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Climate-Related Disclosures and Risk Management – Standards and Leading Practices

Climate Risk Task Force

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Climate-Related Disclosures and Risk Management – Standards and Leading Practices

This paper was prepared by the Climate Risk Task Force of the International Actuarial Association (IAA).

The IAA is the worldwide association of professional actuarial associations, with several special interest sections and working groups for individual actuaries. The IAA exists to encourage the development of a global profession, acknowledged as technically competent and professionally reliable, which will ensure that the public interest is served.

The role of the Climate Risk Task Force is to deliver on the Statement of Intent for IAA Activities on Climate-Related Risks (SOI) as adopted by Council on 7 May 2020.

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This paper was written during the period when the Sixth Assessment Report (AR6) produced by the Intergovernmental Panel on Climate Change (IPCC) was released. AR6 adds to AR5 and updates it. The reader is advised to consult AR6 for updated information.

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Executive Summary

Climate-related disclosures by companies aim to provide relevant information to financial markets, investors, and a range of other stakeholders (such as clients, business partners, policymakers, supervisors, employees, and society) about the potential impacts of climate change on a company, as well as the consequences of the company's activities and products on the planet's climate. Such disclosures help promote transparency around climate-related risks and opportunities and, if based on similar principles, contribute to comparability amongst companies. They are also instrumental in assessing a company's environmental claims and fighting greenwashing.

Multiple standards and requirements for sustainability- and climate-related disclosures are being developed around the world. One of the most influential is the Taskforce for Climate-related Financial Disclosures (TCFD), which recommends climate reporting structured along four main pillars (governance, strategy, risk management, and target & metrics). The TCFD framework is supported by over 3'100 institutions globally, and a growing number of countries have either advised or mandated its adoption over the next few years.

In addition to TCFD, other influential initiatives notably include net-zero pledges to decarbonize financial activities, sustainable finance taxonomies providing a reference framework for classifying economic activities compatible with climate objectives, and science-based labels for eco-friendly saving products. The integration of climate and sustainability considerations alongside classical financial information is also in scope of the IFRS Foundation with its newly created International Sustainability Standards Board (ISSB).

TCFD and other global initiatives play a key role in driving evolving standards for climate and sustainability disclosures, but they tend to be adopted by firms and institutions only on a voluntary basis. Therefore, a growing number of jurisdictions have gone further and adopted specific regulations requiring mandatory climate-related disclosures for companies and financial products.

Most disclosure standards notably require companies to provide detailed information on how they assess and manage climate-related risk. This contributes in turn to the integration of climate considerations into the governance, strategy and Enterprise Risk Management (ERM) framework of companies, a developing area which this paper also touches on.

It is hoped this paper will assist actuaries (and others) to understand the principles and leading practices for preparing climate-related disclosures, and how they can be used to inform risk management processes in relation to the impacts of climate change. Using their specific skills and their professional judgment, actuaries will help companies, investors, policymakers, and society to better understand the risks involved and meet the disclosure standards and reporting requirements.

While climate-related disclosures should reflect a company's own business and regulatory environment, it is also hoped that in due course the various frameworks will become sufficiently standardised to facilitate comparisons across firms, industries, and countries.

Just as importantly, companies will be able to leverage these disclosures to structure their climate strategy and governance, demonstrate their resilience to climate-related risk, and communicate in a transparent way how they contribute to building a more sustainable world.

Introduction

As evidence of the devastating and irreversible effects of climate change accumulates year after year, countries around the world have embarked on a journey to manage climate crises and understand their effects, decarbonize their economies, and adopt more sustainable policies. The financial system, which provides capital, credit, liquidity, and insurance to the real economy, is set to play a key role in this transformation and actuaries have the potential to play an important part in the process.

Areas such as asset liability management, market-consistent valuation or risk-based solvency assessments were developed in response to the risk management challenges of recent decades. They featured significant input from actuaries, and they have gradually become central parts of actuarial work, in addition to more traditional functions such as pricing and reserving. Similarly, tasks like carbon measurement, which are currently alien to most actuaries, are set to become increasingly relevant to their work. The actuarial profession has evolved over time to tackle many new risk management challenges, and the management of climate-related risk and opportunities is one more step in that process.

Actuaries already have extensive responsibilities in the reporting of financial results and risks through things like financial condition reports and own risk & solvency assessments. In the future, they will also play a significant role in climate-related risk reporting, which is itself set to become increasingly integrated in traditional financial disclosures. To do that effectively, actuaries will need to become literate in new areas as discussed in this paper, such as measuring scopes of emissions, modelling the impact of climate change on a company's financial position and performance (including but not limited to natural catastrophes and financial assets)[1], or understanding new taxonomy regulations and sustainability-related standards. They will also increasingly need to engage with other professional disciplines (such as engineers or hydrologists, for instance).

Enterprise Risk Management (ERM) frameworks will need to evolve accordingly to include climate risk. New metrics and measurement methods will be developed to measure climate-related risk and inform companies' key risk and performance indicators. As a profession leading in numerical and financial literacy, actuaries have a key role to play in this. For example, stress testing and scenario analysis are important tools to explore and understand the impacts of climate change, and they will feature prominently in climate-related risk management work performed by actuaries.

Climate-related measurements incorporate emerging risks associated with significant uncertainties, and they cannot be performed solely based on a statistical analysis of historical data, or on the observation of current market prices. They require actuaries to integrate forward-looking considerations, professional judgment, and an allowance for model risk. Although this poses new challenges, it is in principle a continuation of the role of actuaries in measuring, managing, and reporting risks. In addition to continuous education in the area of climate and sustainability risks, actuaries will need to collaborate closely with other scientists and experts in the course of fulfilling their risk and reporting duties in relation to climate change.

This paper follows four earlier publications from the IAA Climate Risk Task Force and a joint publication by the IAA and the Working Group I of the Intergovernmental Panel on Climate Change. It focusses primarily on climate-related disclosures and how climate-related risk can be integrated into Enterprise Risk Management (ERM) practices. Readers are advised to refer to earlier IAA publications which provide useful foundations:

- Paper 1: Importance of Climate-Related Risks for Actuaries[2];
- Paper 2: Introduction to Climate-Related Scenarios[3];

- Paper 3: Climate-Related Scenarios Applied to Insurers and Other Financial Institutions[4];
- Paper 4: Application of Climate-Related Risk Scenarios to Asset Portfolios[5]; and
- Climate Science: A Summary for Actuaries; What the IPCC Climate Change Report 2021 Means for the Actuarial Profession[6]

The current paper does not cover the scientific basis of climate change. It is assumed that basic scientific information, such as the climate-related effects of various scenarios related to greenhouse gas (GHG) emissions, is known or available from sources such as the Intergovernmental Panel on Climate Change (IPCC). It is also assumed that, in countries in which a company operates, key policies impacting transition risk can be identified.

This paper covers a wide range of potential users of disclosures in different countries around the world, but the primary focus is on financial services and in particular on insurance. Individual users may wish to only consider the practices and requirements relevant to their specific circumstances and purposes.

The paper was principally written during the first quarter of 2022. The climate-related disclosure requirements and risk management standards are evolving rapidly. Readers should anticipate that some of the examples used here will be superseded by others over time. Illustrations in this paper are thus focused on the conceptual framework using available examples at the time of writing. Changes in practice may mean that the details of which may not be appropriate for future applications.

This paper is organized into five main sections:

- Section 1 presents an analysis of the TCFD requirements;
- Section 2 provides a summary of the other main international standards and initiatives which are involved in climate-related disclosures;
- Section 3 gives an overview of the expectations around climate-related disclosures from selected regulators and supervisors around the world;
- Section 4 introduces the integration of climate-related risk into existing ERM frameworks; and
- Section 5 reviews a selection of examples for leading practices on climate-related disclosures, spanning a variety of companies and geographies.

Accompanying this paper is a separate glossary[7] of terms used. The IAA will update this glossary as further papers on climate-related risks are developed.

1. Taskforce Climate-Related Financial Disclosures (TCFD)

1.1 Introduction to TCFD

In 2015 the G20's Financial Stability Board[8] formed the Taskforce for Climate-Related Financial Disclosures (the TCFD) based on the observation that companies were not recognising or disclosing a significant amount of risk that was contained in their balance sheets in respect of climate-related risks. In 2017 the Taskforce produced their recommendation report[9],setting out eleven recommended disclosures under four main pillars:

Table 1: Recommendations and Supporting Recommended Disclosures

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

Source: Figure 4 from Final Report Recommendations for the Taskforce on Climate-related Financial Disclosures.

These recommendations have remained unchanged since their original publication and have become the most common basis for climate-related financial disclosures worldwide.

The recommendations have an emphasis on opportunities as well as risks to balance out reporting. Where there is risk for an organisation and the potential for change, there will be opportunities for businesses to profit if they are well prepared and have the appropriate foresight.

The TCFD has continued its work publishing further guidance to the original recommendations in areas such as scenario analysis, risk management and metrics and targets. Annual reviews are published. The most recent annual review was published in October 2021[10]. At the same time the TCFD published revised guidance for certain sectors of the economy, replacing the original Annex published in 2017[11].

In addition, further guidance was published on Metric and Targets describing recent developments in climate related metrics and the increasing focus on the transition to a low carbon economy[12].

1.2 Who has Adopted TCFD?

Many countries have announced TCFD aligned reporting requirements. These jurisdictions include Brazil, the European Union, Hong Kong, Japan, the United Kingdom, Switzerland, New Zealand, Singapore, the Republic of China (Chinese Taipei) and South Korea.

More than 3,100 companies worldwide have endorsed the TCFD recommendations since their publication in 2017[13]. Support for the recommendations has been growing year on year with over 1,000 organisations expressing support between the 2020 and 2021 reports. Supporting organisations cover USD27 trillion in market capitalisation and USD194 trillion in financial company assets.

The TCFD Status Report for 2021[14] noted that the insurance sector significantly increased its average level of disclosure between 2019 and 2020 and is leading the way in terms of risk management processes.

1.3 Breakdown of TCFD Pillars and Recommendations

This section gives detail of the recommendations within each pillar of the TCFD recommendations. It also discusses the additional guidance that has been provided by the TCFD. There is additional guidance for all companies looking to disclose under the TCFD recommendations and guidance specifically targeted at different sectors such as banking, insurance companies, asset managers and asset owners. Asset owners include entities such as pension plans, insurance and reinsurance companies with significant investment portfolios, endowments and foundations who invest their assets either for their own behalf or on behalf of beneficiaries.

1.3.1. Governance

The governance recommendations cover board level and management level oversight and management of climate related risks and opportunities.

Board level recommendations and guidance focus on how the board is informed about the risks and opportunities, where responsibility sits, the frequency and content of reporting of climate risks and the monitoring of goals and targets.

In respect of management the guidance suggests providing details of where responsibility for climate related issues sits and the reporting lines for those responsibilities and details of how management monitors climate related issues.

The TCFD Governance pillar is silent on specific guidance for sub-sectors.

1.3.2. Strategy

The second pillar of the TCFD recommendations is Strategy.

The recommendations focus on:

- Identifying the risks and opportunities of climate related issues;
- Assessing the impact of those risks and opportunities on business, strategy, and financial planning; and
- The resilience of the organisation to different future climate scenarios.

The second recommendation includes disclosing the expected financial impacts on the company as well as key information on its plans for transitioning to a low-carbon economy (transition plans). The third recommendation includes providing details of the impact of a scenario with global warming of 2°C or lower above pre-industrial averages.

