NZSUPERFUND
Te Kaitiaki Tahua Penihana Kaumātua o Aotearoa

Climate Change Report

2024

20 YEARS

INVESTING FOR FUTURE GENERATIONS

Contents

Purpose

Sustainable investment delivering strong returns for all New Zealanders // Kia toitū te haumi hei hua mā ngā tangata katoa o Aotearoa

FOREWORD

The Guardians of New Zealand Superannuation ('Guardians') has a long-standing commitment to responsible investment, informed by our statutory mandate to administer the Fund on a prudent, commercial basis and in a manner consistent with:

- best practice portfolio management
- maximising return without undue risk to the Fund as a whole
- avoiding prejudice to New Zealand's reputation as a responsible member of the world community.

The Guardians' Board recognises that best practice includes supporting the goal of transitioning to a sustainable financial system, as reflected in our adoption of a revised organisational Purpose in 2023: *'Sustainable investment delivering strong returns for all New Zealanders'*.

Our Guardians of the Future strategy (2024-) establishes key principles and focal areas to guide pursuit of that purpose through our culture, systems, people and decision making. The strategy explicitly acknowledges climate change as a major source of future uncertainty - along with the need for an adaptive approach to managing broader systemic risks and opportunities.

The Sustainable Finance Strategy approved by our Board reflects one of our key investment beliefs; that environmental, social and governance (ESG) considerations, including climate change, are fundamental to long-term risk and return. This means we: i) incorporate ESG into investment decisions with the intention of advancing sustainability, while fulfilling our financial purpose; ii) consider the impact of ESG on our investments, and the impact of our investments on society and the environment, and; iii) work with others to overcome barriers to a sustainable financial system.

Guardians' Sustainable Finance Goal

'The Guardians incorporates sustainability considerations into investment decision-making and supports the development of a sustainable financial system.'

ESG considerations are integrated across the Fund's investment activities and asset classes. Sustainable Investment is incorporated into portfolio management through the way we analyse and define investment opportunities, allocate risk budgets, conduct investment selection and due diligence, and through active ownership. This includes collaborating with our external investment managers, exercising our voting rights, and engaging with companies to improve their own ESG policies and practices.

As data, modelling, methods and tools improve - and global good practice and standards evolve - the Guardians are committed to continuing to review and refine our approach to climate-related risk analysis, investment strategy, and reporting.

The Guardians has published an annual Carbon Footprint and/or Climate Change Report since 2017, in line with the recommendations of the Taskforce on Climate-related Financial Disclosures. This Climate Change Report is the first to align with the Aotearoa New Zealand Climate Standards issued by the New Zealand External Reporting Board.

Jo Townsend - Chief Executive Officer

DISCLOSURE STATEMENT

The disclosures in the climate statement (comprising this Climate Change Report and a standalone Carbon Footprint Report)[1] are made in alignment with the Aotearoa New Zealand Climate Standards (the 'Standards') issued by the External Reporting Board (XRB), and in respect of the New Zealand Superannuation Fund (the 'Fund').[2]

The Guardians of New Zealand Superannuation ('Guardians') is not a climate-reporting entity under the Financial Markets Conduct Act 2013. Nonetheless, we have adopted the Standards as the basis for our climate-related disclosures, due to our commitment to transparency, best practice, and application of the Crown Responsible Investment Framework (December 2021).[3]

The climate statement contains some disclosures that rely on incomplete or estimated data, partial or provisional assessments of current and forward-looking information, and related judgements, opinions and assumptions. In preparing the climate statement, the Guardians has elected to rely - in full, or in part - on some of the adoption provisions in the Standards (see Overview).

1 *nzsuperfund.nz/how-we-invest/sustainable-finance/climate-change/*

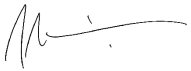
2 *Aotearoa New Zealand Climate Standards, effective 1 Jan 2023 (xrb.govt.nz)*

3 *nzsuperfund.nz/assets/Uploads/Enduring-Letter-of-Expectations-to-Crown-Financial-Institutions-in-relation-to-Responsble-Invesment.pdf*

The preparation of the Fund's climate statement requires the Board and management to make judgements and use estimates that affect the reported risks, opportunities, metrics, and accompanying disclosures. Uncertainty about these judgements and estimates could result in outcomes that require a material adjustment to climate-related disclosures in future periods.

The judgements and estimates used in respect of the Fund are believed to be reasonable under the current circumstances, and are re-evaluated on an annual basis. They are based on a range of factors, including projections of plausible but uncertain futures that may impact the Fund. The judgements and estimates that the Board and management consider the most significant are as follows: Climate change scenarios; Carbon emissions intensity of our investment portfolio, and; Climate value-at-risk.

