disclosed their scope 1 and 2 emissions. Therefore, in accordance with the principles outlined above, the tool automatically omits those companies from the portfolio score calculation. Instead, the tool adjusts and normalises the weights of those companies in the portfolio (see Figure 4 columns A and B) for this calculation.

The scores for companies and the portfolio temperature score (see Figure 3 columns I and J) are colour coded. Scores below the ideal aim of 1.5°C will be displayed as green, scores between this and the Paris Agreement target of 2°C as yellow, and scores above that limit will be displayed as red. The results show that none of the companies in the portfolio meet the Paris ambition nor get close to the ideal score of 1.5°C. In fact, the scores range from 2.26°C to 10.84°C. In aggregate, the portfolio scores at 5°C. The high emissions intensity value of the worst performing company (10.84°C) and its large global equivalent CO_2 emissions (Figure 4) are the basis for the very high temperature score.

Accordingly, the analysis indicates that the emissions of underwritten activities in the example portfolio **are aligned with a 5°C temperature rise by 2100**. This score does not assume any future decarbonisation commitments have been made by the companies in the portfolio nor makes any assumptions about the future behaviour of the macroeconomy. Instead, emissions performance is projected to be constant over time, based on current (2019) emissions, revenues and premiums from the companies in the portfolio. The score does not include scope 3 emissions. The companies not disclosing their emissions at all, unfortunately, must be included in a discussion of the portfolio score, as those companies could, in reality, potentially influence the score in one or the other direction. This underlines the importance of investors and underwriters encouraging companies to disclose their emissions data yearly.

Temperature scores are neither designed nor intended to be used as forecasting tools. Instead, they are a proxy for the distance between a company's or a portfolio's current climate performance and scientifically defined climate benchmarks (ie, the Paris ambition). If companies translate their commitments into action by decreasing their emissions intensity in the future, those efforts will be translated into lower temperature scores year-on-year as they are updated with more recent data.

A.7 Strengths, challenges and next steps for insurers

The methodology outlined here attempts to provide a universal, simple and transparent method for underwriters that translates company and portfolio emissions into global temperature rise, expressed in °C.

The use of such a method can provide insurance underwriters with insights into where emissions from underwriting activities are conducive to global temperature rise that is above or below the Paris Agreement, to better understand, manage and report portfolio climate risk.

This methodology was adapted from CISL's *Understanding the climate performance of investment funds. Part 2: A universal temperature score method;* please refer to this report to gain a deeper understanding of the strengths and challenges this methodology offers. It further builds on a larger programme led by CISL and ILG to quantify the social and environmental impacts of investment, most recently published as the Sustainable Investment Framework.[80]

The case study involved members of the Net Zero Underwriters Task Group to test trail the method and tool through assessing underwriting portfolio emissions. More test trials are encouraged to help refine the robustness of the methodology as well as the usability of the excel built-in tool.

A.8 Discussion: temperature scoring method and the TCFD

Q: How does the temperature score created by this method align with the TCFD framework and net zero ambitions?

A: As part of a public consultation process, the TCFD published two reports in June 2021:

- *Proposed Guidance on Climate-related Metrics, Targets, and Transition Plans*[81]
- *Measuring Portfolio Alignment: Technical Supplement*[82]

In these documents, the TCFD presented 22 recommendations for the design of portfolio alignment metrics. For a detailed explanation of how our proposed temperature score method relates to each of these recommendations, please consult Annex B in the CISL report: *Understanding the climate performance of investment funds. Part 2: A universal temperature score method.*[67]

In short, the proposed method is fully transparent at each step, facilitating discussion about the assumptions underpinning temperature score estimation. By following the three guiding principles of simplicity, transparency and robustness, CISL offers a metric that addresses the primary concerns highlighted by the TCFD. Our tool, therefore, enables underwriters to understand the alignment of their portfolios with the Paris ambitions and how to track the climate performance of their clients on an annual basis.

Annex – Estimation of the benchmark ratio using MSCI ACWI

The key question underlying our proposed temperature score method for asset underwriting is: What is the temperature alignment of this underwriting portfolio, if the entire economy operated at the same emissions intensity as the companies insured?

If company-level indicators were a perfect proxy for global emissions and global output, then company-level and global-level emissions intensity would be straightforwardly comparable. This is not the case as there are no perfect proxies for either global emissions or global output at the company level. Consequently, when using company-level data to estimate equivalent global CO_2 emissions (Step 2 of our method), it is necessary to use a benchmark ratio (or scaling factor) to ensure comparability – that is θ (theta).

$$\theta = \frac{\textit{Global benchmark for emissions intensity}}{\textit{Portfolio benchmark for emissions intensity}} = \frac{Pref}{Pref} \qquad 11$$

Where the global benchmark for emissions intensity *Pref* corresponds to the actual emissions intensity of the global economy, estimated as the ratio between global CO_2 emissions and global GDP in the year 2019:

$$Pref_{2019} = \frac{\textit{Global Anthropogenic } CO_2 \textit{ Emissions}_{2019}}{\textit{Global GDP}_{2019}} = 493.18\ [t\ CO_2 / US\$m] \qquad 12$$

And the portfolio benchmark for emissions intensity Pref corresponds to the emissions intensity of a benchmark portfolio representative of the global economy. Naturally, such a portfolio does not exist, but some indices provide an approximation of what might be considered a reasonable proxy. For the proposed method, we use the MSCI ACWI index, which includes assets across 23 developed and 27 emerging markets. For the companies included in the MSCI ACWI index, emissions intensity is estimated following Step 1 of the method:

$$Pref_{2019} = \sum_{i=1}^{N\ assets} w_i \cdot \frac{Emissions_i}{Revenue_i} = 206.15\ [tCO_2 / USD\ Million] \qquad 13$$

where w_i corresponds to the weight of asset i in the index

Thus, the benchmark ratio is estimated as:

$$\theta = \frac{Pref}{Pref} = 2.39\ \frac{tCO_2}{tCO_{2e}} \qquad 14$$

This disclosure ensures that users can calculate updated versions of theta themselves, building up in-house capacity to make sure the model stays accurate every year.

Compared to the *Understanding the climate performance of investment funds. Part 2: A universal temperature score method* report, the adaptation of the Temperature Score Methodology for asset underwriting requires replacing the aggregated budget approach with a weighted average approach (ie, the temperature score of the portfolio is the weighted average of the score of the companies insured). Therefore, by using a weighted average approach to the representative portfolio (MSCI ACWI), we achieved a slightly different value for theta: 2.39, compared to 2.61 which uses an aggregated budget approach.

Case Study B: Climate Transition Pathways

B.1 Introduction and objectives

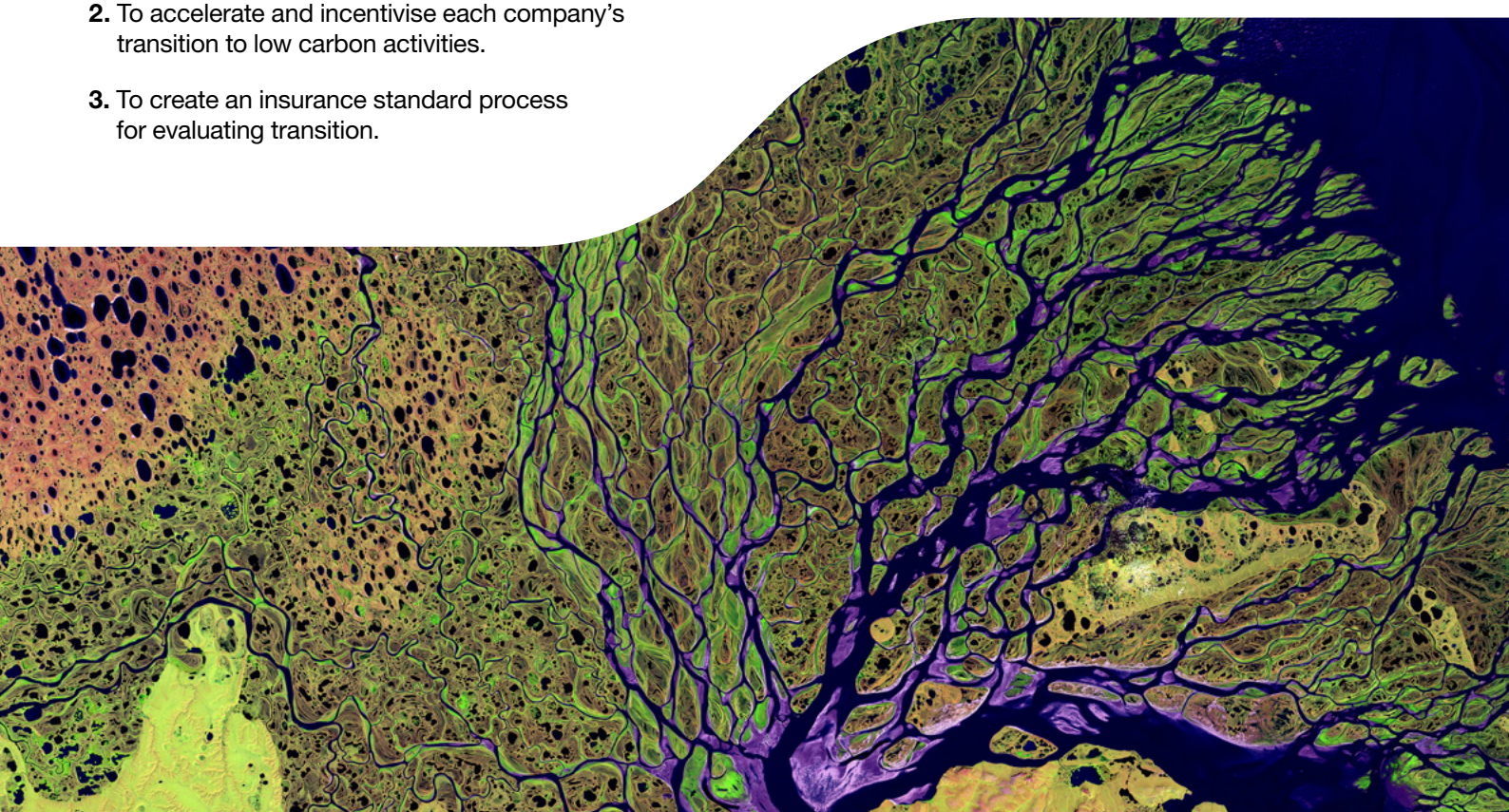
Climate Transition Pathways (CTP) creates a consistent approach for the market and a practical solution that insurers (and other financial institutions) can utilise to help them meet their net zero commitments, enabling them to easily identify and support those insured organisations that are committed to executing robust transition plans.