The 2021 TCFD Status Report notes assessing the impact of climate related risks and opportunities under different scenarios is an area with the lowest level of disclosure. It is an area where companies have experienced the greatest challenges in deciding what and how to present the disclosures. Translating scientific climate scenarios into real world impacts on a company's business has proven to be a difficult task. Each company will have specific assets, business processes and a customer profile that are exposed to climate-related risks and opportunities in different ways. Each company will need to consider its own unique set of circumstances to understand the impacts of climate change and to be able to present an appropriate set of disclosures.

To date a lot of guidance has been developed and published on how to develop appropriate scenarios. It is also the area where actuaries are suitably qualified to provide significant input, particularly as the scenarios are likely to consider the long-term future projections involving a high level of uncertainty. Examples of guidance include the TCFD's guidance on The Use of Scenario Analysis in Disclosure of Climate-Related Risks and Opportunities[15] and Guidance on Scenario Analysis for Non-Financial Companies[16] as well as the third paper from this series of papers on climate issues from the International Actuarial Association.

As well as the level of warming assumed in each scenario the company will need to consider the timeframes over which the level of warming is considered. For example, different scenarios may result in 2°C warming but may follow different paths. Firstly, where mitigation actions and adaptation measures start early and are consistent across the timeframe of the projection, a so-called orderly transition. Alternatively, a 2°C scenario may assume that mitigation activities only occur later within the scenario, a disorderly transition. Each example may achieve the same level of warming but the different paths to the outcome may result in significantly different impacts on society, the economy, and the company.

Companies should consider how their own actions will impact the future outcomes of the company. This section may also include information about areas where a company may be considering, or need to consider, changes to their business model driven by changes in climate-related risks. This could include changes to the business model to take advantage of opportunities arising from climate change.

Scenario analysis is an area where there is potential for significant variation in the presentation of the disclosures which will impact the comparability of the disclosures between entities. Regulators and standard setters are aware of this issue. It is possible that in the short term there will not be a great deal of comparability of disclosures. However, over time regulators and other stakeholders may develop further guidance to make the disclosures more comparable. This has been done for instance in Australia, with the publication of a framework of standardized assumptions for physical risk events (the Climate Measurement Standards Initiative, or CMSI[17]) developed through an industry-led collaboration between insurers, banks, scientists, regulators, reporting standard professionals, service providers and supporting parties.

The Annex to the TCFD recommendations provides further guidance for both financial and non-financial industries for the preparation of strategy disclosures.

For insurance companies the supplemental guidance suggests providing information on their core businesses, products and services at business division, sector, and geographic levels. It also suggests commenting on how the potential impacts influence client or broker selection, as well as on areas where products or competencies are under development such as insurance of green infrastructure, specialty climate-related risk advisory services and climate-related client engagement. For insurance companies with significant exposure to weather-related perils, whether that is through the products it sells or through assets it holds, the guidance suggests that the company should consider disclosing a scenario assuming greater than 2°C of warming to show the impact of increasing climate-related risk.

For asset managers and asset owners the supplemental guidance for this pillar recommends describing how climate-related risks and opportunities are factored into relevant investment strategies, how each product or investment strategy might be affected by the transition to a low-carbon economy, and how climate-related scenarios are used to inform investments in specific assets.

For banks the supplemental guidance recommends describing significant concentrations of credit exposure to carbon-related assets.

1.3.3. Risk Management

The risk management pillar focusses on how an organisation identifies, assesses, and manages climate-related risks. This activity is likely to require a cross disciplinary group to identify risks from across a company and then identify actions to manage the risks.

The recommendations include:

- Describing the organisations processes for identifying climate-related risks;
- Describing processes for managing those risks; and
- Explaining how those processes are integrated into an organisation’s overall risk management.

The guidance highlights the need to consider the significance of climate-related risks compared to other risks within the organisation when identifying climate-related risks. In describing how to manage climate-related risks it is suggested that the organisation includes details of how they make decisions to mitigate, transfer, accept or control the risks and how those risks are prioritised against other risks within the organisation.

Actuaries will be able to advise on the development of physical climate-related risks over time and assist in identifying processes to manage those risks as they arise.

Supplemental guidance is provided for financial sector organisations in respect of this pillar. For insurance companies that guidance suggests providing information on reinsurance as well as insurance risks and providing information based on geography, business division or product segment. Risks include the physical risks from changing frequency and intensity of weather-related perils. Transition risks are also explicitly mentioned relating to the changes in the value of insurable interests, changes in energy costs or enactment of carbon regulation. Litigation risks are mentioned as well. Insurance companies are also likely to have specific tools to manage climate-related risks. Companies are encouraged to describe the nature of these tools along with the range of climate-related events considered. Actuaries will be well placed to describe the processes and expected outcomes in managing underwriting and asset risks in insurance companies and interpreting how these risks may develop over time. This includes considering outcomes under specific scenarios.

Supplemental guidance for asset owners and asset managers recommends describing engagement activity with investee companies to encourage better climate-related disclosure and risk practices. It also suggests describing how material climate-related risks are identified, assessed, and managed for each product or investment strategy, as well as the positioning of the total portfolio with respect to the transition to a low-carbon energy supply, production, and use.

Specific guidance is also provided for banks. The guidance encourages banks to consider their climate related risks in the context of traditional risk categories such as credit risk, market risk, liquidity risk and operational risk. Where banks are exposed to long term physical risks, for example in mortgage portfolios, actuaries will be able to bring their insurance modelling skills to shed light on the long-term development of the risks.

1.3.4. Metrics & Targets

The Metrics and Targets pillar focusses on the metrics used to assess and manage relevant climate-related risks and opportunities in line with the strategy and risk management processes. Recommendations include disclosure of Scope 1, Scope 2 and if appropriate Scope 3 greenhouse gas (GHG) emissions (see the Glossary for the definitions and 2.2 on Net zero initiatives for more information on Scopes). It is recommended that emissions are calculated in line with the GHG Protocol methodology. Further details of the GHG Protocol are given below in section 2.2.

The 2021 updates to the guidance removed the materiality condition on Scope 1 and 2 emissions. Scope 3 emissions will still be subject to materiality. Scope 3 emissions, which include investments and (on an optional basis) insurance contracts, are often harder to assess consistently as they rely on data sources external to the company.

The final recommendation within the Metrics and Targets pillar is to describe targets to manage climate-related risks and opportunities. Targets can include GHG emissions, water usage, energy usage as well as other measures. It is suggested organisations should include whether the target is absolute or relative, timeframes over which the target applies, a base year for measurement and any key performance indicators to assess progress against targets over time. Targets are often long term in nature. Actuaries can assist in developing targets by assessing the long-term impact of actions needed to achieve the target.

In 2021 the Taskforce published Guidance on Metrics, Targets and Transition Plan[18]. This document provides more guidance around characteristics of effective climate-related metrics, effective climate-related targets, and effective transition plans.

Additional guidance is provided for both financial and non-financial organisations.

For insurance companies the supplemental guidance suggests insurance companies should provide aggregated risk exposures to weather related catastrophes of their property business by relevant jurisdiction. It is also recommended that insurance companies describe the extent to which their underwriting activities are aligned to a well-below 2°C scenario. Finally, it is suggested to disclose the weighted average carbon intensity or GHG emissions associated with commercial property and specialty lines of business. Many of the metrics being produced will be informed by the actuarial function at insurance companies. Actuaries will be able to assist in the measurement and target setting around these metrics.

Supplementary guidance for asset owners and asset managers recommends describing the metrics used in each fund or investment strategy, investment decisions and monitoring, and the extent to which assets, funds and investment strategies are aligned with a well below 2°C scenario (also indicating which asset classes are included). Emissions should be calculated in line with the Global GHG Accounting and Reporting Standard for the Financial Industry developed by the Partnership for Carbon Accounting Financials (PCAF[19]) or a comparable methodology.

Following the 2021United Nations Climate Change Conference in Glasgow (COP26) and the increasing awareness of carbon reduction initiatives an increasing number of companies are setting net zero targets for their business, see section 2.2 below for more detail. These net zero targets will be disclosed within this section of the TCFD disclosures along with interim targets and progress towards achieving the medium- and long-term targets.

2. Other Main Climate-Related Disclosure Initiatives

Many initiatives have been developed over the last ten years on climate- and sustainability-related disclosures after the introduction of the Principles for Sustainable Insurance by the United Nations in 2012. Since the introduction of the TCFD recommendations in 2017, the new disclosure requirements usually build upon the TCFD guidance and its four pillars. Some frameworks cover climate issues as part of larger sustainability-related disclosures. The next sections present an overview of some key international disclosure requirements.

2.1 UN Principles for Sustainable Insurance (PSI)

The Principles for Sustainable Insurance (PSI) were introduced by the United Nations Environment Programme Finance Initiative (UNEP FI) during the United Nations Conference on Sustainable Development (also known as the Rio+20 Summit) in 2012. Initially, 26 insurance and reinsurance companies signed the PSI. As of March 2022, the PSI have around 120 signatories.

Each signatory commits to four overarching principles to promote sustainable insurance activities:

- Principle 1: To embed in their decision-making environmental, social and governance issues relevant to their insurance business;
- Principle 2: To work together with clients and business partners to raise awareness of environmental, social and governance issues, manage risk and develop solutions;
- Principle 3: To work together with governments, regulators, and other key stakeholders to promote widespread action across society on environmental, social and governance issues; and

- Principle 4: To demonstrate accountability and transparency in regularly disclosing publicly their progress in implementing the Principles.

Principles are however not legally binding. For each Principle, several possible actions are proposed, however each signatory might choose its own actions to reflect its own interpretation.

Signatories should disclose annually their progress in implementing the Principles, but PSI does not impose a specific format for this disclosure. Some companies have replaced the PSI disclosures requested by Principle 4 with a global sustainability report to limit redundancies with other frameworks. Some examples include AXA, Generali and Zurich.

2.2 Net Zero Initiatives

Carbon neutrality means purchasing carbon reduction credits equivalent to emissions released. It does not feature an explicit requirement for emissions reduction to have taken place, nor does it always include greenhouse gases other than CO_2. The net zero concept goes further as it requires reducing emissions as much as possible and balancing the residual emissions through carbon removal credits. Net zero also considers greenhouse gas emissions overall[20] and is a target for all emissions in an organisation's value chain.

Greenhouse gas (GHG) emissions, also known as carbon emissions and often reported as CO_2e (CO_2 equivalent[21]) are categorised into three groups or 'Scopes' by the most widely used international accounting tool, the GHG Protocol:

- **Scope 1** – direct emissions from company-owned and company-controlled resources. In other words, emissions released to the atmosphere as a direct result of a set of activities, at a firm level;
- **Scope 2** – indirect emissions from the generation of purchased energy from a utility provider. In other words, all greenhouse gas emissions released in the atmosphere from the consumption of purchased electricity, steam, heat, and cooling; and
- **Scope 3** – a consequence of the activities of a company but occurring from sources not owned or controlled by the company. Some examples of Scope 3 activities are extraction and production of purchased materials, transportation of purchased fuels and use of sold products and services, financing, investments, and insurance of emissions-intensive activity.

'Net zero' is achieved when the amount of carbon being emitted is cancelled out by the amount that is removed. This means reducing existing emissions as much as possible as well as actively removing greenhouse gases from the atmosphere. This can be done through what are known as carbon sinks, i.e., things that absorb more carbon from the atmosphere than they release (like oceans, forests, and soil such as peatland and permafrost) or through Carbon Capture and Storage (known as CCS).

Carbon offsets are what provide the 'net' in net zero to match whatever emissions cannot be reduced in other ways. Businesses, governments, or individuals pay someone else to either reduce their emissions or to permanently remove greenhouse gases from the atmosphere. Once an organisation's emissions are reduced as far as possible and its remaining emissions are removed from the atmosphere, then the organization is said to have achieved net zero.