For and on behalf of the Guardians Board, who authorised the issue of this climate statement on 26 September 2024:



JOHN WILLIAMSON,
Chair - Guardians Board
26 September 2024

DOUG PEARCE
Chair - Audit & Risk Committee
26 September 2024

OVERVIEW OF DISCLOSURES

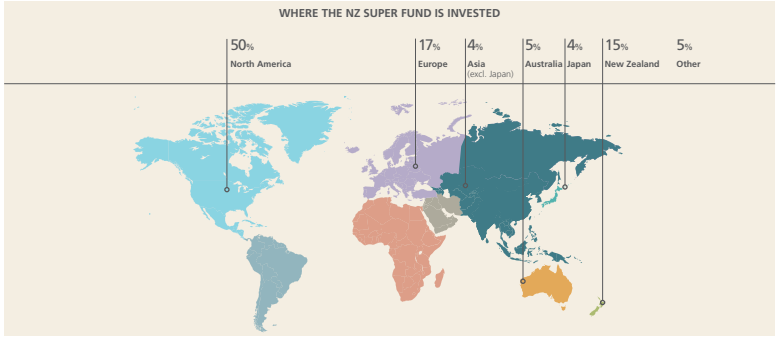
NZ CLIMATE STANDARDS [CS reference]	NZ SUPER FUND REPORT REFERENCE
GOVERNANCE: Respective roles of governance body and management in overseeing, assessing, and/or managing climate-related risks and opportunities [CS1-6]	
Governance body responsible for oversight of climate-related risks and opportunities [CS1-7; CS1-8]	2. Governance (p11); Figure 1 (p13)
Management role in assessing and managing climate- related risks and opportunities [CS1-7; CS1-9]	2. Governance (p11); Figure 1 (p13); 3.3. Strategy (p16); 4.2 Risk Management (p36)
STRATEGY: How climate-related scenarios, risks, opportunities and impacts are identified and assessed; approach to climate transition [CS1-11]	
Current physical and transition impacts, including material financial impacts [CS1-12]	3.3 Climate Change Investment Strategy (CCIS), (iii) Climate-related investment impacts – Current and potential future (p21)
Adoption Provision 1 - Current Financial Impacts [CS2-10]: Partially applied	3.3 CCIS, (a) Analyse, (iii) Climate-related investment impacts (p21); Box 1 (p22)
Climate scenario analysis undertaken [CS1-13]	3.3 CCIS, (a) Analyse, (i) Climate Scenario Analysis (p18); Table 1 (p20)
Climate-related risks, opportunities [CS1-14]	3.3 CCIS, (a) Analyse, (ii) Climate-related investment risk analysis (p21)
Anticipated physical and transition impacts, including material financial impacts [CS1-15]	3.3 CCIS, (a) Analyse, (iii) Climate-related investment impacts (p21)
Adoption Provision 2 - Anticipated Financial Impacts [CS2-12] Partially applied	3.3 CCIS, (a) Analyse, (iii) Climate-related investment impacts (p21); Box 1 (p22)
Transition plan aspects of strategy [CS1-16]	3.3 CCIS (p16); 3.4. Climate Action Plan (p31); Figure 2 (p16)
Adoption Provision 3 – Transition Planning [CS2-15]: Not applied	3.3 CCIS (p31); 3.4. Climate Action Plan (p31); Box 2 (p31)

RISK MANAGEMENT: How climate-related risks are managed and integrated as part of Guardians' wider risk management processes [CS1-17]	
Processes for identifying and assessing climate-related risks [CS1-18a; CS1-19]	3.3 CCIS, (a) Analyse, (ii) Climate-related investment risk analysis (p21); 4.1 Climate-related enterprise risk management (p36)
Integration of climate-related risk management into overall risk management system [CS1-18b]	4.1 Climate-related enterprise risk management (p36); Figure 5 (p37)
METRICS AND TARGETS: Targets and measures established in relation to climate-related risks and opportunities [CS1-21]	
Metrics used to assess climate-related risks and opportunities [CS1-21]	5.1 Carbon emissions intensity (p39); Table 2 (p41) 5.2 Climate Value-at-Risk; Table 3 (p44) 5.3 Carbon Price (p46) 5.4 Other climate and ESG performance measures (p46)
Adoption Provision 6 - Comparatives for Metrics [CS2-20]: Partially applied	5.4 Other climate and ESG performance measures; Box 4 (p46)
Adoption Provision 7 - Analysis of trends [CS2-22]: Partially applied	5.4 Other climate and ESG performance measures; Box 4 (p46)
Targets used to manage climate-related risks and opportunities [CS1-23]; Performance against targets [CS1-23d]	5.1 Carbon emissions intensity (p39); Table 2 (p41)
Greenhouse gas (GHG) emissions [CS1-22a; CS1-22b; CS1-24]	5.1 Carbon emissions intensity (p39); Table 2 (p41) 2024 Carbon Footprint Report
Adoption Provision 4 - Scope 3 GHG emissions [CS2-17]: Partially applied	5.1 Carbon emissions intensity; Table 2 (p41)
Adoption Provision 5 - Comparatives for Scope 3 GHG emissions [CS2-18]: Not applied	2024 Carbon Footprint Report

INTRODUCTION

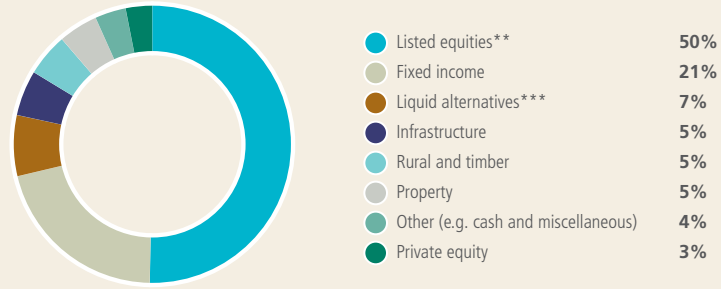
1.1 WHO WE ARE

The New Zealand Superannuation Fund (the Fund) exists to help pre-fund the increasing cost of government-provided superannuation due to New Zealand's ageing population. The Fund is a growth-oriented investment portfolio, holding a mix of public and private assets from New Zealand and around the world, reaching NZ$76.6 billion as at 30 June 2024.