Climate Transition Pathways is underpinned by a robust accreditation model with principles consistent with the Paris Agreement and a number of net zero initiatives. Fundamentally, CTP has three key aims:

1. To support an orderly transition to the low carbon economy in a way that is consistent with the goals of the Paris climate agreement goals.
2. To accelerate and incentivise each company's transition to low carbon activities.
3. To create an insurance standard process for evaluating transition.

CTP provides a rigorous assessment of a company and its alignment with the Paris climate agreement. Companies undertaking the process gain accreditation if their transition plans and performance meet Paris-aligned thresholds. Insurers can then use the output of the assessment and accreditation in their risk assessment process and hence they can measure portfolio alignment to net zero and the transition goals of the Paris Agreement.

This case study gives an overview of the assessment and accreditation process, followed by the methodology used to assess the company transition plan, and finally example outputs and use by insurers.



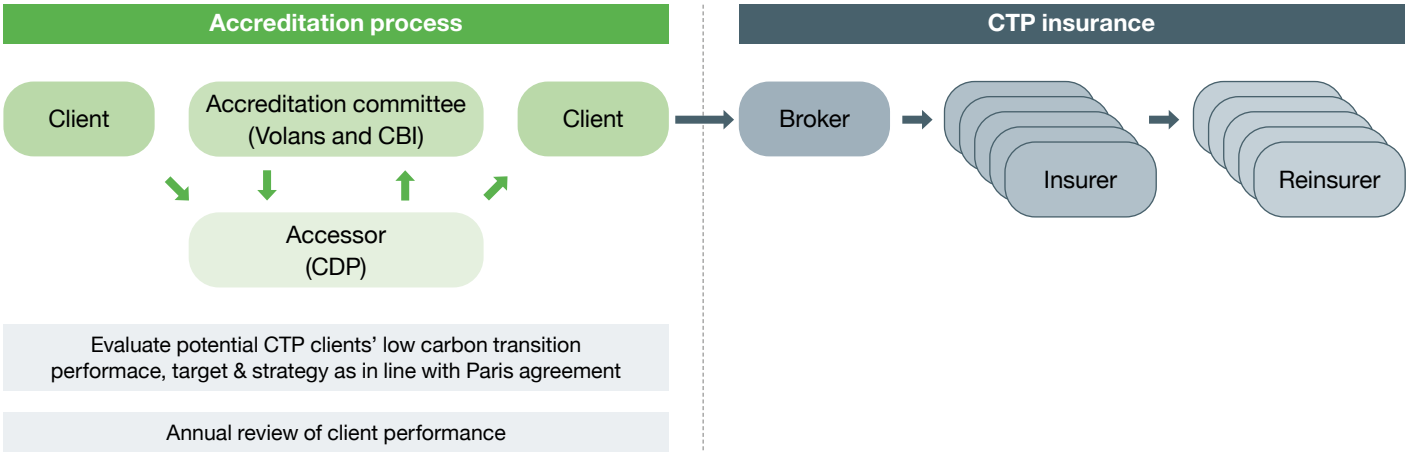


Figure B.1: Accreditation governance set-up

B.1.1 Structure and use

The accreditation process is run independently of, and is a precursor to, the insurance placement. The process is overseen by an accreditation committee, comprised of members from external bodies, namely Volans (which created Bankers for NetZero) and the Climate Bonds Initiative (CBI).

The process begins when a prospective client engages in a risk management discussion with their broker. For companies with existing transition plans, the first stage of accreditation is to apply for assessment against CTP's accreditation principles. This assessment is undertaken by a credible and recognised third party – CDP.

The broker will pass the client's details to CDP, informing them that an ACT assessment is required. The client must then enter into an agreement with CDP for the assessment to be completed and for their transition plans to be assessed. The client will work with CDP, sharing data in support of their transition plans to enable a full assessment to be completed, with CDP charging the insured client directly for their assessment services. The vast majority of this data is publicly available, but it will also include data relating to the client's management plans, and also data utilised by CDP but originating from third party databases, eg carbon emission records. CDP will ultimately produce their standard ACT report, detailing the indicators and qualitative commentary to support their assessment. The client may choose to use the assessment to refine their own transition plan and strategy.

Once an ACT assessment is complete, the client will be expected to share the indicators and report with the accreditation governance committee. A pre-agreed mapping of the ACT indicators and report to the CTP accreditation principles will utilise a pass and clear fail threshold to determine the accreditation outcome.[i] If the ACT output is above the pass threshold, then the client will automatically be awarded the accreditation and will gain access to the CTP-aligned insurance capacity.

If the ACT output is below the clear fail threshold, then the client will not be awarded the CTP accreditation.

The initial accreditation assessment of an organisation will require the full in-depth ACT assessment to inform the CTP principles and grant the accreditation. On an annual basis thereafter, the organisation's performance against their plans will be considered in a re-evaluation to ensure they continue to meet the CTP accreditation standard as defined by the principles. If there is significant deviance from the plan then the accreditation can be rescinded as part of this annual re-evaluation.

Principles of accreditation

The framework is built to recognise the evolving science and policy in the climate space, aligning to the Paris Agreement goals, the Science Based Targets initiative and the EU sustainable finance taxonomy, driving disclosure in line with the TCFD. It is consistent with scenarios to keep warming below a target of 2.0°C above pre-industrial levels, with an aim of 1.5°C. The set of accreditation governance principles that ultimately set the standard for entry into CTP are shown below.

To assess against these principles, companies will undergo assessment in the form of a standard Assessment of low Carbon Transition (ACT). Once this assessment is complete, the outcome is used by the accreditation governance committee to grant or fail the CTP accreditation.

	#	Principle that insured transition plan needs to align with	Reasoning / Basis	Mechanism	Type
Transition plans align to Paris agreement	1	Target: Client needs to align with net-zero carbon by 2050 and Paris aligned short & medium term targets	Ensuring short, medium and long term targets align with the Parisagreement. Avoiding locking-in of fossil fuel assets that may become stranded assets across operations & value chain	Target should be approved or consistent Science Based Targets Initiative and the Sector Decarbonisation Approach: i.e. based on absolute emissions budget	Foundation of transition
	2	Pathway: Client transition pathway needs to be aligned by science, not exceeding company specific carbon budgets			Foundation of transition
	3	Goal: Transition goals are credible and pathways don't count offsets as means to transition		EU Sustainable Finance Taxonomy will be applied, where mitigation efforts of GHG emissions meet requirements of "Substantial contribution" under EU Sustainable Finance Taxonomy	Pathway principle
	4	Technology: Include an assessment of current and expected technologies which can be used to determine a decarbonization pathway			Pathway principle
	5	Ongoing: Be backed by operating metrics rather than a commitment or pledge.	Demonstrate achievement against Paris agreement goals and carbon budget.	Ability to track performance against plan, demonstrating keeping within carbon budget. Disclose against TCFD and similar frameworks.	Progress

Figure B.2: Climate Transition Pathways accreditation principle

[i] These thresholds are being developed and agreed by the accreditation governance committee.