For financial institutions and investors, emissions from financing, insurance, and investments (included in Scope 3) will generally outweigh emissions from the firm's own operations (Scope 1 and 2). For the financial sector, net zero targets that exclude Scope 3 will have little real-world impact or credibility. Even within Scope 3, decisions on what assets and sources of emissions to account for need to be carefully considered, as material exclusions from reporting could be considered greenwashing[22].

Calculating Scope 3 emissions is complex and presents difficulties. However, understanding the upstream and downstream climate impacts and opportunities for a company or an investment is essential to understanding climate-related investment risks and opportunities. One issue is double counting of emissions, which can occur where, within a single portfolio with allocations to assets across the market, there are holdings for multiple companies in the same supply chain. Multiple counting for the emissions of the same company can also occur when a company uses multiple forms of financing (e.g., equity and debt) and insurance.

A focus solely on a company's own current carbon emissions can drive particular behaviours. For example, public companies or investors may be tempted to sell their highest emitting assets, reducing their own emissions while at the same time having no impact at all on global emission levels as the assets they have sold are acquired by other players in the financial system (such as private equity or hedge funds). Forward-looking metrics can help identify investments that may not be low carbon today but where companies are taking action to decarbonise and have credible commitments, targets and plans in place. Metrics and methodologies are still developing and expected to standardise over time, with some areas better developed than others. Reinsurance metrics for example are less developed although organisations and firms are collaborating to develop suitable approaches.[23]

The year 2021 saw the launch of a multitude of world-wide net zero initiatives. The global Race to Zero[24] campaign aims to mobilise actors outside of national governments to join the Climate Ambition Alliance[25] to accelerate the necessary transformation to reach the goals of the Paris Agreement and stabilise the global temperature rise at 1.5°C. The campaign focusses on rallying support from cities, regions, businesses, investors, and higher education institutions.

In the lead up to the COP26[26] climate conference in 2021, the Glasgow Financial Alliance for Net Zero (GFANZ[27]), backed by Race to Zero, developed a global coalition of leading financial institutions committed to accelerating the decarbonisation of the economy. The net zero initiatives include:

- Net-Zero Banking Alliance (NZBA[28])
- Net Zero Asset Managers initiative (NZAM[29])
- Net-Zero Asset Owner Alliance (NZAOA[30])
- Paris Aligned Investment Initiative (PAII[31])
- Net-Zero Insurance Alliance (NZIA[32]), which was launched during COP 26
- Net Zero Financial Service Providers Alliance (NZFSPA[33])
- Net Zero Investment Consultants Initiative (NZICI[34])

Each net zero initiative requires organisations to demonstrate and accelerate their commitment to decarbonising the global economy, reporting annually on their activities and the outcomes they have achieved. Key challenges include effectively implementing an organisation's net zero commitment and monitoring their emission reductions against their targets. Many companies' and countries' plans heavily rely on the use of technologies that are still under development and on the future scaling up of things like CCS, as well as on assumptions on carbon sinks that may not be supported by current evidence.

The Partnership for Carbon Accounting Financials (PCAF) has developed data and methodologies that actuaries should find useful to include in developing net zero initiatives. PCAF is a Dutch-based industry-led partnership who aims to facilitate transparency and accountability of the financial industry to the Paris Agreement. It partners with the NZAOA and the NZIA.

2.3 The International Sustainability Standards Board of the IFRS Foundation

As part of the five-year strategy review required by the IFRS Foundation Constitution, the IFRS Foundation Trustees published a Consultation Paper on Sustainability reporting in September 2020 to "*assess the demand for global sustainability reporting standards and for the Foundation involvement*"[35].

The Trustees noted an urgent need to improve the global consistency and comparability in sustainability reporting. The IFRS Foundation's Constitution was revised in November 2021 to create a new standard setting body within the IFRS Foundation, the International Sustainability Standards Board (ISSB). According to the Constitution[36], this new board "*develops IFRS Sustainability Disclosure Standards acknowledging the importance of their interoperability with other reporting initiatives that address broader information needs of other parties*".

The strategic direction of the ISSB will be defined by the following principles as set out by the Trustees:

- Focus on enterprise value: the ISSB should focus on information that is material to investor's decisions, i.e., on sustainability matters that create or erode enterprise value;
- Climate priority: the ISSB should cover sustainability matters globally but must prioritise climate-related reporting in the beginning;
- Build upon existing frameworks such as the TCFD and the standard prototype set out by the five leading standard-setters[37];
- Follow a 'building blocks' approach to provide a globally consistent and comparable sustainability reporting baseline, while also providing flexibility for specific requirements from key jurisdictions, such as the European Union or the United States.

The Trustees also set up two working groups: the Multilateral Working Group (MWG) and the Technical Readiness Working Group (TRWG). The former is expected to gather multiple stakeholders to create an expert consultative committee advising the ISSB, while the latter is focus on providing technical recommendations for consideration by the ISSB.

In November 2021 during the COP26 held in Glasgow the TRWG presented their first two deliverables:

- The General Requirements for Disclosure of Sustainability-related Financial Information (General Requirements Prototype), which sets out the general principles and the framework that an entity must follow when disclosing sustainability matters to investors as part of an entity's general purpose financial reporting, based on the four TCFD pillars (Governance, Strategy, Risk Management, and Metrics and Targets see section 2.3); and

- The Climate-related Disclosures Prototype, which sets out the information that an entity would need to provide for a user to assess each of the four pillars.

The Climate Prototype acknowledges that the exposure to, and the effects of, climate-related risks and opportunities would differ considerably between industries and thus proposes industry-specific reporting metrics on top of a series of cross-industry metrics.

The cross-industry metrics are largely inspired by the previous work performed by the Climate Disclosure Standard Board[38].

For the insurance sector, the industry-specific disclosure topics and the corresponding metrics and targets are presented in the table below:

Table 2: Industry-Specific Disclosure Topics and the Corresponding Metrics and Targets

Disclosure topic	Metric / target
Incorporation of Environment, Social and Governance (ESG) factors in Investment Management	Total invested assets by industry and asset class
	Description of approach to incorporation of ESG factors in investment management processes and strategies
Policies designed to incentivise responsible behaviour	Net premiums written related to energy efficiency and low carbon technology
	Discussion of products and / or features that incentivise […] environmentally responsible actions and / or behaviours
Environmental risk exposure	Probable Maximum Loss of insured products from weather-related natural catastrophes
	Total amount of losses attributable to payments from natural catastrophes
	Description of approach to incorporation of environmental risks into the underwriting process for individual contracts and the management of firm-level risks and capital adequacy

According to the General Requirements Prototype, materiality should be defined in line with IAS 1.7, i.e., information is deemed material if omitting, misstating, or obscuring it could reasonably be expected to influence decisions that the primary users of general-purpose financial reports make based on those elements.

According to the TRWG, an entity's impacts on society, the environment and climate change are material if these elements might impact future cash flows of the company over the short-, medium- or long-term. The TRWG also recognises that materiality is dynamic since an entity's circumstances can change over time. Sustainability- and climate-related information that is not material today might become material at a future reporting date. Therefore, materiality needs to undergo a periodic review.

In March 2022 the ISSB took one step further with the publication of two exposure drafts: IFRS S1 General Requirements for Disclosure of Sustainability-related Financial Information and IFRS S2 Climate-related Disclosures. These drafts are largely inspired on the work of the TRWG. Most of the changes brought by the ISSB focus on enhancing consistency with the IFRS Framework and internationalizing the metrics suggested by the TRWG. The IFRS Foundation has published a summary of main changes brought[39] and a comparison between IFRS S2 Climate-related Disclosures with the TCFD Recommendations[40]. These exposure drafts are open for comments until July 2022 through the IFRS Foundation usual processes.

2.4 Taxonomies of Sustainable Activities

A sustainable finance taxonomy is a classification tool for helping investors and companies to make informed investment decisions based on a reference framework of sustainable economic activities. Taxonomies aim to provide market clarity on what is sustainable in terms of green or social issues. In doing so they also help to fight greenwashing and exaggerated claims from companies and financial product providers.

Green taxonomies may for example establish criteria to assess whether assets or economic activities are ultimately aligned with a specific climate transition pathway (for instance a rise of global temperature well under 2°C, in line with the 2015 Paris Agreement). By comparison, transition or ‘brown’ (harmful) taxonomies are meant to provide criteria and methodologies assessing the transition paths of companies operating in traditionally high-emission sectors. Debates around the classification of transitional activities typically revolve around natural gas (a fossil-fuel energy, but a marginal improvement over coal-generated electricity) and nuclear power plants (in principle mostly carbon-free but producing long-term toxic waste).

Most taxonomies are developed by sovereign states or regional hubs (e.g., EU, ASEAN), with some taxonomies also developed at the initiative of the private sector (e.g., in Canada), of academia (e.g., in Japan) or by non-governmental institutions (e.g., Climate Bonds Initiative). As of March 2022, green taxonomies are already in place in the EU, China, Russia, Malaysia, Mongolia, Bangladesh, as well as through the Climate Bonds Initiative. Several other green taxonomies are in development, notably in Chile, Singapore, South Africa, the ASEAN, the UK, and Mexico. Transition taxonomies are also being considered in the EU, Canada, and Japan[41]. To date no ‘brown’ or harmful taxonomy has been developed yet (although this is being considered by the EU Taxonomy Platform[42]).

The growing number of sustainable finance taxonomies and their differences in use-cases, geographical and sectoral coverage, and eligibility criteria may bring confusion and fragmentation to the market[43]. Harmonisation and standardisation have started, though. For example, in July 2020 the EU and China launched a working group with the aim of developing and publishing a Common Ground Taxonomy. Work started on a UK taxonomy, in June 2021 with the aim to publish in 2022. This UK taxonomy will build on existing international taxonomies, including the EU Taxonomy. As of March 2022, major greenhouse gas emitting countries such as the USA and India have not yet announced any plan to develop or adopt a sustainable finance taxonomy.

Insurers and other financial services companies can be users and subjects of such taxonomies in multiple ways, as can be illustrated with the EU Taxonomy which includes six environmental objectives. (The EU Taxonomy is presented in more detail in section 3.1.1) From 2022, the EU Taxonomy regulation already includes mandatory disclosures for large companies for the first two objectives (climate change adaptation and climate change mitigation) under the Non-Financial Reporting Directive (NFRD), and for financial products providers under the Sustainable Finance Disclosure Regulation (SFDR). Insurers are in scope as large holders of capital and institutional investors (having to report a green asset ratio), as underwriters for non-life and reinsurance for the climate adaptation objective (having to report a green premium ratio), and as life insurers reporting under EU Taxonomy-alignment when selling investment products labelled as green or promoting sustainability.

Actuaries are likely to play a major role in calculating green premium ratios in accordance with sustainable finance taxonomies. They may also be involved in determining green asset ratios for insurers, banks, and asset managers. The actuarial profession is well placed to support the multiple challenges that will arise in such classification work regarding data, methodologies, aggregation and how to apply professional judgment in cases of uncertainty.

2.5 Climate and Sustainability Disclosures for Financial Products

Investors have traditionally focused on four dimensions when investing in a financial product: risk (volatility, default), return, liquidity/availability, and duration. On top of these features, both individual and institutional investors are now gradually considering a financial product’s sustainability, focusing on Environmental (including Climate), Social and Governance dimensions in their investment decisions. Therefore, issuers and distributors increasingly communicate on the sustainability characteristics of the products they sell to cover the growing demand from investors. Some players have however taken advantage of the lack of a clear framework and of buyers' interest for sustainable features to promote investments with limited ESG dimensions as sustainable, which can amount to greenwashing.