Our governing legislation, the New Zealand Superannuation and Retirement Income Act 2001, requires the Guardians of New Zealand Superannuation (the 'Guardians') to invest the Fund on a prudent, commercial basis and, in doing so, to manage and administer the Fund in a manner consistent with: a) best-practice portfolio management; b) maximising return without undue risk to the Fund as a whole; and c) avoiding prejudice to New Zealand's reputation as a responsible member of the world community.

Asset Class Exposures as at 30 June 2024*



* Excludes the impact of any strategic tilts
** Listed equities (approx. 4% NZ, 44% other developed markets, 2% emerging markets)
*** Includes hedge funds and other liquid alternatives exposures

1.2 ABOUT THIS REPORT

In 2020/21, the Guardians collaborated with other Crown Financial Institutions (CFIs) and the New Zealand Government in developing a common Crown Responsible Investment Framework which outlined the basis for CFIs' alignment on carbon emissions measurement, net zero 2050 commitments, and reporting in line with the Taskforce for Climate-related Financial Disclosures (TCFD) - or equivalent emerging New Zealand disclosure standards.[1]

The Guardians is not a climate-reporting entity under the Financial Markets Conduct Act 2013. Nonetheless, we have adopted the Standards as the basis for our climate-related disclosures, due to our commitment to transparency, best practice, and application of the Crown Responsible Investment Framework.

This Climate Change Report, together with our Carbon Footprint Report, serves the dual purpose of addressing the Standards, whilst also summarising the Guardians' broader strategic approach, processes and practical actions around climate change. We have applied some of the Standards' adoption provisions to reflect limitations in data quality, evolving good practice in the domain of climate-related analysis, planning and reporting - and in light of the planned review of our carbon metrics and targets beyond 2025.

This report sets out how we integrate and address climate change considerations across each of the four thematic areas of the Standards (governance, strategy, risk management, metrics/targets). A glossary of key terms, and statement of methods, assumptions and estimation uncertainties are included to clarify more technical aspects.

The Fund's financed (Scope 3; Category 15) greenhouse gas (GHG) emissions are the most material aspect of climate-related risk from across the Guardians' value chain - comprising the underlying securities and investee companies in the Fund. Accordingly, the primary focus of this report is on the Fund's financed emissions and related climate risks.

Our Carbon Footprint Report provides the details and basis of preparation specific to our carbon emissions metrics and targets - including metrics common with the other CFIs.[2] Further information on the Fund, the Guardians' broader investment approach and Sustainable Finance Strategy can be found in our Annual Report and on our website.

1 *nzsuperfund.nz/assets/Uploads/Enduring-Letter-of-Expectations-to-Crown-Financial-Institutions-in-relation-to-Responsble-Invesment.pdf*

2 *nzsuperfund.nz/how-we-invest/sustainable-finance/climate-change/*

Governance

The Board has overall responsibility for climate-related aspects of the Guardians' operations, investment strategies, risks, and reporting - assisted by the Audit & Risk Committee.

2 GOVERNANCE

The Board has overall responsibility for climate-related aspects of the Guardians' operations, investment strategies, risks, and reporting - delegating the management of these aspects to specific subcommittees and/or senior leadership.

This includes: approving our investment beliefs – such as that environmental, social and governance (ESG) considerations are fundamental to long-term risk and return; setting the Fund's investment risk appetite; and driving climate change objectives by including them in our Statement of Investment Policies, Standards and Procedures (SIPSP).

The Guardians' governance of climate-related reporting (Figure 1) is aligned with existing processes applied to our financial reporting, where applicable. The Audit & Risk Committee terms of reference explicitly reference *'…assisting the Board with oversight of the Guardians' climate-related disclosures (CRD)'*, along with specific responsibilities for the Committee to:

- oversee the integrity of the Guardians' CRD, including compliance with applicable reporting standards
- review our CRD and any supporting information

- review the systems of internal control and satisfy itself that the Guardians CRD is supported by appropriate management sign-off on the adequacy of those systems
- review the scope of arrangement and terms of engagement of the assurance provider for aspects of CRD subject to external assurance
- review any CRD-related external assurance reports (where applicable).

CRD has been a key focus for the Audit & Risk Committee in 2023/24. The Committee participated in quarterly discussions and education sessions on climate reporting regimes in New Zealand and overseas to ensure members understood the requirements, and how the management team were addressing them.

Our CEO is responsible for executing the Guardians' overall strategy and implementing our SIPSP, Statement of Intent, annual Strategic Plan, and delivery of our strategic objectives. Our wider leadership team plays an active role in promoting a focus on climate change across the New Zealand and global finance sector.