Accelerating the transition

For companies that do not have a transition plan in place, or who went through the assessment but were not awarded the accreditation, they will have the option to have a part accreditation given for the period of one year if they commit to the following Transition Commitments:

Incentivise & accelerate transition
For companies who do not have a transition plan in place, potentially they commit to: • 1 year to put a transition plan otherwise ejected from the facility • The committment needs to be signed off by the board with a delivery plan • The transition plan also needs to be put to shareholder / owner within 2 years • Annually disclose emissions through TCF D disclosure (and similar frameworks).

Figure B.3: Transition Commitments

CTP builds upon Paris and net zero finance initiatives

CTP has built upon, and aligns with, finance initiatives across debt finance, equity, insurance and COP26. This is because it fundamentally aligns to the Paris Agreement, with the ACT assessment essentially being a way of assessing whether a company can achieve a science-based target (SBT).

Debt finance for transition • All 5 principles of the Climate Bonds Initiative / Credit Suisse principles on transition bonds • All 4 key elements in the ICMA's Climate Transition Finance Handbook for issuers	**Climate Transition Pathways**	**Insurance** • UNEP-FI Principles of Sustainable Insurance • Net Zero Insurance Alliance • CISL ClimateWise • Sustainable Markets Initiative
Equity initiatives to promote transition • Goals and targets of the UNEP-FI led Net Zero Asset Owners Alliance • Commitments under the Net Zero Asset Managers Initiative • "Sayonclimate" initiative	**COP26 Private Finance (Goals)** • Promote disclosure to TCFD • Assess the resilience of companies to climate risks • Assess the credibility of net zero transition plans • Encouraging new market structures and products	**Policy and climate science** • Delivering Paris-aligned outcomes • Use of EU Sustainable Finance Taxonomy • Science Based Targets Initiative

Figure B.4: CTP Principles are aligned with Climate Transition Finance Initiatives

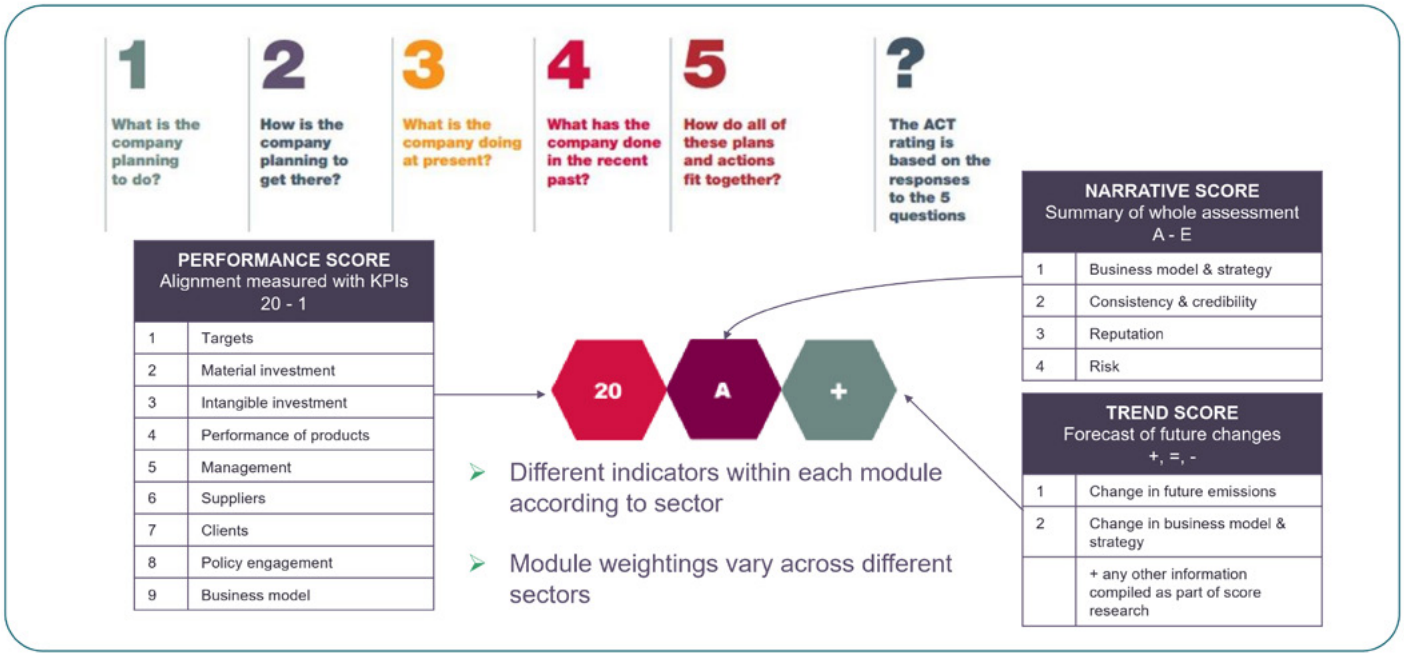


Figure B.5: Overview of ACT methodology

B.2 Assessment methodology (ACT) and CTP accreditation

Overview of ACT methodology

The ACT (Assessing low-Carbon Transition) is designed to assess how companies' decarbonisation actions put them on a Paris Agreement compatible pathway.[83] It was launched at COP21 in 2015 by ADEME, the French Agency for Ecological Transition, and CDP, the global climate disclosure system, to drive climate actions by companies. ACT is supported by the French government as one of the flagship initiatives and is part of the United Nations Framework Convention on Climate Change (UNFCCC) secretariat Global Climate Agenda.

The methodology, which is publicly consulted on and available, is based on five key questions that consider both the current and future states of the company in the assessment of its transition plan. This is then turned into three ratings: 1) a performance score based on scoring of key performance indicators, 2) a narrative score that summarises quantitative and qualitative factors, and context of the assessment, and 3) a trend score of potential changes in future ability to deliver against the transition plan.

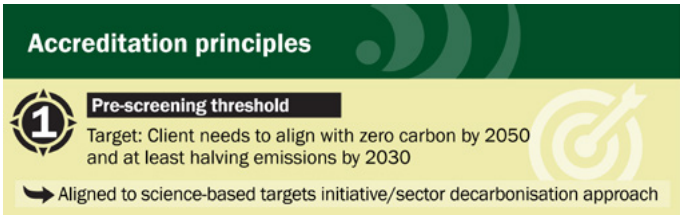
The ACT methodology has already been used by the World Benchmarking Alliance in its Climate and Energy Benchmark.[84] Many of the indicators in the performance score overlap with the disclosures recommended by the TCFD, and in some cases go beyond, including the latest consultation.

Assessment to accreditation

CTP maps the ACT indicators in the performance score to the principles, and then accreditation is dependent on thresholds for each principle, plus minimum thresholds on the narrative score and trend score, being achieved.

Targets set in the short, medium and long term need to align with principle 1 as an entry point, such that the size of the target reductions, date and rate of decarbonisation are in line with those set out by the Science Based Targets initiative.

Company
Short, medium and long term targets



The ACT performance score then goes into detailed assessment of the transition plan, with each indicator mapped against principles 2 to 5. The narrative and trend ACT scores also provide a check on whether the context of the transition plan is consistent with the current and future performance for the CTP accreditation. A performance score of 20 out of 20 (ie 100 per cent) would indicate a company that is already transitioned to a zero carbon business model and performance.

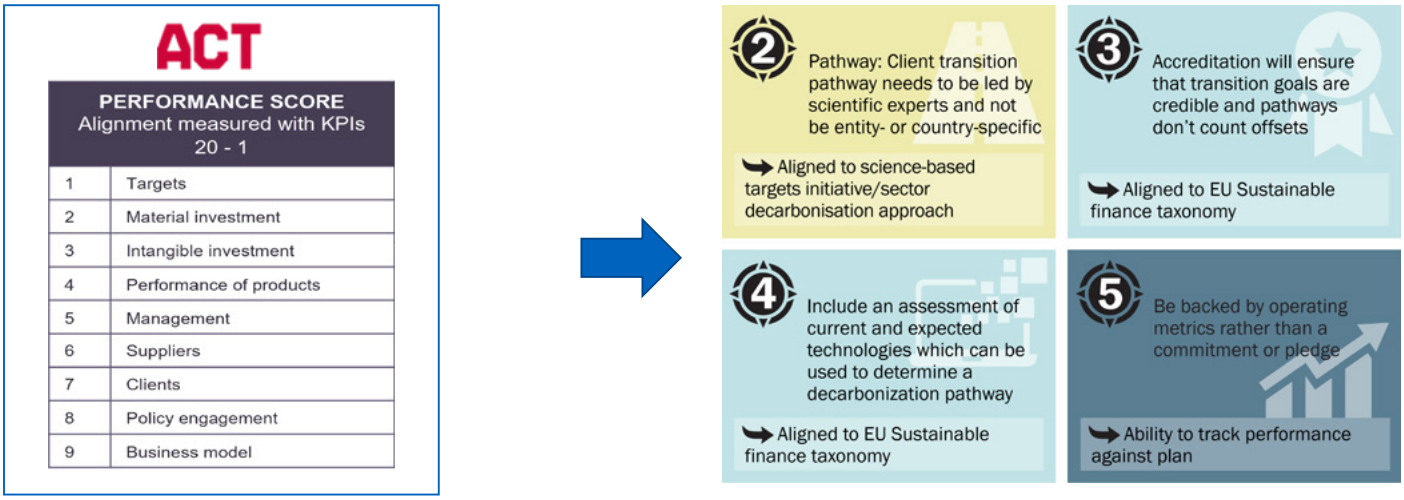


Figure B.6: ACT performance score

From the results of meeting principle 1 (targets) and then the ACT scores mapped to principles 2–5, we obtain an overall score by principle. Company assessments can then be represented as below:

Principle 1 – Targets

- Short ✓
- Medium ✓
- Net zero ✓

CTP Principle	Total ACT indicator Score mapped for this principle	Pass / Fail
Principle 2 – Pathway	**67%**	✓
Principle 3 – Goal	**54%**	✓
Principle 4 – Technology	**71%**	✓
Principle 5 – Ongoing performance	**83%**	✓

Figure B.7: ACT Company assessments

However, another company may have set a net-zero target by 2050 but have short and medium targets that are not aligned to the Paris agreement, and also not provided sufficient details of how it intends to invest and deploy / retire technologies in its asset base.