Several initiatives have been developed internationally to fight greenwashing by enhancing transparency and consistency on the information available to investors, not only about the positive effects of a financial product but also on any adverse impacts on climate or social matters. These initiatives apply to both issuers and distributors of financial products, as misleading information can lead to reputation and litigation risks. Among these initiatives, the European Union and the United Kingdom are among the most mature and build on their respective sustainable finance taxonomies (see previous section 2.4).

The SFDR (Sustainable Finance Disclosure Regulation) Directive of the European Union has introduced three categories for financial products based on their sustainability assessment. In particular, the European Commission has decided to create two separate categories to distinguish between products that promote a certain level of sustainability and products whose primary objective is to be sustainable.

The SFDR Directive defines a set of mandatory sustainability criteria to be disclosed as part of the pre-contractual information and consistently over time on a regular and timely basis. The SFDR Directive and its integration within the European Green Deal framework is also addressed in section 3.1.1.

Since leaving the European Union in January 2020, the United Kingdom authorities are working on building their own regulatory framework. The Financial Conduct Authority (FCA) issued Discussion Paper DP21/4 in November 2021 on Sustainability Disclosure Requirements and investment labels. While recognising the need for consistency between the UK and EU frameworks to favour cross-border activities and allow the different stakeholders to build on their past efforts, the FCA wants to develop their own sustainability requirements.

The UK product classification would tentatively include five product categories split into two broader groups:

- Three categories of sustainable assets depending on the alignment to the UK taxonomy and the products of the investments; and
- Two categories of assets that are not considered sustainable, including 'responsible' products which might have some sustainable characteristics.

The following table presents the correspondence between the European and UK categories.

Table 3: Correspondence Between the European and UK Product Categories

UK	European Union SFDR
Not promoted as sustainable	Products that do not consider sustainability factors (Article 6)
Responsible	
Sustainable - transitioning	Products that promote sustainability factors (Article 8)
Sustainable - aligned	Products with sustainable objectives (Article 9)
Sustainable - impact	

2.6 Taskforce for Nature-related Financial Disclosures (TNFD)

Nature and climate are inextricably linked. Biodiversity is affected by climate change (e.g., dying coral reefs) and, through the ecosystem services it supports, biodiversity also makes an important contribution to both climate change mitigation and adaptation (e.g., forests as carbon sinks, mangroves as natural dikes against coastal floods). Biodiversity loss and climate change are both driven by human activities and mutually reinforce each other. Consequently, conserving and sustainably managing biodiversity is critical to addressing climate change and nature-related disclosures deserve a mention in this paper.

The Dutch Central Bank De Nederlandsche Bank (DNB), was the first financial supervisor to highlight biodiversity as a material risk for the financial sector in its landmark publication 'Indebted to Nature'[44] (June 2020). An initiative to establish a Taskforce on Nature-related Financial Disclosure (TNFD) was then announced in July 2020 by a coalition of partners including Global Canopy, UNDP, UNEP Finance Initiative and WWF, supported by financial institutions like AXA, BNP Paribas, DBS Bank, Rabobank, First Rand, Yes Bank, Storebrand, as well as the governments of France, the Netherlands, Switzerland, and the UK.

The TNFD officially launched in June 2021. It aims to provide a framework for organisations to report and act on evolving nature-related risks and to support a shift in global financial flows away from nature-negative outcomes and toward nature-positive outcomes. The TNFD estimates that more than half of the world's economic output is moderately or highly dependent on nature. However, financial institutions and companies currently do not have the information to understand how nature impacts their financial performance (and how their own activities impact nature) or the financial risks that may arise from how their organisation itself impacts nature. Ideally, better information would ultimately allow financial institutions and companies to incorporate nature-related risks and opportunities into their strategy and decision-making processes.

The TNFD will not create a new disclosure standard but build upon the structure and foundation of the TCFD to avoid repetition and maximise the prospects of accelerated market adoption. The aim is for the two frameworks to be comprehensive in their coverage of climate and nature-related financial risks, and complementary in their usability and adoption (although the TNFD is expected to be more complex due to its broader scope). 35 Taskforce Members are working to develop the TNFD Framework and a group of over 100 institutions support the work of the Taskforce as part of the TNFD Forum. The TNFD published a beta version of its framework for consultation in March 2022, with plans to finalise it in 2023[45].

3. Selected National Regulations on Climate-Related Disclosures

TCFD (section 1) and other global initiatives (section 2) play a key role in driving evolving standards for climate and sustainability disclosures. However, so long as they remain purely voluntary, they tend to be mainly adopted by a select group of large financial institutions, including insurance companies. Therefore, a number of countries have gone further and started adopting specific regulations requiring mandatory climate-related disclosures (in several cases aligned or compatible with TCFD). This section aims to provide a (non exhaustive) overview of such national regulations.

3.1 Europe

3.1.1. European Union

The European Union has set a comprehensive framework for climate and sustainability reporting. This framework is driven by three main regulations of the European Parliament on taxonomy, disclosure, and benchmarks.

<u>Taxonomy</u>

The taxonomy regulation[46] "*establishes the criteria for determining whether an economic activity qualifies as environmentally sustainable for the purposes of establishing the degree to which an investment is environmentally sustainable.*" The taxonomy regulation represents a major effort to harmonise the criteria to qualify as green investments across the European Union.

The regulation sets six environmental objectives to assess whether an economic activity is environmentally sustainable:

i. Climate change mitigation;

ii. Climate change adaptation;

iii. The sustainable use and protection of water and marine resources;

iv. The transition to a circular economy;

v. Pollution prevention and control; and

vi. The protection and restoration of biodiversity and ecosystems.

To be considered as sustainable according to the EU taxonomy, economic activities must contribute significantly to at least one of these objectives, do no significant harm to others and respect minimum human rights and labour standards. Compliance on the first two objectives must be disclosed from 2022 onwards. Assessment of the remaining four objectives is planned for 2023.

<u>Disclosure</u>

The disclosure regulation[47] "*lays down harmonised rules for financial market participants and financial advisers on transparency with regard to the integration of sustainability risks and the consideration of adverse sustainability impacts in their processes and the provision of sustainability related information with respect to financial products*"[48].

In particular, insurers and pension fund managers will need to disclose on their websites information about their policies on the integration of sustainability risks in their investment decision-making process (Article 4). They will also need to clearly state as part of their pre-contractual information the way sustainability risks are integrated into their investment decisions and mention whether the financial product include any sustainability features. This regulation also adds specific disclosure requirements for products that are advertised as promoting environmental or sustainable characteristics (Article 8) and products that have sustainable investment as their main objective (Article 9).

These standards are expected to enter into force in January 2023.

Benchmark

The benchmark regulation[49] sets a list of requirements for benchmark administrators, either based in the European Union or offering benchmarks within the Union. This regulation was amended in 2020 to introduce new disclosure requirements relating to the ESG characteristics of the benchmark underlying assets.

Moreover, two climate-related labels have been introduced, to support climate-focused investment strategies through the use of labelled benchmarks:

- the EU Climate Transition Benchmarks (CTB); and
- the EU Paris-Aligned Benchmarks (PAB).

These benchmarks have strict eligibility criteria such as reducing carbon intensity by 30% (EU CTB) or 50% (EU PAB) compared to the investable universe, activity exclusions and a minimum 7% year on year self-decarbonisation. The EU CTB and EU PAB labels are automatically withdrawn if a benchmark does not align with its trajectory for two consecutive years.

Role of Actuaries

The regulations are of particular interest to actuaries as they may be involved in:

- Assessing whether financial products held and commercialised, and in particular assets backing unit linked contracts are environmentally sustainable according to the European taxonomy;
- Providing inputs relating to the principal adverse sustainability impacts of financial products held and commercialised, and in particular assets backing unit-linked contracts; and
- Building and maintaining financial benchmarks.

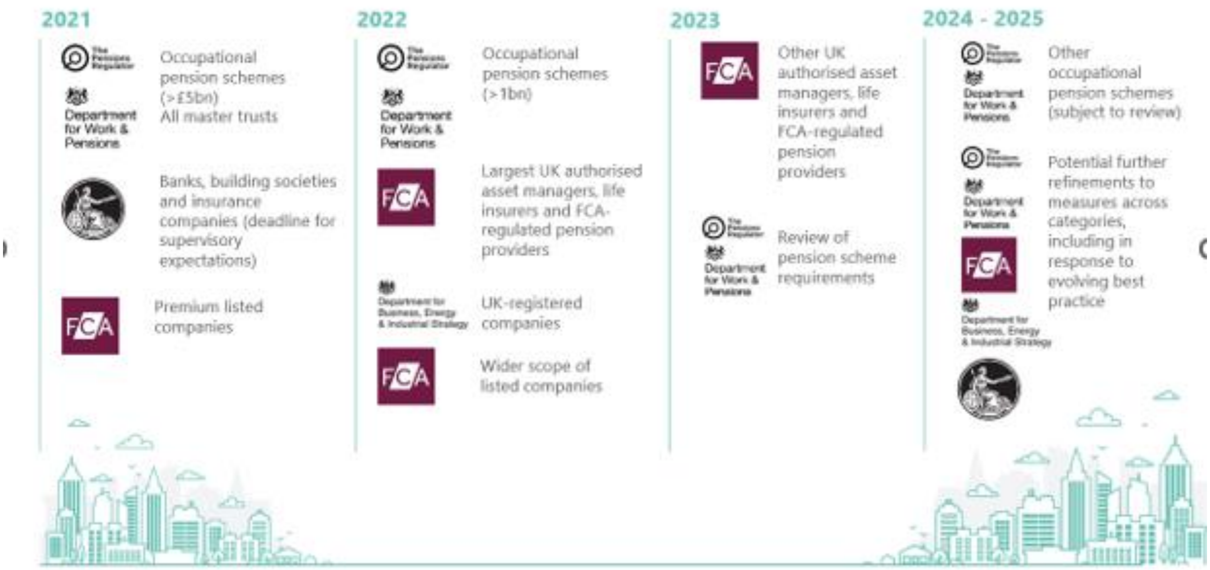
On top of these three main regulations, the revision of Directive 2009/138/EC[50] on Solvency II proposed by the Commission sets new requirements on insurers and reinsurers by introducing climate-related scenarios on their Own Risk Solvency Assessment report (see also section 4.3 for more details). This is another area where actuaries are expected to play a prominent role.

3.1.2. UK

In 2020 the UK government announced mandatory climate governance and reporting requirements across the entire economy, banks[51], asset managers[52], pension schemes[53], insurers[54] and companies. All organizations will need to implement a framework covering the recommendations of the TCFD and then disclose their activities annually, beginning with the largest in 2021/22.

The government’s intention is for all market participants to be reporting by 2024/25. The UK Treasury in 2020 published an indicative path for increasing the coverage of disclosures coordinated across seven categories of organisation: listed commercial companies; UK-registered companies; banks and building societies; insurance companies; asset managers; life insurers and FCA-regulated pension schemes; and occupational pension schemes.

Figure 1: Climate Governance and Disclosure



Source: Interim report of the UK's Joint Government-Regulator TCFD Task Force, Nov 2020

From January 2022, FCA-regulated asset managers and asset owners must disclose how they take climate-related risks and opportunities into account in managing investments. They also must make disclosures about the climate-related attributes of their products.[55] For smaller firms, these rules come into effect from 1 January 2023. The first public disclosures in line with these requirements must be made by 30 June 2023.