In 2024, the Board and CEO adopted the 'Guardians of the Future' as our organisational strategy, including explicit reference to climate change as a key consideration in strengthening our investment approach, optimising our organisation, and enhancing our external presence.

Our Chief Investment Officer (CIO), Investment Heads and internal committees each have designated roles in ensuring that our policies, investment strategies and processes remain appropriate and effective, as they relate to climate change considerations. This includes CIO and Investment Committee oversight of the implementation of our Board-approved Climate Change Investment Strategy (CCIS).

Members of our Investment Team, including sustainable investment subject-matter experts, are responsible for addressing climate-related risks and opportunities, and integrating key considerations into the Guardians' investment due diligence, investment strategies and portfolio management processes.

FOUNDATIONS OF OUR SUSTAINABLE INVESTMENT APPROACH

GUARDIANS' STATUTORY INVESTMENT MANDATE

Invest the Fund on a prudent, commercial basis in a manner consistent with:

- Best practice portfolio management
- Maximinising return without undue risk to the Fund as a whole; and
- Avoiding prejudice to NZ's reputation as a responsible member of the world community

BOARD-APPROVED POLICY, STRATEGY AND TARGETS

Purpose: Sustainable investment delivering strong returns for all New Zealanders

Policies: Statement of Investment Policies, Standards and Procedures (SIPSP); Sustainable Investment Policy and Framework

Strategy: Guardians of the Future; Sustainable Finance Strategy; Climate Change Investment Strategy (CCIS)

Practice:

- Sustainable Finance Roadmap
- Emissions Reductions targets (2020-25)
- Paris-Aligned Portfolio benchmarks

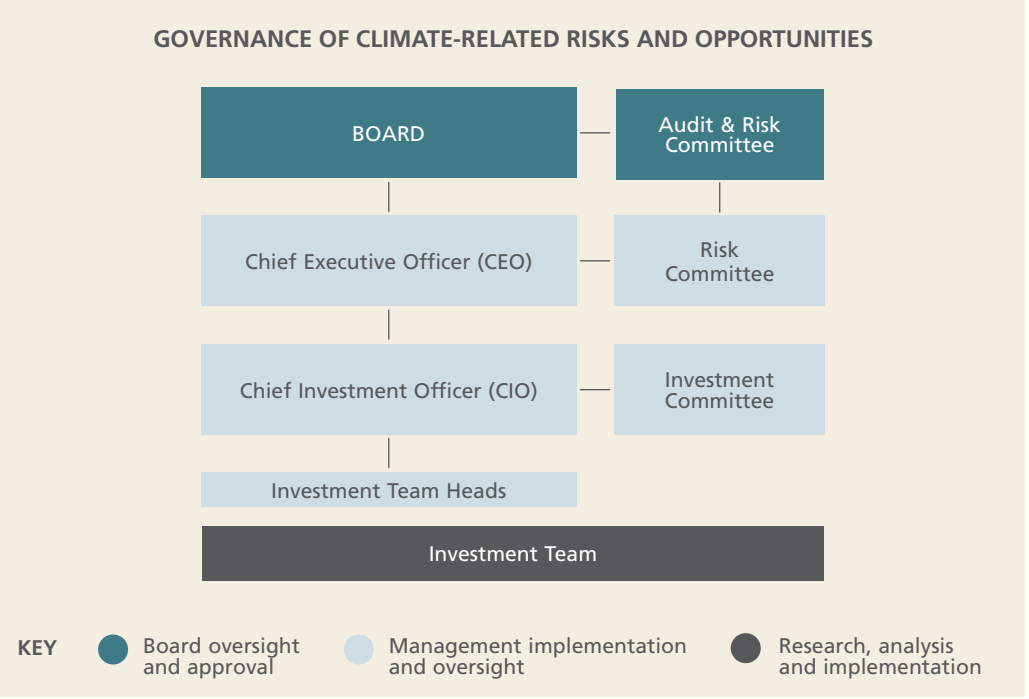


Figure 1: Policy, governance and strategy around the Guardians' climate-related risks, opportunities and reporting

We aim to give all Guardians the knowledge and tools they need to address climate-related issues relevant to their role, by including key aspects of our approach in the staff induction process. Our onboarding, periodic Investment Forums and ad-hoc education sessions for the Board, executive leadership and investment team members on climate change, reporting and assurance help to develop appropriate competencies. These internal initiatives are supplemented with external sustainable finance training and certification for an increasing number of the Guardians team.

Our Statement of Intent sets out the key performance indicators determined by the Guardians' Board, while the Statement of Performance Expectations includes near-term expectations about progress against strategic priorities. Key aspects of these statements may be rolled into individual objectives for relevant members of the senior team.

We do not currently link performance objectives or incentives to outcome-related climate targets. However, where teams or individuals have been set specific objectives related to process improvement aspects of the CCIS, performance against those objectives is linked to a discretionary portion of remuneration.

Strategy

Our Climate Change Investment Strategy sets out a framework for addressing the complexities, risks and opportunities related to climate change, and shapes our strategic response.

3 STRATEGY

3.1 OVERVIEW

We take climate change into account in designing our investment approach. We joined the Carbon Disclosure Project in 2007 and launched our first dedicated Climate Change Investment Strategy (CCIS) in 2016.