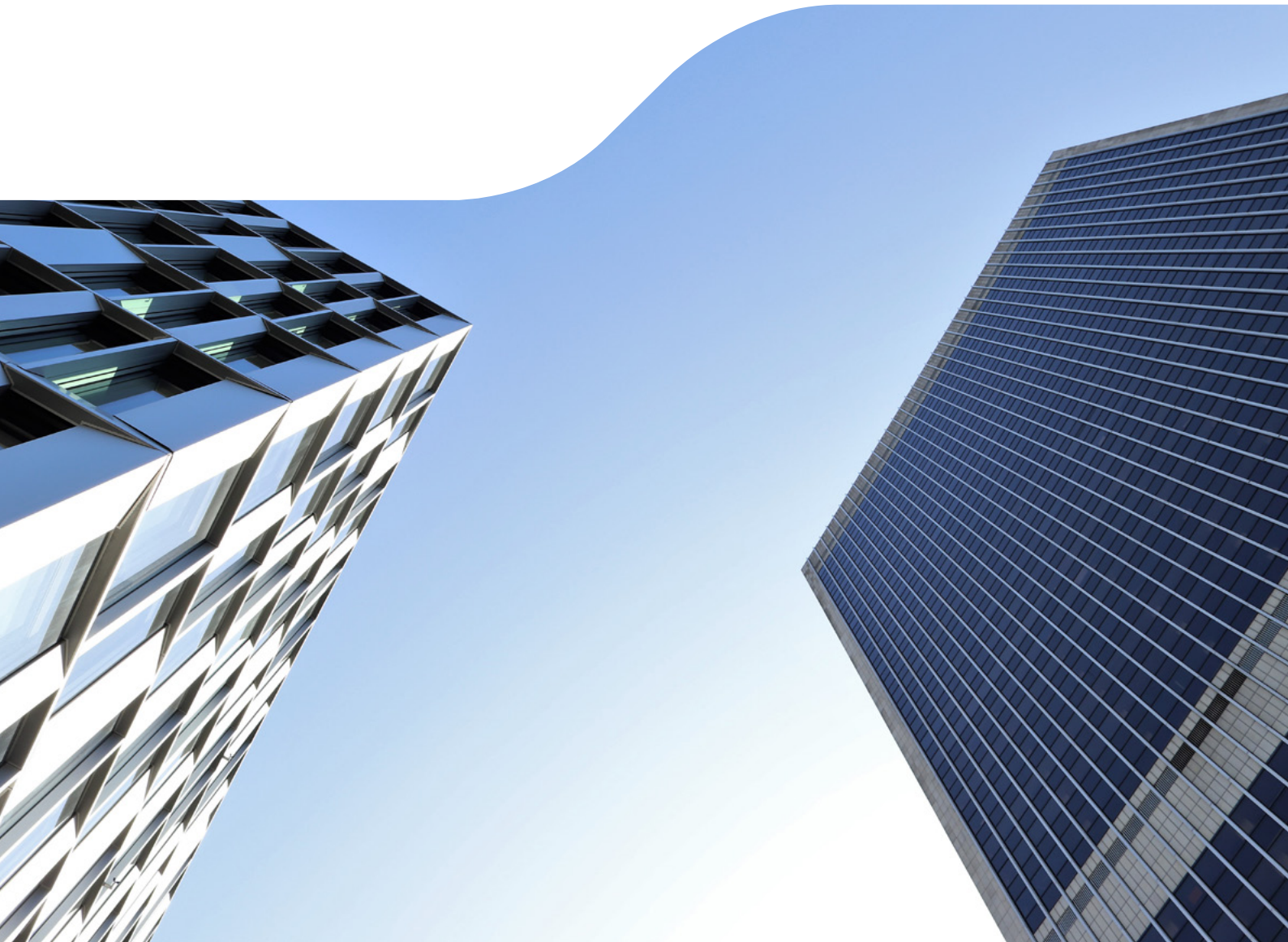
Principle 1 – Targets

- Short ✗
- Medium ✗
- Net zero ✓

CTP Principle	Total ACT indicator Score mapped for this principle	Pass / Fail
Principle 2 – Pathway	23%	✗
Principle 3 – Goal	52%	✓
Principle 4 – Technology	31%	✗
Principle 5 – Ongoing performance	42%	✓

Figure B.8: ACT Company assessments

This company would need to improve its transition plan and short/medium-term targets in order to attain accreditation.



B.3 Examples of companies

In this section are examples of companies and aggregate results. Since many companies are starting or in the early stages of transitioning, our results are based on *illustrative* pass thresholds set for each principle of 40 per cent. It is expected over time that the threshold levels will need to be raised to show that companies will need to demonstrate more advanced levels of transition. These thresholds are set by the CTP accreditation committee.

The results here do not certify that the companies highlighted have received CTP accreditation.

Applying to the electric utilities sector

The ACT methodology for the electric utilities sector consists of 17 performance indicators. These are shown below.

Each indicator is scored at a percentage level as an output of the ACT assessment. The indicators are also given an individual weighting for their relative importance in the overall ACT performance score, with the sum of all weightings adding up to 100 per cent.

For CTP, each indicator above is mapped to one principle only and then the weighted scores are added to give a percentage score for that principle against the maximum achievable score for that principle.

	ELECTRIC UTILITIES			
		PAST	PRESENT	FUTURE
CORE BUSINESS PERFORMANCE	1. TARGETS	EU 1.3. Achievement of previous targets		EU 1.1. Alignment of Scope 1+2 emissions reduction targets
				EU 1.2. Time Horizon of targets
	2.MATERIAL INVESTMENT	EU 2.1. Trend in past emissions intensity		EU 2.2. Locked-in emissions
				EU 2.3. Trend in future emissions intensity
	3.INTANGIBLE INVESTMENT		AU 3.1 R&D for low-carbon transition	
	5.MANAGEMENT		EU 5.1. Oversight of climate change issues	EU 5.3. Low-carbon transition plan
			EU 5.2. Climate change oversight capability	
			EU 5.4. Climate change management incentives	EU 5.6. Climate change scenario testing
			EU 5.5. Fossil fuel power incentives	
INFLUENCE	8.POLICY ENGAGEMENT		EU 8.1. Company policy on engagement with trade associations	
			EU 8.2. Trade associations supported do not have climate-negative activities or positions	
			EU 8.3. Position on significant climate policies	
	9.BUSINESS MODEL	EU 9.1. Integration of a low-carbon economy in the current and future business model		

Figure B.9: The ACT methodology for the electric utilities sector

Accreditation is given based on all of the conditions below being passed:

CTP Condition	Pass criteria
Principle 1 – Targets	Company short, medium and long-term targets meet or exceed Paris decarbonisation goals.
Principles 2 – 5	ACT performance indicator weighted scores add up to 30% achievement against possible score for each principle.
Additional Criteria	Narrative ACT scores of A-C Trend ACT scores of "+" and "="

Company Example: Ørsted – illustrative scoring

Ørsted A/S is a global renewable energy company headquartered in Denmark with assets and operations in Denmark, the UK, Germany, the Netherlands, USA and Taiwan. It is publicly listed, with 50.1 per cent owned by the government of Denmark. In 2019, its revenue was US$10.18 billion and by the end of that year, installed renewable capacity was 9.9 GW. Ørsted's aim is to develop and deploy market-leading sustainable energy solutions. The focus on renewable energy, primarily offshore wind, means the company's business model is essentially aligned with the low carbon transition.

Ørsted's ACT assessment in July 2020 provided the following scores when applied to CTP principles 2–5. It passed every principle, and received 'A' narrative and '+' trend ratings.