Legislation comes into force in April 2022, requiring all UK registered companies with over 500 employees and £500 million in turnover to disclose climate-related financial information. Pension schemes with assets over £1bn are required to describe the extent to which their assets are aligned with the Paris Agreement to scheme members from October 2022. These changes are in addition to the Government proposals that will require, from 2023, financial institutions and listed companies to publish transition plans that consider the Government's net zero commitment, or to provide an explanation if they have not done so.[56]

3.1.3. Switzerland

In May 2021, the Swiss Financial Market Supervisory Authority (FINMA) amended its circulars to include the mandatory disclosure of climate-related financial risks for its largest banks and insurers, based on the TCFD recommendations[57]. The consequences of climate change could pose significant financial risks for financial institutions in the longer term and large Swiss banks and insurance companies are now required to inform the public adequately about their climate-related risks, providing both qualitative and quantitative information.

In November 2021, the Federal Council further recommended that financial market players use comparable and meaningful climate indicators to create transparency in financial products and client portfolios. It specifically highlighted the example of implied temperature indicators to provide a straightforward understanding of how financial products can be classified in terms of their impact on the climate. The Federal Council also instructed the Federal Department of Finance to propose by the end of 2022 how financial market legislation could be amended regarding transparency to avoid greenwashing[58].

In March 2022, the Swiss government (Federal Council) also launched a consultation on mandatory climate reporting by all large Swiss companies, which includes the binding implementation of the TCFD recommendations. This implementation is expected to take place from 2024 for the 2023 financial year[59].

In addition, most large Swiss financial institutions rely on access to the EU market and hence need to comply with EU climate and sustainability regulation (see section 3.1.1). Switzerland is an example of how smaller countries may need to follow regulatory initiatives from their bigger neighbors and financial partners.

3.2 North America

3.2.1. United States of America

The National Association of Insurance Commissioners (NAIC) has asked insurers with more than $500 million worth of premium revenue to produce an annual Insurer Climate Risk Disclosure Survey, analyzing the insurer's financial exposures to climate change and its responses to those risks. TCFD reports may be submitted in lieu of this Survey. However, this request is only mandatory for insurers of a certain size and in States like California, Connecticut, Minnesota, New Mexico, New York, or Washington State. The California Department of Insurance collects and makes publicly available responses to the NAIC Survey[60].

Several further federal and State climate disclosure initiatives are underway in the USA:

- U.S. Securities Exchange Commission (SEC): In March 2022, the SEC Chair announced a proposal for mandatory climate reporting rules for listed companies[61], with similarities to TCFD. The proposal would require companies to disclose a range of information on climate-related risks, as well as their greenhouse gas emissions (Scope 1 and Scope 2, with the need to disclose Scope 3 emissions if they are material). The phase-in period for emission disclosures ranges from 2024 to 2026, and assurance requirements for certain categories are also foreseen.

- Department of the Treasury: In May 2021, President Biden issued an Executive Order on Climate-Related Financial Risks. The Executive Order notably asks the Secretary of the Treasury to present a plan for improving climate-related disclosures.

- New York State Department of Financial Services (NYDFS): In November 2021, NYDFS issued their Guidance for New York Domestic Insurers on Managing the Financial Risks from Climate Change[62], detailing expectations related to insurers' management of the financial risks from climate change. On public disclosure, the Guidance states that all insurers should publicly disclose how climate-related risks are integrated into their corporate governance and risk management, including the processes used to assess whether these risks are considered material.

- State of California: The California Department of Insurance asked in January 2016 all insurance companies doing business in California to voluntarily divest from thermal coal enterprises (such as coal-fired power plants)[63]. It also required insurers with more than $100 million worth of annual premium revenue to publicly disclose their investments in oil, gas, and coal companies held as of 31 December 2015. In April 2021, proposed legislation was introduced[64], which would require California-based business entities with over $500 million in annual revenue to annually disclose their climate-related financial risks in accordance with the TCFD recommendations.

3.2.2. Canada

Multiple levels of the Canadian government have issued reports and commitments in support of clearer and more consistent climate disclosure, which currently remains voluntary for companies and financial institutions.

In October 2021, the Canadian Securities Administrators (CSA) published proposals[65] that would introduce climate-related disclosures for public companies in line with the TCFD standards. The CSA is seeking to mandate that issuers disclose their greenhouse gas (GHG) emissions and the related risks or explain why those disclosures are not needed. Additionally, the proposals call for companies to spell out their governance for overseeing climate-related risks; their strategy for tackling material risks and opportunities created by global warming; their approach to risk management; and the specific metrics and targets used in assessing climate-related risks. The proposed rules are not expected to take effect before the end of 2022.

In April 2022, Canada's federal government released its annual budget which includes a number of measures aimed at achieving a net zero economy, as well as a plan to require federally regulated financial institutions to report on climate-related financial risks[66]. The Office of the Superintendent of Financial Institutions (OSFI) will consult with banks and insurers on developing climate disclosure guidelines that adhere to the TCFD framework, with a goal gradually phase in reporting requirements from 2024.

3.3 Asia/Pacific

3.3.1. People's Republic of China & Hong Kong Special Administrative Region

China adopted multiple regulations in 2021 to support its climate change agenda, both at the national and local government level. Of particular interest for this paper are the Guidelines on Environmental Information Disclosure for Financial Institutions, issued by the People's Bank of China in July 2021[67]. These Guidelines clarify the principles, form and frequency of the reporting, and content elements that financial institutions should follow in the process of preparing climate and environmental disclosures.

The Guidelines on Environmental Information have similarities to TCFD and notably require financial institutions to disclose:

- Environment-related governance structures, policies, and systems;
- Environment-related products and services innovation;
- Environmental risk management processes;
- A quantitative analysis of environmental risks through scenario analysis;
- The impact of environmental factors on the financial institution; and
- The environmental impacts of their investment, financing, and insurance underwriting activities, as well as the impact of their own operations.

In April 2021 the People's Bank of China, the National Development and Reform Commission and the China Securities Regulatory Commission jointly issued a new version of their Green Bond Endorsed Project Catalogue. The new version of this taxonomy:

- Unified and expanded the scope of green bond-endorsed projects:
- Added green projects for carbon dioxide capture, utilisation, and storage; and
- Eliminated the 'clean' utilisation of fossil fuel projects such as coal in the scope of support, to achieve convergence with international standards.

Overall, China has launched three different taxonomy initiatives:

- The Green Bond Endorsed Projects Catalogue;
- The Green Industry Guiding Catalogue, which is mandatory for sustainable financing purposes; and
- The Technical Report on SDG (UN Sustainable Development Goals) Finance Taxonomy, a classification system with impact assessment and reporting criteria for finance and investment activities that can make a substantial contribution to at least one SDG, while avoiding significant harm to the others.

The Chinese central bank has implemented the Green Finance Evaluation Plan for Banking Financial Institutions since July 2021. The scope of the evaluation has been expanded incrementally. In addition to green credit, green bonds have been added, and the evaluation results will be included in prudential management tools such as the rating of financial institutions by the central bank. Many local governments have also issued their own initiatives on green finance.

In Hong Kong, the Monetary Authority issued draft guidance in July 2021 indicating that authorised institutions (i.e., banks, restricted license banks and deposit-taking companies) should make climate-related disclosures aligned with the TCFD recommendations. The Hong Kong Exchange also published guidance to listed issuers on climate-related disclosures in November 2021[68], incorporating certain key recommendations of the TCFD. Hong Kong's Green and Sustainable Finance Cross-Agency Steering Group has announced plans for mandatory TCFD-aligned climate-related disclosures by 2025.

3.3.2. Japan

Japan's Financial Services Agency (JFSA) introduced climate-related disclosures into Japan's Corporate Governance Code in June 2021. The Code is not legally binding, and the disclosures were recommended on a 'comply-or-explain' basis.

Climate-related disclosures will be mandatory for large Japanese companies from April 2022, where companies listed on the Tokyo Stock Exchange Prime Market will be required to comply with mandatory climate-related risk disclosure requirements aligned with the TCFD recommendations. After fiscal year 2023, the JFSA intends to expand the disclosure requirements to cover all companies that submit annual securities reports.

Japan currently has the highest number of supporters for the recommendations released by the TCFD, ahead of the UK and the USA[69]. This is in part linked to the establishment of the Japan TCFD Consortium in May 2019 at the initiative of leaders of the industry and academia. Through a series of dialogues between the financial and non-financial sectors, the Consortium furthers discussion on effective and efficient corporate disclosure of climate-related information and their use by financial institutions[70].

3.3.3. Australia

Various organisations in Australia have released guidance and recommendations on climate related disclosures for specific sections of the economy:

- The Australian Prudential Regulatory Authority (APRA) published a Prudential Practice Guide CPG 229 Climate Change Financial Risks (in November 2021 for banks, insurers, and superannuation trustees to consider their climate change risks[71];

- The Corporate Governance Council of the Australian Stock Exchange released revised Principles and Recommendations in February 2019, which encourage listed companies with exposure to climate change risk to adopt the TCFD framework[72]; and
- The Climate Measurement Standards Initiative (CMSI), a collaboration between climate scientists, insurers, and the finance sector, provides Australian banks, financial institutions, and insurers with technical guidance on how to assess the risk of climate-related damage to buildings and critical infrastructure from extreme weather events.

However, none of the reporting requirements are currently mandatory and none of the main regulatory organisations have announced plans to introduce mandatory reporting. Published guidance often includes a 'comply or explain' principle.

The Actuaries Institute of Australia has also published an Information Note on climate-related risks for Appointed Actuaries preparing Financial Condition Reports[73]. Further detail on this Information Note was included in the third paper in this series, Climate-Related Scenarios Applied to Insurers and Other Financial Institutions.

3.3.4. New Zealand

In September 2020 the Minister for Climate Change announced that the New Zealand government would introduce legislation to require the financial sector to report on climate-related risks. The companies that will be required to disclose are large banks, large insurance companies, investment funds with more than NZD1 billion under management, all listed equity and debt issuers on the New Zealand stock exchange and crown financial institutions with greater than NZD1 billion under management.

Legislation to require the disclosures was passed by the government in October 2021[74]. The New Zealand External Reporting Board (XRB) is charged with designing the disclosure standard which is to be based on the TCFD recommendations. XRB are expecting to publish final disclosure standards in December 2022 with the first disclosures likely to be required for reporting periods starting in or after January 2023[75].

3.4 Commonalities between National Frameworks

When comparing climate disclosure regulations between countries, two overarching themes can be identified:

- The mandate for financial companies to publish climate-related disclosures, aligned or compatible with the TCFD framework; and
- The existence of sustainable finance taxonomies, which provide a common reference framework to classify which economic activities can be considered sustainable.

The following table summarizes how these requirements apply as of March 2022 for the 10 jurisdictions with the highest insurance premiums written worldwide (based on premium data compiled by OECD including reinsurance, listed alphabetically).

Table 4: Summary of Requirements as of March 2022 for 10 Jurisdictions

Jurisdiction	Mandatory TCFD disclosures	Sustainable Taxonomy
Bermuda	No	No
Canada	Recommended only	In discussion
European Union	Yes (TCFD compatible)	Yes
India	No	No
Japan	Yes (2022)	In discussion
People's Republic of China	Recommended only	Yes
Republic of China (Chinese Taipei)	Yes (2023)	No
South Korea	Recommended only	Yes (non-binding)
United Kingdom	Yes (2021-2025)	In development
United States	Proposed	No

4. Climate-Related Risk as Part of Enterprise Risk Management

This section introduces how climate-related risk can be integrated into a financial institution's Enterprise Risk Management (ERM) framework. This is specifically relevant for climate-related disclosures, as most disclosure standards and regulations (notably TCFD) require detailed information on how climate-related risk is assessed and managed. Conversely, financial institutions with strong climate-related risk management may take advantage of public disclosures to showcase their best practices. Please note that a more complete description of climate-related risk management goes beyond the scope of this paper and that we only offer selected considerations here.