Our broader Sustainable Finance Strategy, established in 2022, sets out the interlinked intentions of:

- incorporating ESG into investment decisions to advance sustainability, whilst fulfilling our financial purpose
- considering the impact of ESG on our investments, and the impact of our investments on society and the environment
- working with others to overcome barriers to a sustainable financial system.

We continue to explore and progressively integrate sustainability-related considerations into our core thinking, operations, systems and processes, as appropriate.

Our latest Guardians for the Future strategy established key principles and focal areas to guide our organisational culture, systems, thinking and decision-making within the context of an uncertain future. This strategy explicitly acknowledges climate change as one source of uncertainty, along with the

need for an adaptive approach to managing this, and other systemic risks and opportunities in support of our Purpose.

3.2 CLIMATE CHANGE INVESTMENT CASE

Climate change is an intergenerational and transboundary challenge, necessitating unprecedented levels of constructive coordination across diverse countries and stakeholders. We developed our initial CCIS because we came to the view that climate change also involved substantial market and policy failures and material physical risks - which presented undue risk for the Fund.

Climate change presents both systemic risks and specific risks for which we are not always rewarded via investment returns. While many climate-related impacts will take time to be revealed, financial markets are forward-looking. Prices may adjust quickly when a greater appreciation of the risks and opportunities from climate change emerges.

As a long-term investor, it is prudent to reduce portfolio exposure to uncompensated risks and seek exposure to opportunities now, rather than trying to estimate when markets will adjust. As an asset owner with broad market exposure, it is also important we play our role in facilitating the climate transition and adaptation.

3.3 CLIMATE CHANGE INVESTMENT STRATEGY

Our **Climate Change Investment Strategy** has four elements:	
	**ANALYSE** integrates climate change considerations into our assessment of potential new investments and when we review our existing holdings. We do this by building climate change scenarios and risk analysis approaches into our risk analyses and/or valuation protocols.
	**REDUCE** decreases the transition risk of the portfolio. We do this by: • measuring our carbon footprint • setting a target to reduce our portfolio's emissions intensity and potential emissions from fossil fuel reserves • applying a carbon reduction methodology to our equity portfolio and our benchmark.
	**ENGAGE** influences the companies we own an interest in to continuously mitigate and adapt to climate-related risks. We do this by being an active owner, including prioritising engagement and voting in accordance with our climate change insights and strategies.
	**SEARCH** focuses us on finding companies that will thrive during the low-carbon and climate-resilience transition. We do this by actively searching for new investment opportunities in areas such as renewable energy, energy efficiency and the circular economy.

Figure 2: Overview of the Guardians Climate Change Investment Strategy

Our CCIS sets out a framework for understanding and addressing the complexities, risks, opportunities and the Fund's response to climate change.

This involves analysing risks, setting carbon reduction targets, investing in solutions to drive the transition to a low-carbon economy, and engaging with companies, peers and policy makers to encourage emissions reductions, transition planning and climate-resilient economies.

Our management team is responsible for ensuring that the elements of our CCIS are integrated into relevant investment processes, decisions and actions. Progress on implementing the CCIS is a key component of the Guardians' sustainable finance annual reporting to the Investment Committee and the Board.

Ultimately, the CCIS – together with the Crown Responsible Investment Framework and our Net Zero Asset Owners Commitment – provides the impetus for our Climate Action Plan [see Section 3.4].

(A) ANALYSE

The aim of the Analyse pillar is to progressively integrate climate-related analyses into our portfolio management policies, systems and processes. This includes considering a range of plausible climate-related scenarios, and incorporating climate-related risks and opportunities into investment analysis and decision-making for new and existing assets.

Climate scenario analysis

Climate scenarios represent a series of assumptions, analyses and informed judgement used to establish plausible projected future pathways and outcomes for global climatic and socio-economic conditions.

We developed an initial set of custom high-level climate scenarios in 2018 to inform our initial CCIS. A 2023 internal review considered a range of alternative approaches and sources, whilst taking into account evolving good practices, our Net Zero Asset Owners Commitment, and the Standards. The Investment Committee reviewed and debated the findings and recommendations, with the CIO ultimately approving adoption of the proposed approach.

Climate scenario analysis and practice have evolved since 2018, with an enhanced evidence base, modelling sophistication, and consolidation of standards and approaches. However, most mainstream climate models and associated scenarios retain significant limitations due to inherent conceptual or practical constraints; this means approaches often under represent the degree of complexity, ambiguity and potential volatility in projected pathways or outcomes (see *Appendix*).

For example, interrelated transition and physical climate risks may compound or be unevenly distributed across time, geographies and/or sectors of society - potentially leading to divergent, unpredictable outcomes.

Recognising our diverse global portfolio and the inherent complexity and limitations of climate scenarios, we avoid assigning a high degree of conviction to any particular pathway or outcome. Our approach is to explore a series of plausible scenarios and position the portfolio to be resilient and responsive to a range of pathways - rather than attempt to optimise our Fund for a specific normative scenario.

We apply a dual approach to scenario analyses; considering both top-down / long-term, and bottom-up / near-term perspectives on our portfolio and

underlying holdings. Our approach focuses on blending the use of top-down climate scenarios to explore implications, test sensitivities, frame narratives, and inform more detailed, bottom-up climate risk analyses.