Ørsted is prepared for the low carbon economy shifting from a fossil fuel energy company to a renewable power company early compared to the sector, and having already decarbonised by 86 per cent since 2006. It set the pace by being one of the first two utilities to have a 1.5°C-aligned target approved by the Science Based Targets initiative, and has also committed to climate neutrality ten years ahead of most net zero commitments. It has strong governance of climate change and has invested heavily in renewable assets.

CTP Accreditation

Principle 1 – Targets

- Short ✓
- Medium ✓
- Net zero ✓

CTP Principle	Total ACT indicator Score mapped for this principle	Pass / Fail
Principle 2 – Pathway	**80%**	✓
Principle 3 – Goal	**82%**	✓
Principle 4 – Technology	**71%**	✓
Principle 5 – Ongoing performance	**85%**	✓

Renewable energy company Ørsted commits to reduce Scope 1 and 2 GHG emissions 98% per kWh by 2025 from a 2006 base year.* Ørsted also commits to reduce absolute Scope 3 GHG emissions 50% by 2032 from a 2018 base year.*The target boundary includes bioenergy emissions and removals from biogenic sources.

The targets covering greenhouse gas emissions from company operations (scopes 1 and 2) are consistent with reductions required to keep warming to 1.5°C. The renewable energy procurement target covering scope 2 emissions is consistent with reductions required to keep warming to 1.5°C.

Ørsted has committed to carbon neutrality across its whole carbon footprint by 2040.

Figure B.10: Østred – illustrative performance score

Company Example: SSE – illustrative scoring

SSE plc is a publicly listed energy company headquartered in the UK with operations and assets in the UK and Ireland. In 2019, it had a revenue of US$9.02 billion and installed capacity of 10.53 GW (including purchased capacity). SSE's climate strategy is generally strong but is undermined by inadequate emissions targets and locked-in emissions from gas-fired power plants.

SSE's ACT assessment in July 2020 provided the following scores when applied to the CTP principles. It passed every principle, and received 'B' narrative and '=' trend ratings.

Since the appraisal, the company has committed to both improved short/medium-term targets including a Science Based Target, and in November 2020 set a net zero target by 2050 for all of its operations, as well as other investments in clean energy. As such, this company is in a good position with respect to achieving CTP accreditation, and we would expect stronger scoring against the principles due to its updated transition plan.

Principle 1 – Targets

- Short ✓
- Medium ✓
- Net zero ✓

CTP Principle	Total ACT indicator Score mapped for this principle	Pass / Fail
Principle 2 – Pathway	46%	✓
Principle 3 – Goal	79%	✓
Principle 4 – Technology	31%	✓
Principle 5 – Ongoing performance	75%	✓

Since July 2020, SSE has improved its short, medium and long term goals, including the approval of a well-below 2 degrees target by the Science Based Targets Initiative:

SSE plc commits to reduce scope 1 GHG emissions 60% per gCO_2e/kWh by 2030 from a 2018 base year. SSE plc commits to reduce absolute scope 1 and 2 GHG emissions 40% by 2030 from a 2018 base year. SSE plc commits that 50% of its suppliers by spend will have a science-based targets by 2024. SSE plc also commits to reduce absolute GHG emissions from use of products sold 50% by 2034 from a 2018 base year. The target boundary includes biogenic emissions and removals from bioenergy feedstocks.

SSE plc also commits to achieving net zero carbon emissions across all operations by 2050 at the latest, covering both our direct and indirect emissions (scope 1, 2 and 3 greenhouse gas emissions).

Figure B.11: SSE – illustrative performance score

Aggregate results for electric utilities

Using the illustrative approach, CTP has analysed the 50 companies assessed using ACT in the World Benchmarking Alliance's Climate and Energy Benchmark in 2020.[84] These companies represent some of the biggest utilities globally.

Not Paris-aligned	Marginal cases or improving towards Paris alignment	Paris aligned
28 need to start or aggressively revise plans to meet Paris ambitions	12 need to improve short, medium and/or long-term plans/targets	10 are provisionally assessed as potential CTP passes

Figure B.12: Summary of other illustrative results

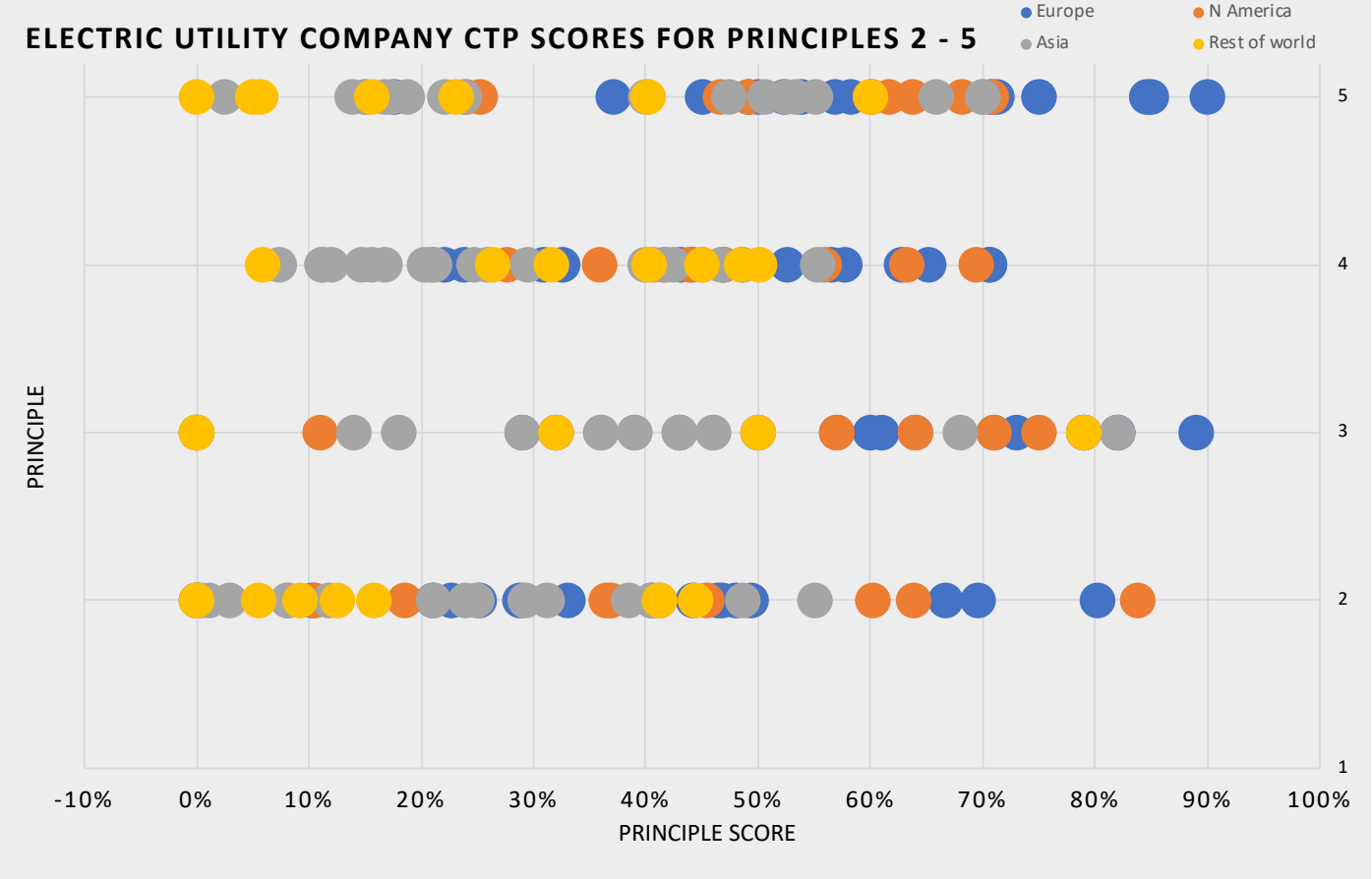


Figure B.13: Electric utility company CTP scores for principles 2 - 5

In the majority of cases, electric utilities will need to improve their transition plans, targets and implementation to receive accreditation. The diagram below illustrates their potential performance against the individual principles 2–5. The use of traffic light ratings (as above) could also indicate which companies are not yet aligned to the Paris Agreement but are making progress towards this.

A similar assessment is underway for 100 companies in the oil and gas sector, where transition is not as advanced as in the electric utility sector.

Use in insurance and next steps

CTP accreditation can give insights to insurers to identify those companies that have robust transition plans and performance in high carbon sectors. Insurers in the scheme are aligning open market capacity to be able to provide (initially) property and casualty underwriting terms. CTP will then expand to other insurance products.

Additionally, the information collected in the ACT assessment could be used by the insurer to integrate into the risk profile, incorporate into their own ESG assessments and policies, and then use this as a metric to assess and manage their own portfolio alignment with the transition goals of the Paris Agreement.