4.1 Governance

Enterprise Risk Management (ERM) is the approach whereby large organisations manage all of their risks and opportunities in an integrated, holistic way. It is referred to in the IAIS's Insurance Core Principle 16 (Enterprise Risk Management for Solvency Purposes) which sets out supervisory expectations of how insurers coordinate their risk management, strategic planning and capital management processes. In this context, climate-related risks are conceptually no different from other risks. Physical and transition risks will materialise through traditional risks categories, such as increased insurance risk or the depreciation of asset values.

The integration of climate-related risks into an organisation's general ERM framework generally falls into two broad categories, depending on which department initiated the process within the organization:

- If the work is initiated by the risk management department, it will naturally follow the classical risk management process to identify, assess, control, mitigate and monitor emerging risks, with a corresponding disclosure in the general risk report or Own Risk and Solvency Assessment (ORSA) report; or
- If it is initiated by a dedicated ESG taskforce or committee, the work will generally be organised along a cross functional structure aligned with or inspired by TCFD, with

focus on how the company's governance enables the oversight, assessment and management of climate-related risks and opportunities.

The European Insurance and Occupational Pensions Authority (EIOPA) sets the typical example for managing climate-related risk under a traditional risk framework. EIOPA recommends the integration of emerging ESG and climate-related risks in the existing prudential framework of insurers[76]. This requires insurance companies to consider climate and sustainability risks across all areas: the calibration of the risks; the design, distribution, and prudential treatment of products; and the integration of sustainability risks in their governance and risk management framework. In this approach, the reporting normally follows the ORSA or risk report structure, with specific mention of the strategy and governance structure for climate-related risks.

Alternatively, several companies have launched a dedicated climate-related risk and ESG taskforce structured along the recommendations of the TCFD (i.e., Governance, Strategy, Risk Management, and Metrics & Targets). Some companies even go as far as to establish a specialised ESG committee under the board, in parallel with risk and audit committees. (This special committee may also have as its main goal a target for reaching net zero within a given time horizon.) Typical organisational examples are described in the 2020 guidance document issued by the UK Climate Financial Risk Forum (CFRF)[77].

Both governance models (either through the existing ERM and risk framework, or at the initiative of a dedicated taskforce) are possible and can, in principle, be deployed successfully. However, in practice, confusion or internal conflicts can arise regarding who is responsible for which aspect of climate-related risk, or due to the various internal functions having a different agenda or priorities. To minimize these risks, financial institutions can build a target operating model for climate and ESG risks, with a clear allocation of responsibilities and decision-making.

In the UK, the Financial Conduct Authority (FCA) and the Prudential Regulation Authority (PRA), as an example, require the establishment of an effective governance that ensures understanding, oversight and accountability for financial risks arising from climate change. Governance arrangements should promote a strong understanding of the risks at source and a consistent approach to ensure that climate-related risks are identified, assessed, and accepted at the right levels throughout the organisation.

Based on these considerations, an effective climate-related risk governance may include the following elements (the list is not intended to be exhaustive):

- Effective climate-related risk oversight from the board, including notably:
  - 'Fit and proper' requirements and training to make sure the board understands climate-related risks and is competent to address them;
  - The inclusion of climate-related risks in the company's overall risk appetite;
  - A clear 'tone from the top' and specific climate targets;
  - Variable remuneration rules which include a link to climate objectives;
- Appropriate and detailed allocation of climate-related risk responsibilities for executive management, including a link with variable remuneration;
- Clear roles, responsibilities, and accountability across all three lines of defense,
- Internal controls embedded into all relevant processes covering risk identification, assessment, acceptance or approval, monitoring, and reporting;

- Up-to-date risk framework and policies for the relevant traditional risk types through which climate-related risks materialise; and
- Continuous education and awareness-building to develop climate-related risk understanding at all levels of the organisation.

4.2 Monitoring Climate-Related Risk Exposure and Materiality

Financial institutions, including insurance companies, have three main areas of focus for sustainability and climate-related risk: their investments (own and managed assets); their lending and underwriting activities; and their own operations. Investments and underwriting are the most material aspects compared to own operations, although a company's own ESG practices can also be relevant to their overall reputation.

Investments are generally most exposed to climate transition risks, linked to policy, social and technological changes which can potentially materialise at any moment. For instance, the demand for oil and natural gas may be negatively impacted by new regulatory or market incentives to conserve energy or use alternative energy sources in combating climate change. This in turn would negatively impact the supply chain related to the energy industry. Physical risk channels can also result in asset loss and Asset-Liability Management (ALM) impacts due to climate-related perils, particularly affecting asset classes such a properties and commodities.

Monitoring the exposure and risk materiality for investments may start with a market analysis to identify which assets could be most affected by climate change. To do so, companies may use a scoring system based on internal analysis, on external data and ratings (including using existing taxonomies where appropriate, see section 2.4), or a combination thereof. Financial institutions can also leverage such scores to identify opportunities and set targets on green and sustainable investments (in absolute amounts or as a percentage of total assets).

For underwriting, relevant risk metrics generally include the physical impact on policyholders and on liabilities. They can be assessed, for instance, with the Probable Maximum Loss for different perils and using holistic scenarios and stress-tests results. For climate opportunities, companies can monitor the premiums for green products (in absolute amounts or as a percentage of total premiums), using definitions of sustainable products based on international standards and taxonomies.

Table 5: Example of Risk Measurement Characteristics

Climate Risk Type	Impact	Likelihood	Velocity	Response Maturity
Physical / Transition / Litigation	Expected or scenario-based effects on assets and liabilities	Potential for risk to occur	Speed of impact (short-, medium- or long-term)	Evaluation of controls and response plans to mitigate risk

Not all climate-related risks may be already modeled in a company's risk framework. For example, in Europe Solvency II's Standard Formula does not currently include wildfires. Financial institutions need to estimate how material unmodelled climate risks may be and whether they should be gradually integrated in the modelled risks.

Using adequate data and modelling granularity constitutes a further challenge for climate-related risk exposure and materiality assessments. For physical risks, high-resolution geolocation may be necessary to distinguish between high-risk and safer assets. For transition risks, broad asset classes in existing risk models can be refined into relevant sectors and subsectors. For example, within the energy sector, economic activities can be split between fossil fuels and renewables to allow for a differentiated risk assessment.

Finally, model risk is another area of focus, as climate-related risk often requires assembling various physical and financial models which may operate under different sets of assumptions. The design of such integrated assessment models involves numerous explicit and implicit trade-offs between analytical tractability, accuracy, and model compatibility.

The next two sub-sections offer further considerations inspired by the inclusion of climate-related risk scenarios in ORSA (Own Risk Solvency Assessment) in the EU, and by various regulatory climate stress tests.

4.3 Climate-Related Risk Scenarios in ORSA (EU Directive)

An insurance company's ORSA can be defined as the regular exercise during which the company analyses whether its overall solvency requirements would still be met under several stress scenarios specifically defined and calibrated based on the company own risk profile, exposure, and appetite.

For insurers subject to EU regulation, ORSA is defined by article 45 of the Solvency II Directive[78]. The ORSA forms part of Solvency II Governance 'Second Pillar'. The results of the assessment should be presented to the administrative, management or supervisory body. These results shall also be communicated to the national supervisory authorities. The ORSA supervisory report is thus one of the elements of the regular supervisory reporting.

Since Solvency II came into force in 2016, some insurance companies in the EU have started including some climate scenarios in their ORSA, although there was no specific obligation of doing so. As part of its 2021 review of the Directive, the European Commission has now recommended to companies to include climate scenarios in their solvency assessment[79].

Under the amended Directive, insurance companies with material exposure to climate change risks, both physical and transition, are required to include at least two long term climate-related scenarios in its ORSA based on two global temperature increase trajectories (one below 2°C, and one equal or higher than 2°C).

These changes in the European regulation raise several challenges for insurance companies and to actuaries, as described in the Consultation Paper and guidance[80] published by EIOPA in December 2021.

Materiality: Insurance companies need to assess whether climate change risks are material, i.e., whether their "omission or misstatement could influence the decision-making or judgement of the supervisory authorities"[81]. To do so, insurance companies need to consider possible impacts on both sides of the balance sheet, including capital requirements. Materiality assessment should consider the impact, probability, and time horizon of an adverse situation.

Time horizon: Insurers should assess their exposure to material climate change risks using at least two climate scenarios. The time horizon of these scenarios must be long enough not to underestimate a company's exposure since the consequences of climate change risks might arise later.

Climate change risk factors: Insurers will need to translate each climate scenario into concrete risk factors to measure their risk exposure. For example, for a given climate scenario insurers will need to estimate the frequency and severity of flood episodes to measure their exposure to increasing natural catastrophe risk.

4.4 Regulatory Climate Stress Tests

Regulatory climate stress tests also form part of financial institutions' climate-related risk management toolkit. No company may rely solely on external and irregular stress testing exercises for the inclusion of climate-related risk into their ERM framework, but such exercises serve as important checkpoints and learning exercises. Regulatory climate stress tests help raise awareness of climate-related risks, including with the company's board and executives. They drive financial institutions to better understand climate-related risk drivers and to initiate or improve their inclusion in risk management frameworks and processes. They allow companies to take stock of their climate-related risk management capabilities and assess their progress, providing in the process potential references for future improvements in models, data, and disclosures. They can also be used to start carefully exploring the company's business strategy and risk appetite and to role-play future management actions to address climate-related risk. (Of course, as a company's approach to climate-related risk matures over time, their ERM framework will likely require climate stress tests that differ from, and go beyond, such standard regulatory exercises)[82].

A growing number of supervisory authorities have either conducted, are in the process of conducting, or have announced plans to conduct climate stress testing exercises. They are summarized in the next Table.

Table 6: Main Regulatory Climate Stress Tests to Date for Banks, Insurers and Pension Funds

Country	United Kingdom	France	The Netherlands
Supervisory authority	PRA / Bank of England	ACPR / Banque de France	DNB
Year	2021 (prev. 2019)	2020	2018
Participants	Largest banks and insurers	Banks and insurers (voluntary)	Banks, insurers, and pension funds (voluntary)
Risks included	Physical, transition, litigation	Physical, transition	Transition only
Projection horizon	30 years (physical risks 60 years)	30 years	5 years
Scenarios	3 (built on NGFS)	4 (built on NGFS)	3
Supervisory authority	ECB	Bank of Canada	APRA
Year	2022	2021	2021
Participants	Banks	6 large banks and insurers (voluntary)	Major banks

Country	United Kingdom	France	The Netherlands
Risks included	Physical, transition	Transition only	Physical, transition
Projection horizon	30 years	30 years	30 years
Scenarios	3 (built on NGFS)	4 (mostly built on NGFS)	2 (built on NGFS)

In its 2021 Stress Testing Programme, the Reserve Bank of New Zealand (RBNZ) also included a climate scenario involving three large storms to test the resistance of the five largest general insurers[83].

In the European Union, EIOPA launched in April 2022 a simplified stress test exercise for pension funds which includes transition risk from climate change[84], based on the disorderly transition scenario developed by the NGFS and with an instantaneous shock on pension funds' initial balance sheet. For insurers, a climate stress test exercise is planned by EIOPA for its upcoming 2024 stress testing cycle, with potential discussions to hold it earlier in 2023[85].

4.5 The Roles Actuaries Can Play in Climate-Related Risk Management

Actuaries can be involved in multiple ways in climate-related risk management, both for specific firms and in the wider context of financial stability discussions. Within their traditional role, they will primarily help assess climate-related risks, opportunities and financial impacts on liabilities, assets, and capital requirements. They contribute not only to the quantification of climate-related risks in the context of existing risk frameworks, but also working in multi-disciplinary teams to develop new approaches to monitor and mitigate emerging climate-related risks – notably in the design, computation, and analysis of climate-related risk scenarios.