We adopted the Network for Greening the Financial System (NGFS) scenarios as a top-down, long time-horizon input, due to their: integration of transition and physical factors; regular updates based on leading international climatic and economic research; transparency of key underlying assumptions/ limitations; and consideration of a range of policy ambitions, climate action, technological developments, emissions pathways, and geophysical processes.

The three NGFS scenarios we apply on a high-level, long-term (2050; 2100) basis are *Current Policies, Delayed Transition* and *Net Zero by 205*0. See Figure 3 and Table 1 for further information.

Under the Current Policies Scenario, the world is headed for 3 degrees of global warming by 2100 and the physical risks are high. In this scenario the transition risk is low. The Delayed Transition Scenario indicates a disorderly transition to a net zero carbon economy by 2050, and assumes there are average physical risks to the portfolio. The Net Zero Scenario assumes an orderly transition to a net zero economy, with low to average physical risks.

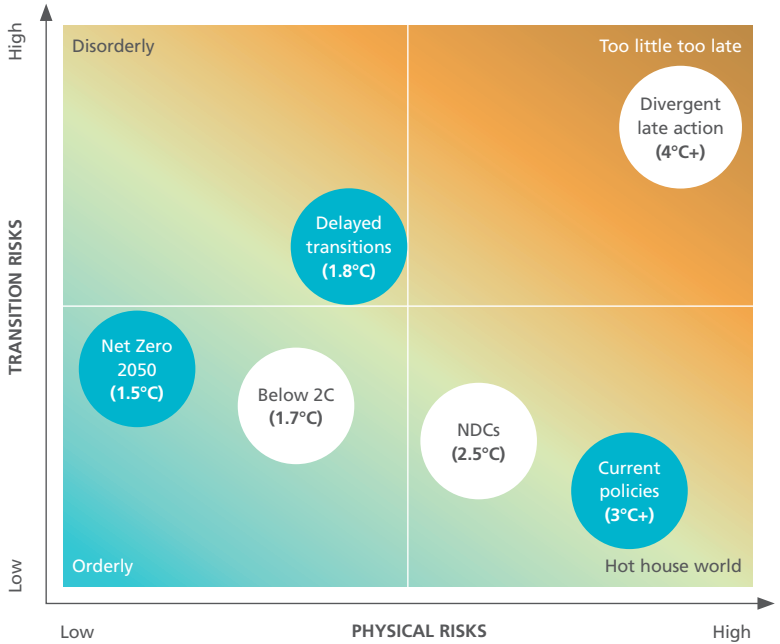


Figure 3: High-level NGFS climate scenarios (blue shading) adopted by the Fund

TABLE 1: SUMMARY OF HIGH-LEVEL CLIMATE SCENARIOS ADOPTED BY THE FUND

SCENARIOS	Net Zero 2050	Delayed Transition	Current Policies
Implied (2100)[1]* temperature rise	1.5 ºC	<2 ºC	~3 ºC
Rationale for adoption	Aligns with Net Zero Asset Owners Commitment (NZAOC) Reflects our Paris-aligned Reference Portfolio. Prescribed under XRB climate-related disclosures	Reflects stop/start nature of Paris Accord/COPs. Reflects lower end of emissions trends and market pricing 'Inevitable Policy Response'	Reflects higher end of emissions trends and market pricing Enables ongoing tracking of current ITR Prescribed under XRB climate-related disclosures
Exploratory use cases	Extreme transition (policy/tech) risks. Moderate physical climate risks	Moderate transition (policy/tech) risks. Moderate-to-high physical climate risks	Lower transition (policy/tech) risk Extreme physical climate risks
Key features	Ambitious/stringent policy change; moderate regional variation	Delayed, ambitious, disorderly policy change; high regional variation	Deferred, unambitious or abandoned policy change; moderate regional variation
	Paris Accord goals ambitiously pursued	Paris Accord action deferred	Paris Accord goals missed; Current policies only
	High rate of technology transition	Moderate rate of change, then rapid transition	Slow rate of technology transition and investment.
	Medium/high reliance on carbon dioxide removal	Low/medium reliance on carbon dioxide removal	Low/no reliance on carbon dioxide removal
	Net zero by 2050	Net zero by 2060	Net zero unclear
	50% chance of limiting GW to 1.5°C by 2100 (low overshoot)	67% chance of limiting GW to <2°C by 2100	Low chance of limiting GW to <2°C by 2100
	Moderate, 'locked-in' physical climate change impacts (lower uncertainty)	High physical climate change impacts (moderate uncertainty)	Extreme physical climate change impacts (high uncertainty)
Equivalent scenarios*	SSP2-RCP1.9	SSP2-RCP2.6	SSP2-RCP4.5

1 *Relative to pre-industrial times; Shared Socioeconomic Pathways (SSP)-Representative Concentration Pathways (RCP)

In 2023/24, the NGFS updated their scenarios to account for the latest GDP data, demographic projections, geopolitical context, and country-level climate commitments. Key changes include:

- Revised modelling of impacts from the COVID-19 pandemic and war in Ukraine
- Addressing climate policy revisions in key states e.g. US Inflation Reduction Act; Paris Agreement COP outcomes, etc.
- Updated projected technology pathways e.g. reduced readiness of carbon dioxide removal technologies, relative to previous assumptions
- Enhanced modelling of acute physical risks, with the inclusion of two more hazards (droughts and heatwaves), and increased geographical granularity.