The accreditation scheme is currently being incubated by Willis Towers Watson ahead of being launched as an independent not-for-profit and is open for use by all insurers and brokers. The accreditation could also be used by corporates and providers of debt/project finance.

ClimateWise and Climate Transition Pathways

The members of the Net Zero Underwriting Task Group welcome the development of the Climate Transition Pathways solution as a practical tool for use in the insurance market.

Climate Transition Pathways would like to thank ClimateWise and the members of the Net Zero Working Group for their support in producing this case study.

Case Study C: Underwriting portfolio climate risk assessment tool

Milliman LLP (Milliman) and OneRisk Consulting Limited (ORC) (collectively 'Milliman and ORC') have worked in partnership to create an underwriting portfolio climate risk assessment tool ('the tool'). The tool was designed to help understand the impact of climate change on the underwriting portfolio of non-life insurance companies.

The tool was selected by ClimateWise as part of their net zero underwriting (NZU) case studies. It comprises a web-based questionnaire which was sent out to four participating firms, and focused on the individual (re) insurance business units that were considered most impacted by climate change. The responses from the four participating firms were completed by individuals across the insurance divisions or business units responsible for the company's business and underwriting strategy for their respective areas of insurance, which included property, energy and financial lines.

Once the questionnaires were completed, Milliman and ORC analysed the responses from all the participants, supplementing the analysis with clarifications obtained through discussions with the participating insurer's project co-ordinator.

Based on this analysis and complemented by the feedback of case study participants and the wider market, Milliman and ORC have designed an NZU framework, which has been enhanced through the project by incorporating responses and feedback from the participants within the case study. The framework outlines three main areas that insurers need to focus on in terms of reducing their carbon footprint in respect of their future underwriting strategy. These cover, firstly, the changes in an insurer's risk appetite strategy to insure more sustainable assets and carbon-friendly companies as well as reducing their capacity in underwriting fossil fuels related exposures.

Secondly, there are a number of tactical operational implementation levers that insurers can seek to use. These include improving their risk selection and transaction escalation processes and providing incentives for improvements in risk management to reduce the cost of future losses from floods, for example. A third area is product innovation as there is a general expectation that insurers should, and can, play a vital role in the mitigation of climate risk through underwriting climate-related risks and offering low carbon solutions where possible.

Through the case study process, Milliman and ORC also observed a wide range of responses relating to the impact of climate change on the company's underwriting portfolio that have arisen from specific key drivers and root causes. This is due to both differing risk profiles and perceptions of the issues facing the individual companies, and classes of risk from the companies that took part in the case study.

Further details of the framework can be found in the 'Results' section of the case study.

Through discussions with both ClimateWise and the participants, there is an opportunity to further develop the tool to support a common market approach in terms of best practice. Milliman and ORC will be happy to support any future development in this.

The chapter in the report is laid out as follows:

- Background and objectives
- Main features and benefits
- Overview of the case study process
- Anonymised results from participants of the case study
- Strengths of the tool as well as challenges and next steps.

Background and objectives

The tool was originally designed to stress test the impact of climate change on an underwriting portfolio of an insurance company, in line with regulatory requirements in the UK, as set out in Supervisory Statement SS3/19,[85] to support decision-making in areas such as risk appetite, pricing, reserving, risk aggregation/exposure management, new product development, underwriting strategy and business planning.

The strategic part of the tool should be completed by individuals who oversee the underwriting strategy of the company, whereas the climate change impact should be completed by the underwriters.

The assessment process has included the design of a web-based questionnaire to raise awareness of the main climate drivers and impacts across the business that leverages internal knowledge with key stakeholders to support decisions across the firm's underwriting portfolio.

The web-based questionnaire includes two main sections. The first section covers the high-level assessment of an organisation's underwriting strategy. The second section covers the quantitative aspect of the climate change process, whereby it looks at the main root causes and drivers of claims and premiums across multiple time horizons and across physical, transition and liability risks.

Milliman and ORC researched, and developed, a list of root causes and drivers for premiums and claims for commercial insurance such as property (including business interruption), casualty and liability lines, financial lines (including directors and officers liability, financial crime and professional indemnity) and specialty lines (including energy, marine and aviation). The process was repeated for personal lines, such as health, travel, motor and household insurance. For each key driver, it was considered whether it was related to physical, transition or liability risk, together with specific examples to help explain the rationale for that driver.

Milliman and ORC then tailored the tool to support the NZU project by adjusting and including additional questions in the first section, with the objective of enabling the high-level assessment of an organisation's underwriting strategy to help shape the articulation and considerations for NZU.

The questions have been developed to understand the evolution of ideas and challenges to address how an insurer is planning to transition to a lower carbon economy.

The design and development of this tool can assist insurance companies in developing and implementing their strategy to transition to a lower carbon portfolio, complementing other net zero activities within the insurance company. The tool will also be able to support the wider insurance industry in its aim to move towards NZU.

Main features and benefits

An outline of the main features and benefits of the tool is described below:

Main features

- **Overview:** The tool is a web-based questionnaire that is designed to gather information about how individual business units and insurance companies are thinking about the impacts of climate change. It can also be used to provide benchmarks for other insurers who are interested in participating in this exercise.
- **Flexible:** It is simple to use and can be deployed across the whole of any non-life insurance company's business. The tool can be adapted for different uses within an organisation (for example, a wider environmental, social and governance (ESG) appraisal). The tool considers the major root causes and key drivers of physical, transition and liability risks.
- **Data requirements:** It does not rely on third-party data sources. It uses data provided by individual participants.
- **Target participants:** The tool is intended to be completed by a combination of senior executives and subject matter experts. This will capture the most complete picture, in terms of climate change risks, from both strategic and business perspectives.
- **Facilitation:** The main concepts of the tool are to raise awareness within the company by interacting with key stakeholders to get feedback from each underwriting profit centre or business unit (eg property, casualty, and energy). In turn, it is possible to share the results of the analysis in a collective but meaningful manner across the whole business.

Benefits

- **Early warning system:** The tool also helps to differentiate the short and long-term impacts of climate change and acts as an early warning system by picking up on emerging climate trends.
- **Stress testing:** The process can support an insurance company with their stress testing assessment of the impacts of climate change.
- **Assess main drivers and impacts:** The outputs of the process can help to assess both the qualitative and quantitative impacts of the main climate change drivers, both positive and negative, affecting the profitability of each main underwriting business unit.
- **Underwriting strategy and risk appetite:** The tool can help support the future underwriting decisions of an insurance company with respect to climate change. For example, depending on the information provided, it can give scope for participants to consider the climate change impacts across various factors such as lines of business, insured assets, sectors, coverage limits, geographical concentration and line of business aggregation.

Case study process

The tool was selected by ClimateWise as one of the tools to use as part of their NZU case studies. It was redesigned and structured into two main parts:

Part A (Questions 1-9): In this section, the aim was to capture both past assessment and future planned changes to an organisation's underwriting strategy in respect of climate change. This section also includes specific questions relating to NZU ambitions such as tactical implementation levers and product innovation.

Part B (Questions 10-28): In this section, the aim was to address the main root causes and drivers of climate change for claims and premiums across physical, transition and liability risks over two different time periods: short-to-medium (1–5 years) and long (>5 years).

The compiled list of key drivers for each risk type, were then ranked (on a scale 1-4, with 1 being severe negative impact and 4 being positive impact) which allowed participants to quantitatively assess how each trigger impacted their insurance portfolio.

The web-based questionnaire was sent out to four participating firms. The responses from the four participants were completed and sent back across three main areas of insurance, namely property, energy and financial lines. A high-level flowchart of the process is shown below:

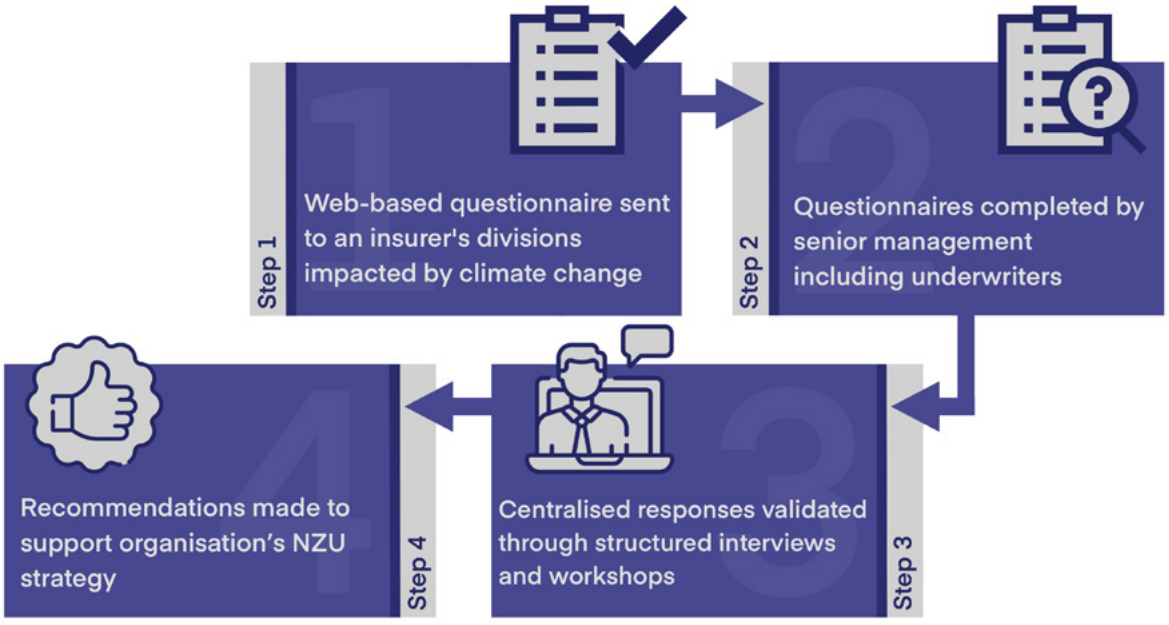


Figure C.1: High-level process flowchart

Results

The results of the case study are provided in this section and set out in two parts: Part 1 covers the results relating to the insurers' NZU strategy; and Part 2 covers the impact of climate change on claims and premiums across different lines of business.