Regarding the impact of climate-related risk on liabilities, actuaries can assess the expected or scenario-based increase or decrease of premiums, claims, expenses and reserves due to climate change factors (from both physical and transition risk). Specific loadings for climate-related risk may be considered. For emerging climate perils, actuaries can incorporate expertise from other fields like meteorology and geology[86]. Other modelling issues such as sea-level rise and coastal erosion are also call for more academic attention. For mortality and morbidity, consideration may be given to the effect of temperature increases and heat waves and to the consequences of climate change on human health[87]. The previous IAA paper of the same series *Climate-Related Scenarios Applied to Insurers and Other Financial Institutions* provide some insight as how to do it.

For investments and assets (owned and managed), actuaries can investigate statistical dependencies connecting asset prices, interest rates and credit risk to changes in climate, economic and social conditions. They can also participate to the elaboration of hedging strategies involving both financial and insurance risks. The previous IAA paper of the same series on *Application of Climate-Related Risk Scenarios to Asset Portfolios* provide good examples.

On solvency requirements and capital management, actuaries may develop additional climate-related risk dimensions and integrate them to existing models and to recovery plans. For example, they can explore how tools like Climate Value-at-Risk[88] (Climate VaR) can be calibrated and used to quantify climate-related risks. Actuaries can also analyse the consequences of climate change on ALM, as climate-related risk can potentially increase liabilities (e.g., through physical risk channels) at the same time as it decreases assets (e.g., through transition risk channels).

Actuaries can also help design, price, and manage new insurance products against physical and transition risks from climate change. Weather index insurance is an example of how parametric solutions can support farmers and the agricultural sector. Another interesting example is the insurance of coral reefs in Mexico[89]. Moreover, actuaries may contribute to climate adaptation through the inclusion of risk-based incentives in insurance products (an approach notably promoted by EIOPA as 'impact underwriting'[90]).

In addition to traditional actuarial work, actuaries can be involved in many other ways to foster proper climate-related risk awareness within the financial system. They can collaborate with regulators, supervisors, NGOs, and other international bodies. The actuarial community has supported the IMF, the World Bank and the UN on financial planning and relief efforts in relation to natural and man-made catastrophes[91]. The UK Institute and Faculty of Actuaries (IFoA) was an observer at COP26 in Glasgow. Both the Swiss and the UK actuarial societies ran movie screenings and roundtables on climate and sustainability risks and opportunities in collaboration with the WWF[92] in 2021-2022.

A growing number of actuarial societies are launching training programs for climate-related risks. The UK IFoA has notably developed sustainability trainings mirrored by other societies[93]. The educational material and syllabus developed in this context can help support not only actuaries, but other finance professionals whose work is related to or impacted by climate-related risk. Some actuarial societies are also looking at the potential integration of formal climate-related risk and sustainability duties for actuaries, as has been done in Australia.

5. Leading Practices on Climate-Related Disclosures

This section presents some selected instances of leading practices on climate-related disclosures. The examples analysed below were mainly drawn from the field of insurance and reinsurance, but also from pensions and banking. The sample includes international companies as well as national players and aims to cover a variety of geographies across Europe, Asia-Pacific, Africa, and the Americas. These examples are collectively intended to point to a general direction of travel and to present interesting trends and challenges in climate-related reporting. Please note that they should not be interpreted as ranking of firms (which are listed here alphabetically). Other companies not selected here also have high-quality disclosures, and there remains room for further improvement for all the reports in the sample.

5.1 General Considerations on the Need for Quality Climate-Related Disclosures

Actuaries' expertise, continuous education, code of conduct and practice standards allow them to identify and manage long-term risk in a professional manner. They can leverage these skills to play an important role in preparing and building on climate-related disclosures and driving the TCFD's recommendations, for example by conducting scenario analyses that identify risk exposure and the potential effects of various mitigation measures.

Without disclosures demonstrating in-depth understanding of the potential implications of climate-related risk from such analyses, companies could face reputation and litigation risks. In addition, if a company does not take stock of its exposure to climate change now and communicate the conclusions to investors and other stakeholders, the costs of transitioning to a low carbon environment in the future are likely to increase. This will place the company at a competitive disadvantage to secure funding, win client markets, satisfy supervisory expectations, and ensure talent retention for a workforce increasingly sensitive to climate issues.

There can be serious consequences for suboptimal climate-related disclosures. In McVeigh v Retail Employees Superannuation Trust[94], a member of the fund challenged the trustees in 2018 for failing to disclose the risks of climate change and for breaching their duties to invest with reasonable care and skill. The case was settled in 2020 with the trustees' stating climate was a material financial risk to the fund, announcing a target of net zero by 2050, and committing to report aligned with TCFD. Although the case was filed in Australia, it has been influential globally on how financial institutions manage and disclose climate-related risk. The outcome of the case, a change in strategic direction from the trustees, demonstrates the pressure that can be put on decision-makers through legal challenge, and actuaries may take note the importance of good climate-related risk management and disclosures.

5.2 Selected Examples

5.2.1. Alecta (Sweden)

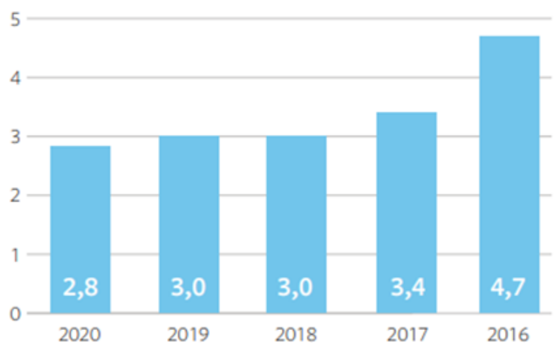
Alecta is a Swedish pension fund founded in 2017. It provides pensions for over 35,000 Swedish companies and 2.5 million individuals, making the company one of the ten largest occupational pension schemes in the European Union. A TCFD supporter and Net-Zero Asset Owner Alliance (NZAOA) member, Alecta aims to invest in line with the climate goal of 1.5 degrees Celsius and the ambition of net zero climate impact by 2050. It also works together with other investors in the NZAOA to contribute towards the development of methods and tools to integrate climate aspects and measure results.

Alecta published in 2021 its first climate report[95] according to the TCFD framework and held discussions with a selection of investee companies on the theme of climate. In this TCFD report, Alecta describes the climate impact of various asset classes, climate-related risks in the investment portfolio and how asset management works with climate issues. Based on its climate report, Alecta also drew up customer-specific information about climate and investments for publication on its website.

The climate indicators reported by Alecta notably include:

- The number of corporate dialogues held on climate;
- The percentage of investee companies in the equity portfolio with confirmed science-based climate targets;
- The percentage of companies in the equity portfolio that report their climate footprint (Scope 1 and 2); and
- The carbon footprint from the equity portfolio (Scope 1 and 2).

Figure 2: Equity Portfolio's Carbon Footprint, tCO2e/SEK million



Source: Alecta's Annual and Sustainability Report 2020

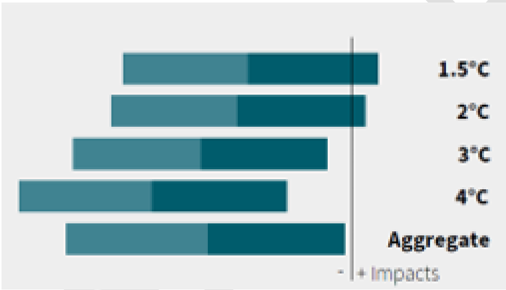
5.2.2. Aviva (United Kingdom)

Aviva is a London-based composite insurer providing insurance and saving products (principally to clients in the United Kingdom, Ireland and Canada). Aviva publishes a comprehensive climate report structured along the four TCFD pillars[96], which details how it integrates climate considerations throughout the decision-making, risk appetite, strategy and ERM framework for its businesses.

The company has set net zero targets for all scopes of emissions as early as 2040, with interim targets for carbon emission reductions by 2025 and 2030 alongside longer-term objectives. In addition, Aviva committed to several global initiatives and collaborative efforts and base its work on international standards such as the Science-Based Targets initiative[97] (SBTi), with plans to have its climate targets validated by SBTi in 2022.

As part of its work scenario analysis, Aviva notably calculates a Climate Value-at-Risk for each of the four scenarios it analyses, reflecting the effect of different emission projections and associated temperature pathways on both the insurance liabilities and investment returns. It clearly describes the assumptions that drive the modelling, with a detailed appendix on its methodology. The use of a multi-disciplinary team of internal and external experts to select, develop and model financial impacts stands out, highlighting the need for actuaries to work with other professions and experts to evolve and improve approaches in rapidly developing areas like climate.

Figure 3: Aviva's Climate VaR Output by Scenario for Shareholder Funds as at 31/12/2021



Source: Aviva

Aviva's 2021 climate-related disclosures include independent assurance from the company's auditors. This covers a range of climate metrics, both operational and linked to the company's financing and insurance activities. Providing such reasonable assurance on disclosures is another area where actuaries are likely to be increasingly involved, whether as preparers, advisors, or internal and external auditors.

5.2.3. Itaú Unibanco (Brazil)

Itaú Unibanco is a Brazilian bank and financial services company headquartered in Sao Paulo and is one of the largest financial institutions in Latin America.

The Sao Paolo stock exchange has adopted a 'report or explain' approach since 2012 to encourage financial institutions to communicate on their sustainability risks and opportunities. The Brazilian central bank announced in September 2021 new mandatory rules for banks to disclose climate-related information as part of their financial reporting from July 2022 (also incorporating climate considerations into their overall risk management to avoid potential financial instability stemming from climate-related risks).

Due to the initial absence of a specific framework, Itaú decided to follow international guidance for its climate and sustainability disclosures. The company joined the UN Global Compact initiative in 2004 and became a signatory of the Principles for Sustainable Insurance (PSI) in 2012. Since then, Itaú has also adopted other initiatives and frameworks such as the TCFD (it belonged to the first wave of supporters in 2017), the Global Reporting Initiative (GRI) and the Sustainability Accounting Standards Board (SASB).

In its sustainability report[98], Itaú includes both GRI and SASB performance indicators. It also reports on the UN Sustainable Development Goals (SDG) and the UNEP FI Principles for Responsible Banking (PRB), while commenting on the progressive alignment of its climate change disclosure with the recommendations of the TCFD. Itaú's disclosures highlight the vast diversity of frameworks that currently coexist for climate and sustainability reporting, and the efforts needed to comply with a multiplicity of standards (in particular for early adopters).

5.2.4. MAIF (France)

MAIF is a French mutual insurance company, originally serving teachers. In 2020 MAIF became one of the first companies in France to adopt the status of "*société à mission*" (purpose-driven company), allowing them to define their social and environmental purposes and accordingly to set several social and environmental objectives and constraints. MAIF have set five such objectives, one of which is to contribute to the ecological transition through its investments, its risk appetite, and its operations.

Purpose-driven companies must comply with specific legal requirements. They need to establish a committee to ensure that the actions of the company are aligned with its objectives and purpose. MAIF has set four specific environmental targets:

- Use at least 8% of recycled / second hand spare parts for motor damages;
- Invest at least 7% of the group portfolio in "green" assets, in line with EU definitions;
- Reduce the carbon footprint of the group investments by at least 20% by 2025; and
- Certify at least 60% of operating buildings and directly owned property with a high environmental quality label.

Since 2016, MAIF publishes an annual sustainability report[99] as requested by French law. While the report is not directly structured along the TCFD recommendations, MAIF provides in an appendix a double-entry matrix which allows mapping each section of the report with both the French law requirements and the TCFD principles.