Climate-related investment risk analysis

Our current approach to climate risk analysis and integration includes:

- Encouraging and supporting investment analysts and strategists to challenge key assumptions with climate change considerations in their core investment analyses
- Adding the requirement to apply climate scenario analysis within investment screening guidelines and templates for prospective new investments, where relevant and feasible
- Applying our Climate Change Valuation Framework for unlisted assets to assess and, where feasible, integrate material and quantifiable climate-related risks and opportunities into our asset valuations
- Estimating the Climate Value-at-Risk (CVaR) associated with existing and new prospective investments in listed equity portfolios.

We aim to progressively build further climate-related risk considerations into investment analyses and portfolio management processes as the available methods, standards and tools evolve.

Climate-related investment impacts – current and potential future

As a globally diversified asset owner, the Fund's assets are impacted by climate change in a range of manners. Some current climate impacts are already manifesting themselves.

Climate-related risks have multiple drivers including technological change, policy actions, and planetary processes. These drivers affect both listed and unlisted assets but may impact them in different ways across a range of timeframes, sectors and geographies.

Risks may arise from: supply and demand changes from substitution; higher cost structures; consumer preference and regulation; increasing prevalence of litigation in relation to perceived action or inaction on climate change; physical

damage or disruption to industries and economies, and/or; the inability to adapt at a reasonable pace, scale and cost. It is likely that the scale, complexity and compounding nature of these impacts will change significantly in the future, hence it is important for us - as a long-term investor - to take them into account now.

Mitigating climate change requires a range of transitions, of which the greatest is the shift to a low-carbon energy system, affecting all sectors of the global economy. Climate change offers opportunities for investment, including, for example, in the development of more efficient alternative energy technologies.

The Guardians has adopted a prudent approach to pro-actively identifying and addressing current and anticipated future climate-related risks and opportunities where we assess them to be most material (see Section 3.4 Climate Action Plan). However, climate-related data quality, modelling and methods remain subject to significant limitations and uncertainties, such that it is not always feasible to effectively and consistently translate climate-related risks and opportunities into specific estimates of current and/or anticipated asset values (see Box 1).

Box 1: Adoption Provisions 1 and 2

Adoption provision 1 - Current Financial Impacts [CS2-10];

Adoption Provision 2 - Anticipated Financial Impacts [CS2-12][1]

The Guardians has opted to disclose approximations of current / anticipated financial implications of climate-related physical and transition impacts in the form of estimated CVaR for our listed portfolio only (see below and Section 5.2).

For the majority of our unlisted portfolio, we consider climate-related aspects in our risk and/or valuation processes. When factoring in the impact of our prior - and ongoing - efforts to avoid and mitigate climate risks (or exploit opportunities) through our CCIS (2016), we have not yet found robust grounds for accurate, verifiable recognition of material net asset value adjustments. See below for further discussion.

1 NZ CS 2 Adoption of Aotearoa New Zealand Climate Standards (standards.xrb.govt.nz/standards-navigator/nz-cs-2)

Listed (public) assets

The Fund's listed equities portfolio accounts for the largest portion of assets under management. Since 2021, we have pro-actively monitored the exposure of this portfolio to climate change, using MSCI CVaR analysis. Section 5.2 presents the results from CVaR analysis as of 30 June 2024.

CVaR provides a forward-looking and return-based valuation assessment to estimate climate-related risks and opportunities in an investment portfolio. By integrating carbon price estimates, physical climate modelling, and company-specific attributes, CVaR projects how transition and physical risks might impact on a listed company's present value, under our three different NGFS climate scenarios (as updated from time to time).

CVaR combines current and anticipated future financial implications for public companies. However, it remains difficult to determine the extent to which climate-related factors have been accurately priced into listed equities markets. Prices are subject to adjustment at any time as part of an active market.

The CVaR method includes limitations due to key data gaps, assumptions and approximations (Section 6.iii), but can be useful for providing high level insights, indications for further analysis, and as an input to strategies to address the most obvious or extreme exposures to policy, technology and/or physical risks (see 3.4: Climate Action Plan).

Unlisted (private) assets

Due to often limited information availability for unlisted assets, we take a different approach to climate risk analysis for the Fund's new and existing private investments.

Our custom Climate Change Valuation Framework offers a structured approach to guiding investment professionals through a bottom-up process of identifying, assessing and addressing climate change considerations in their analysis of new and existing unlisted (private) investments. This involves five iterative steps:

- ***Step 1: Identify*** the investee company or fund's core activities, strategies, operating environments, commercial drivers, geographies, etc.
- ***Step 2: Assess*** the sources of climate-related risks and opportunities to assess how assets might be affected. This process begins by applying the three high-level NGFS scenarios, then exploring a bottom-up perspective on how the features of each scenario might affect the key aspects identified in Step 1, through six lenses:
  - Physical impacts from chronic or acute events linked to climate change
  - Disruption driven by the development of technology to support a low-carbon economy
  - Costs and complexity arising from evolving policies and regulations designed to address climate change and/or encourage sustainability
  - Changes in economic and social factors affecting demand and supply
  - Resource availability and slow onset shifts in environmental factors

- Legal liabilities: Such as from parties seeking compensation for loss and damage from the effects of climate change.