Part 1 – Net zero underwriting strategy

The first part of the tool aims to capture past assessment and future planned changes to an organisation's underwriting strategy in respect of climate change. It includes specific questions relating to NZU ambitions such as tactical implementation levers and product innovation.

The survey captured a wide range of responses from the participants, which has enabled us to design an initial draft NZU framework, seen in the Figure below. This framework can be used as a basis to articulate and deliver practical approaches for insurance companies to achieve NZU.

The following sections show responses from the participants on key climate change issues surrounding underwriting. Note that the responses have been anonymised and grouped into three sections, as presented in the NZU framework above.

Risk appetite strategy

The risk appetite of a company should reflect the amount of climate risk it is willing to take and whether it is aligned to the underwriting strategy of its business model. The three key levers identified and outlined below would help companies consider ways to mitigate climate risk from a risk appetite and underwriting strategy perspective:

- reduce capacity in fossil fuels
- shift to insuring more sustainable assets
- shift to insuring more carbon-friendly companies.

These are described in more detail below.

The insurance sector is well placed to limit fossil fuel risk exposure through underwriting design and placement. In particular, Lloyd's has indicated that it will no longer provide new insurance cover for thermal coal-fired power plants, thermal coal mines, oil sands, or new Arctic energy exploration activities from 2022.[86]

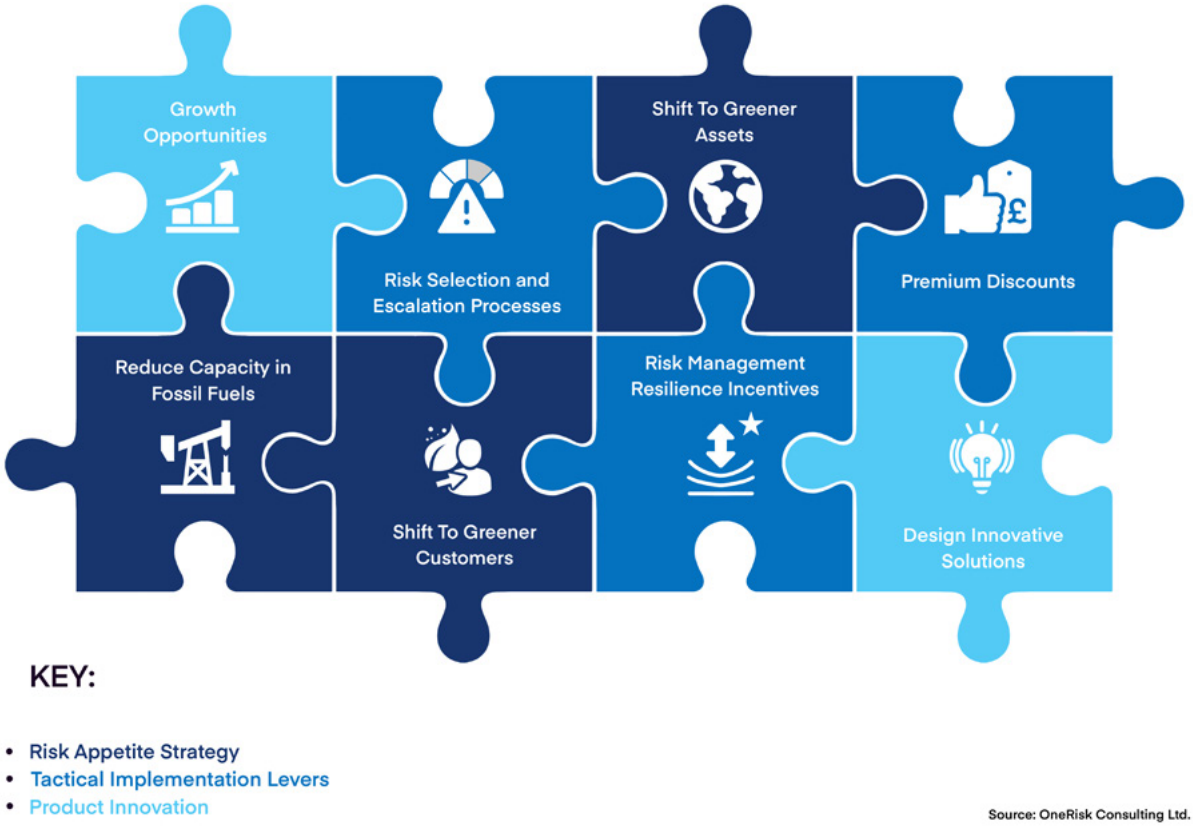


Figure C.2: Conceptual net zero underwriting framework

Case study results indicated that the participants are also considering limiting cover in certain circumstances, if not already doing so:

> "Yes, we already have exclusions in our binders for certain coal contractors and certain power generation companies (depending on the percentage of the Insured's production by megawatt or revenue)."

> "Yes, we are overthinking our underwriting with regard to coal exposure (coal contractors, power generation companies with coal as a major power source)."

There is an obvious opportunity for the insurance industry to shift its underwriting capacity to insure a more sustainable mix of assets within its insurance portfolios, in addition to the opportunity to invest in greener assets. Many of these shifts are driven by the key transition risk drivers identified within the tool, such as government policy responses and consumer demand shifts.

There are increasing opportunities for insurers to provide insurance for a range of renewable energy assets such as wind turbines, solar farms, etc as well as the increasing demand from customers to insure transportation assets, primarily electric and hydrogen vehicles, and associated infrastructure such as charging points.

> "Yes most likely we will change our business mix, for example underwriting more renewable risks."

> "We insure a number of green and environmental consultants across the Retail book."

There is greater regulatory expectation for insurers to indirectly reduce the emissions of customers through the provision of insurance.[87] Regulators such as the Prudential Regulation Authority (PRA) state that firms need to understand the potential current, and future, impacts of the physical and transition risks on their clients and engage with them.

> "We are likely to adapt our risk appetite and focus on clients with 'stronger' ESG credentials."

> "We are on a number of taskforce working groups that are currently working through this topic such as the SMI [Sustainable Markets Initiative] and ClimateWise."

> "[We have] plans to measure the transition and speed of transition of our clients, so we will reduce our carbon footprint as our clients get to net zero."

Tactical implementation levers

As regulators are increasingly expecting insurers to be involved in indirectly reducing carbon emissions of customers (through the provision of insurance), companies are able to employ certain tactical measures to achieve this. The three specific levers identified are:

- risk selection and transaction escalation processes
- premium discounts
- risk management resilience incentives.

These are described in more detail below.

Risk selection and transaction escalation processes are becoming a key underwriting tactical lever to help assess, measure and monitor the company's progress in proactively managing ESG issues. Our tool provides a detailed analysis to support the risk selection process by helping assess the climate change impacts on claims and underwriting profitability and ultimately rank the impacts across all of lines of business.

> "We plan to introduce ESG metrics into our underwriting decision making process with effect from 2022 enabling us to select risks that are seeking to reduce their emissions over time."

Insurers can look to develop tactical strategies that seek to provide differential rating, including premium discounts on their insurance products. For example, premium discounts can be offered for using recycled parts for car repairs or for fire damage relating to wildfire if homes use fire-resistant materials.

Many insurers are now seeking to introduce schemes that provide incentives after a loss to better protect assets from future loss events. For example, some insurers are now willing to spend more money to repair homes in order to protect against future flooding.[88] This includes moving plug sockets higher up the wall and installing one-way valves on waste drains to stop backflow coming through toilets and sinks. This is in line with the principle of 'Build Back Better', which is to use the information from a disaster as a trigger to create more resilient societies and nations than before.