In the climate section of its sustainability report, MAIF gives a significant level of details on the scope and methodology used for measuring the carbon footprint of its investments. It notably provides information on the energy mix used by countries where it holds government bonds, and on the amount of coal and 'brown' investments it finances.

MAIF also gives the public access to a database with the main ESG, and climate indicators mentioned in the different reports prepared by the company, where users can assess the evolution of a given metric over time (as far back as 2015 for some indicators).

5.2.5. Momentum Metropolitan (South Africa)

Momentum Metropolitan is a South African-based financial services group active in insurance, asset management, savings, investment, and employee benefits. It is one of South Africa's larger life insurers and integrated financial services company. The group is listed on the Johannesburg and Namibian stock exchanges.

The group's 2021 TCFD report[100] considers the climate policy framework globally (e.g., the Paris Agreement) as well as nationally (e.g., South Africa's Nationally Determined Contribution) and the implications on the group's business. The report is clear on the limitations, noting for example the inability to rely on historical data, an important point for actuarial advisers who have to explain the limitations of any modelling and any assumptions used.

Momentum Metropolitan uses the United Nations' SDGs and have formed specific, prioritised goals for economic, social, environmental and governance impacts. When considering climate-related opportunities, Momentum Metropolitan has identified a key area for actuarial input is product innovation in non-life insurance, medical schemes, and life industries to meet the demand for climate change related claims. One example of its actions is a partnership to develop multi-peril yield insurance aimed at mitigating the financial risks faced by South African grain farmers, who are vulnerable to drought and price volatility.

Qualitative scenario analysis was used to inform the group's strategy development and helped to provide a forward-looking approach (with a view to identify suitable methodologies to conduct quantitative climate change risk scenarios in the near future). The analysis provided a matrix for decision-making considering various global and national levels of climate response, as well as percentage probabilities for each scenario.

Climate is being integrated into the group's ORSA framework to help identify the impact of future changes in economic conditions and other external factors. This provides an example of how actuaries adding consideration of climate-related risks and opportunities into existing processes to aid effective governance and reporting. The responsible investment approach is also set out in the report.

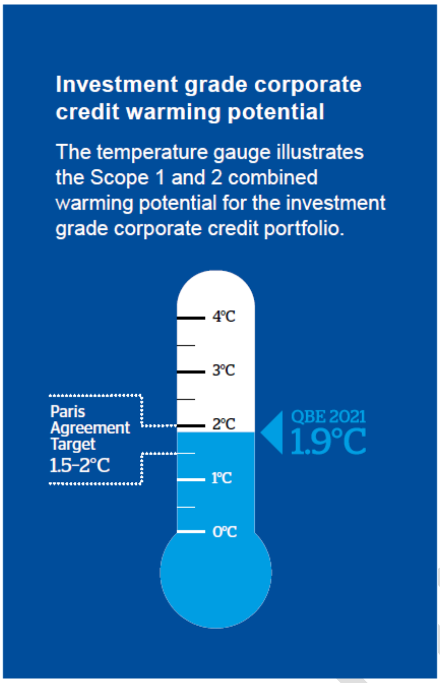
5.2.6. QBE (Australia)

QBE Insurance Group Limited is an insurance and reinsurance company based in Sydney and listed on the Australian Securities Exchange. It has operations in Australia and the Pacific, as well as North America, UK, and Europe and in Asia.

QBE's climate-related disclosures are integrated into its 2021 Annual Report published in February 2022[101]. The climate section is aligned to the TCFD recommendations. Alongside this annual report QBE also published a Sustainability Report[102] that gives further detail on climate change along with more information on wider sustainability issues.

There is a significant section of the report dedicated to QBE's investments. QBE is a member of the UN-convened Net-Zero Asset Owners Alliance (NZAOA) and are targeting for its investment portfolio to be net-zero emissions by 2050. Detail is included on how it measures the carbon intensity of its portfolio, the historic carbon intensity of the portfolio and the steps it is taking to achieve this net-zero target, including engagement with companies and asset managers. QBE also makes use of Implied Temperature Rise (ITR) indicators.

Figure 4: Investment Grade Corporate Credit Warming Potential



Source: QBE Annual Report 2021

As an insurer and reinsurer, QBE addresses the underwriting risks that it faces and how it is dealing with these, including through the use of natural catastrophe models adjusted for the expected effects from climate change. It also highlights initiatives that it is undertaking to work with its clients to support it in becoming carbon neutral by 2050, with a particular focus on the carbon-intensive energy sector.

QBE reports on their climate metrics and targets, noting that its energy reduction targets were refreshed in 2021 and acknowledging that interim targets still need to be set for the long-term goal to achieve net-zero emissions in its underwriting portfolio by 2050. In addition, QBE mentioned that it launched their first sustainability-linked banking loan in 2021, with payments linked to QBE's performance targets on renewable electricity, women in leadership and impact investments.

5.2.7. Swiss Re (Switzerland)

Swiss Re, the world's second largest reinsurer, published both a sustainability report[103] and TCFD-aligned climate-related financial disclosures[104] in 2022. Swiss Re is a Zurich-based provider of reinsurance and other forms of insurance-based risk transfer. Its reporting considers impacts on the company's own operations as well as the extensive potential for impacts across their investment, insurance, and reinsurance business, for example the repricing of carbon-intensive assets. Actuarial modelling drives the organisation's proprietary natural catastrophe models. This is supplemented with qualitative analysis and consideration of non-investment transition risks. The limitations of modelling and assumptions are described in detail with clear rationale for its qualitative scenario analysis and quantitative assessments of materiality over different time horizons. Swiss Re notes that the models will be adjusted over time. Risk modelling is described along with how it is used to help decision-making.

As part of its drive to be net zero, Swiss Re has introduced an internal carbon price (Carbon Steering Levy) for its own operations, pricing both direct emissions and indirect operational emissions (like business travel). In 2021 it increased this internal carbon price from less than USD 10 to USD 100 per tonne of CO_2, in line with the UN Global Compact Recommendations. Swiss Re plans to gradually increase the carbon price to USD 200 per tonne of CO_2 by 2030, which corresponds to the market price it expects at that point in time for high-quality carbon removals. While several other companies have introduced a shadow carbon pricing mechanism (taken into account in assessing business planning decisions, but not leading to any actual transfer of money) Swiss Re uses a real carbon price which impacts budgets and helps secure funding for the purchase of carbon removals.

In addition to its responsible investment policy (which includes minimum ESG ratings, the reference to ESG benchmarks, and the exercise of stewardship), Swiss Re announced in March 2022 an enhanced oil and gas underwriting policy which excludes the provision of insurance for most new oil and gas projects. Swiss Re expresses an ambition that by 2025 half, and by 2030 all, of its oil and gas premiums will come from companies with credible net zero plans; and commits to develop an oil and gas policy for its reinsurance treaty business by 2023.

5.2.8. Tokio Marine (Japan)

Tokio Marine is a global insurance group headquartered in Japan. It is the oldest Japanese insurance company and the largest domestic non-life insurer, conducting international business in over 40 countries.

The group's 2020 TCFD report[105], notably describes using natural catastrophe risk models to quantitatively assess the physical risks of climate change under several scenarios, assessing and quantifying the impact of change in natural catastrophes on insurance losses under future climate conditions. The report also sets out limitations and uncertainties, vital in providing decision-useful information to those responsible for navigating their organisations towards a low carbon future.

Tokio Marine reports developing a system to quantitively assess climate-related risk to their assets, showing how scenario analysis can be integrated into monitoring and decision-making. In addition, the underwriting of risks associated with offshore wind power generation projects and renewable energy projects shows the application of actuarial skills to a novel set of risks. Climate is also integrated into the group's ERM, with scenario analysis and stress testing informing the calculation, quantification and modelling of climate-related risk across the organisation.

Another interesting point to note in the report is Tokio Marine's original approach to achieving carbon neutrality across their operational Scope 1 and 2 and some Scope 3 emissions through its joint Mangrove Planting Project with NGOs in the Asia-Pacific region. As well as absorbing carbon from the atmosphere, this project provides direct physical protection against coastal damage from storm surges, education for local school children, as well as conservation of biodiversity and wetlands, thus supporting broader SDGs.

6. Conclusion

Since the publication of the first TCFD recommendations in 2017, the field of climate-related disclosures has developed rapidly through a multiplicity of national, regional, and global initiatives. A growing number of countries are mandating climate-related disclosures for large companies and financial institutions or have announced concrete plans to do so. The integration of climate and sustainability considerations alongside traditional financial information will continue to play out over several years, and it is hoped that in due course the various frameworks will become sufficiently standardised to facilitate comparisons across firms, industries, and countries.

Climate-related financial disclosures respond initially to a demand from investors and supervisors to understand how a company’s risks and business opportunities are affected by climate change. However, this is also of growing interest to policymakers, employees, clients, business partners, non-governmental organisations, and civil society as a whole. Leading reporting standards and best practices increasingly include a double-materiality perspective i.e., not only the impact of climate change on the reporting company, but also the impact of the company’s activities on climate and the environment.

Some of the world’s largest financial institutions have chosen to sign up to various net-zero initiatives convened by the United Nations, such as the Net Zero Asset Owners Alliance, the Net Zero Asset Managers Initiatives, and the more recent Net Zero Insurance Alliance. Such pledges involve long-term targets for achieving carbon neutrality, while in the short-term climate and emissions data may be incomplete and methodologies are still developing. The discrepancy between long-term climate environmental claims and limited immediate climate action has fuelled concerns around greenwashing. This constitutes another area where complete and transparent climate-related disclosures play an important role.

Greenwashing has also been a primary concern for the sale of financial products. Reporting requirements for financial market participants selling sustainable investments are being introduced for companies themselves in addition to the climate disclosure standards. An important building brick underlying such disclosures is the development of sustainable finance taxonomies, which provide a reference framework to assess which investments or insured activities contribute to climate change mitigation and adaptation.

Climate-related disclosures also require companies to explain how they assess and manage climate-related risk, contributing to the integration of climate considerations into their Enterprise Risk Management (ERM) frameworks and governance. Drawing a parallel with risk-based solvency regimes structured around three pillars (capital requirements, risk management, disclosures), a centripetal trend can be identified here for climate change. The introduction of climate-related disclosures is followed by improvements in climate-related ERM and potentially, in the future, by new climate-related capital requirements (as is being tentatively considered by several regulators around the world, for example around the treatment of natural catastrophe insurance or for green vs. brown investments).

There are multiple areas where actuaries can contribute to the preparation and analysis of climate-related disclosures, and to incorporate the impacts of climate change into risk management processes. To do so, they will need to collaborate with other practitioners. They will also have to move beyond traditional statistical or market-consistent approaches and incorporate forward looking considerations for emerging risks. Only in doing so will they be able to help companies, investors, and society to better understand and address the risks linked to climate change.

7. Next Steps for the IAA Climate Risk Task Force

This paper is the fifth in a series of papers that the IAA Climate Risk Task Force has committed to develop over the coming years. The first paper was entitled Importance of Climate-Related Risks for Actuaries and was an introduction to the series. The second was Introduction to Climate-Related Scenarios. The third was Climate-Related Scenarios Applied to Insurers and Other Financial Institutions. The fourth was Application of Climate-Related Risk Scenarios to Asset Portfolios.

To address the needs of actuaries, more papers are scheduled to be released over the following years, such as papers on:

- The climate change adaptation gap; and
- The link between climate-related risk scenarios and social security.

A review of existing IAA publications is also planned to identify and address any gaps related to climate-related risks. The IAA also plans to refresh the papers in this series periodically, given the rapid pace of change in the climate-related risk space.

The IAA Climate Risk Task Force welcomes and encourages input and involvement in these activities.

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