Product innovation[15]

There is generally an expectation that insurers should play a vital role in the mitigation of climate risk through underwriting climate-related risks and offering low carbon solutions where possible. In that respect, the case study identified two areas of product innovation:

- growth opportunities
- design of innovative solutions.

These are described in more detail below.

There are increasing gaps in the insurance market for covering climate-related perils which are being exacerbated by the impacts of climate change,[89] such as the recent European floods and Greece/California wildfires. As noted above, there is also an increasing opportunity for insurers to insure a range of renewable energy assets and transportation assets.

> **"We expect to see more renewable risks (both onshore and offshore) to insure both construction and operational. We expect to see future opportunities from hydrogen production and transportation; both construction and operational."**

> **"[We have launched a product to] address a shortfall in US flood cover."**

A recent development for the insurance sector is the design of more bespoke insurance solutions, such as parametric insurance, that meet the needs of society across a range of industrial sectors (eg agriculture). By combining these new solutions with improved risk management processes, it can lead to reduced greenhouse gas emissions, thus reducing the need for specific insurance products.

Part 2 – Impact of climate change on claims and premiums

The second part of the questionnaire aims at understanding the main root causes and drivers of climate change for claims and premiums across physical, transition and liability risks over two different time periods: short-to-medium (1–5 years) and long (>5 years).

Physical risk includes direct damage to assets and the indirect impact of supply chain disruption risks. This can be event driven (acute) or due to longer-term shifts (chronic). For example, the intensity and frequency of wildfires, often caused by prolonged drought, are becoming an increasing concern in Australia, California and many European countries. Other examples relate to underwriting portfolios that are becoming increasingly susceptible to acute or chronic climate events such as flooding, windstorms, mudslides and water-level rise.

The main root causes/key drivers that can impact both claims and premiums are:

- extreme weather events (acute) – floods, windstorms, wildfires, etc
- changing climate conditions/patterns (chronic) – droughts, heatwaves, coastal erosion, etc.

Most physical risk drivers were seen to negatively impact claims and thus profitability of insurers across multiple lines of business (eg property, energy and financial lines).

"We are already seeing the impacts of climate change on acute weather events: increase in frequency of stronger typhoons affecting Japan, increased land area burned by wildfire. These individual events have been attributed to climate change. This should continue over the short–medium term."

"Upstream energy assets will be impacted by extreme weather events over short to medium term. For example increase in hurricanes in Gulf of Mexico. Increase in temperature or sea level less likely to influence claims in short to medium term as assets are typical[ly] over engineered with margin built in for increase in sea levels for example."

"The impact depends on political decisions which are mostly short-term oriented. Extreme weather events will most likely put pressure on legislators to raise environmental standards shortly."

"With regard to Financial Lines business, premiums will follow claims which follow new regulations by the legislative. As long as there are no stricter environmental requirements in place it is unlikely that we will see an increase in claims activity and as a result a further increase in premiums."

Transition risk relates to the risk of incurring a financial loss (or gain) as a consequence of transitioning to a lower carbon economy. Transition risks are becoming more prevalent due to an increase in governments providing subsidy for low carbon industries (and taxing more carbon-intensive industries).[90] As a result, more and more companies and industries have started shifting away from carbon-intensive energy sources and industrial processes. This also presents opportunities to enhance competitiveness and growth.

The main root causes/key drivers for claims are:

- government policy responses – increased 'green' investment in infrastructure spending, stricter building regulations, use of electric vehicles, etc
- customer/consumer operational policy responses – 'work from home' practices, changes to business travel policies for employees, improvements in operational resilience covering business continuity, etc
- organisation underwriting policy responses – current and planned changes to underwriting strategy in respect of risk appetite and NZU policies, etc.

The main root causes/key drivers for premiums are:

- shifts in consumer demand to 'greener' products and services – electric cars, housing, solar panels, dietary changes, etc
- technology shifts to the use of greener assets – renewables, greener buildings, electric/hydrogen vehicles, fuel substitutes, etc
- new climate-related insurance products and opportunities – parametric insurance solutions, niche wildfire insurance coverages, development of hydroponics, battery storage for electric vehicles, anaerobic digestion plants, etc.

For government and customer type risk drivers, the responses received from the case study participants were varied, covering both a negative and positive impact on claims. Similarly, technology shifts and new products were seen to have both negative and positive impacts on premiums.

> **"Government policy will encourage more renewable risks for example but new technology can negatively impact claims. Underwriting policy responses should positively impact claims."**

> **"Government policy responses will have an impact; however perhaps not at the short time scale used here (1–5 years). The Thames Barrier, for example, took 8 years to build and even longer to plan."**

> **"Change in customer demand for oil and gas could increase premiums as fewer carriers and more volatile underwriting results with few insureds. Technology shifts should generate new risks and premium growth."**

> **"Climate ready insurance products do not guarantee premium growth; the underlying assets being insured will be the same, but the risk and price will be packaged slightly differently."**

Liability risk stems from the potential for litigation if companies (or Boards of companies) do not adequately consider or respond to the impacts of climate change. This may include the potential breach of directors' duties.

The main root causes/key drivers for claims are:

- legal action relating to latent climate-related claims on historical policies such as under insurance contracts
- legal action relating to future actions initiated by claimants who have suffered loss and damage relating to climate change.

The main root cause/key driver for premiums is:

- breach of directors' duties – changes in premiums due to rate increases.

Most liability risk drivers were seen to negatively impact claims and thus profitability of insurers, particularly on financial lines.

> **"Claims are inevitably going to increase, but the significance of these cases will be dependent on the legal precedent set going forward (on a local, national and international level) e.g. State of New York v. Exxon Mobil Corp."**

Strengths, challenges and next steps

The tool has been used as part of a pilot study, which has meant that some useful feedback has been received from the participants. The feedback highlighted strengths of the tool and also some limitations, which will be addressed in future iterations.

Highlighted below are some of the key strengths along with the next steps that are being considered.

Strengths

The tool has been easy to roll out, with responses across a range of questions being received quickly.

The questions in the tool can be easily adapted to meet specific requirements. The tool can also be easily adapted to include additional functionalities in the future.

The tool can be used to raise awareness of climate change across an organisation as multiple responses can be obtained (both strategically and at a business unit level) from the same organisation. The outputs of this tool can help to improve internal underwriting processes and aid future decision-making.

The tool also helps to differentiate the short-term and long-term impacts of climate change and acts as an early warning system by picking up emerging climate trends.

The tool captures all major root causes and key drivers across physical, transition and liability risks.

The tool considers the impact on premiums and claims separately, as they are driven by different root causes.

The case study has proven to be helpful as a basis to undertake an industry benchmarking exercise to ascertain best practices across insurers.

Challenges and next steps

The tool, in its current state, addresses a wide range of questions that need to be answered by a variety of stakeholders. This could be time-consuming, and, in some instances, responses could be contradictory.

It has been indicated that the benefits of using the tool were unclear to some participants. The results can be improved by splitting the questionnaire into two parts. The first part focuses on understanding the strategic direction of the business in relation to climate change. The second part of the questionnaire should then be focusing purely on the impacts of climate change across individual lines of business. This will ensure that the questions are aligned to the knowledge of the individuals answering the questions, thus providing a basis to obtain more comprehensive and relevant responses.

Four insurance companies participated in the study. This was a very limited sample size and the results would have been more robust had more participants been involved.

There were also difficulties getting the tool to the appropriate stakeholders in the organisations that participated in the study, particularly as there was a limited timeframe for responses.

Through discussions with both ClimateWise and the participants, there is an opportunity to develop the tool to support a common market approach in terms of best practice. Milliman and ORC will be happy to support any future development in this.

Reliances and limitations

This report is a draft and is therefore subject to change. No actions should be taken directly based upon this report.

The results in this report are based on an assessment of the responses received from the individual participants of the case study. The information presented is supported by our understanding and knowledge of climate change practices within the industry, which has been obtained through our involvement in various consulting projects and review of publicly available literature. The report does not represent a specific recommendation for the manner in which any firm should seek to achieve the practices mentioned.

This draft report is for ClimateWise's internal use as a case study to support the public report that will be published for COP26. The report should be read in its entirety and no parts should be extracted and presented elsewhere without clear reference to the whole report, including this case study.

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About the University of Cambridge Institute for Sustainability Leadership

The University of Cambridge Institute for Sustainability Leadership (CISL) brings together business, government and academia to find solutions to critical sustainability challenges.

Capitalising on the world-class, multidisciplinary strengths of the University of Cambridge, we deepen leaders' insight and understanding through our executive programmes; build deep, strategic engagement with leadership companies; and create opportunities for collaborative enquiry and action through our leadership groups.

Over the past 30 years we have built up a leadership network of over 9,000 senior leaders and practitioners from business, government and civil society, who have an impact in every sector and on every continent. Their experience and insights shape our work, which is further underpinned by multidisciplinary academic research.

HRH The Prince of Wales is the Royal Founding Patron of CISL and has inspired and supported many of our initiatives.

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