- ***Step 3: Filter*** the sources of climate-related risks based on their perceived materiality. Risks considered immaterial are not factored into valuation models, but are mentioned in the qualitative commentary and shared with operational teams. For material risks, at a minimum we aim to identify the likely directional impact on the attractiveness of the investment. Where feasible, we try to quantify the impact of high-confidence material risks for our valuation model.
- ***Step 4: Integrate*** the material and quantifiable climate-related risks and opportunities into our valuation models. We have three methods for this – listed in order of preference: (i) adjusting cash flows (revenue, costs, capital expenditure) during the forecast period; (ii) adjusting the terminal value, or; (iii) adjusting the discount rate.[1] The valuation adjustments and commentary are peer reviewed and passed to the CIO (or delegate) - and are built into decisions on whether we buy, hold or sell the asset.
- ***Step 5:*** *We* ***own assets actively***. This may include the exercise of voting rights, engagement with companies and/or active roles on fund/company oversight bodies. We aim to monitor business performance against climate change standards and metrics.

We have made progress in applying the Climate Change Valuation Framework to our existing Direct Investments portfolio, with Step 2 completed for all assets and Steps 3-5 at various stages based on perceived relative materiality of climate-related risk for assets.

For assets or initiatives assessed to have sufficient data, conviction and potentially-material climate risks and opportunities, qualitative aspects from Steps 1-3 have been integrated into investment analysis and decision-making. This has contributed to a number of prospective new investments being rejected, or subjected to further dedicated climate risk due diligence, analysis, and/or integration of mitigation / resilience measures. In some instances, our analysis established sufficient conviction for us to adjust projected yields, increase capital expenditure projections to mitigate climate risk, and/or make operational adjustments to address transition risks/opportunities or increase climate resilience.

1 *When comparing earnings in the future with earnings today, financial models apply a discount to earnings in the future to reflect that they are less certain and that there is value to having cash today, rather than prospect of cash in the future. The amount that earnings are discounted (each year) is called the discount rate. When earnings are less certain, for example because of climate-related risk, this can be adjusted by increasing the discount rate to reflect this extra risk.*

Due to complexity, uncertainty, and a lack of data availability, accuracy, consistency and verifiability, we have found it challenging to effectively complete all steps across all our investments - especially adjustments to asset valuations (Step 4).

The Guardians' Valuation Working Group is responsible for reviewing the valuations of unlisted investments provided by independent third-party valuers. The working group requests that external valuers provide commentary and analysis, including sensitivities, on the net impact of climate change on the valuation of investments. To date, the approaches, analyses and outputs provided have been variable, with some external valuers more advanced at considering potential climate-related valuation impacts than others.

In 2023/24, we enhanced our approach by: improving tools to make it easier for investment professionals to implement the Climate Change Valuation Framework; further integrating the three NGFS climate change scenarios into our investment screening template; and applying additional analytical tools such as MSCI's CVaR for Real Estate, and the Woodwell Climate Exposure Risk Application. As climate-related data, modelling, methods and tools improve - and global good practice / standards on financial 'connectivity' evolve - we will continue to review our approach to climate-related risk, financial impact analysis, and disclosure.

(B) REDUCE

Our work on the CCIS indicates that the Fund's financed emissions (Scope 3; Category 15) are the most material aspect of climate-related risk from across the Guardians' value chain - comprising the underlying securities and investee companies in the Fund.

The aim of the Reduce pillar of our Strategy is to lower the Fund's exposure to investments that are most at risk from the transition to a low-carbon society. We do this by reducing the exposure of some of our portfolio to investments with the highest emissions intensity and potential emissions from fossil fuel reserves.

The Board set our first carbon-reduction targets in 2016 and continues to approve Fund-wide targets for emissions-intensity and potential emissions from fossil fuel reserves. In 2020, we set more ambitious targets through to 2025, on the grounds that:

- Enhancements in our data provider's carbon research and methodology allowed us to use additional metrics to test the impact of various carbon reduction scenarios
- Analysis indicated that we could set more ambitious targets without severely impacting portfolio diversification
- We had greater experience and confidence that doing so would improve the Fund's long-term risk-adjusted returns and resilience.

We addressed these targets by applying a bespoke carbon methodology to our physical passive equity holdings, and then applying a 'carbon short' to neutralise exposure in our synthetic portfolios.

As part of a wider review of our sustainable investment approach - and in accordance with its responsibility to determine the benchmarks against which we measure our investment performance - the Board adopted a new 'Paris-Aligned' benchmark for our portfolio in 2022, with the effect of 'hardwiring' much of our emissions reduction approach.

See our 3.4: Climate Action Plan for more information on our approach, Section 5.1 for our carbon targets and footprint, and Carbon Footprint Report for the basis of preparation.

(C) ENGAGE

The goal of the Engage pillar is to improve the analysis, management and reporting of climate-related risks by the companies we invest in. We report on our stewardship and engagement activities in our Annual Report and on our website.

We are committed to being an active owner of assets. This means we exercise our voting rights for listed equities in line with our voting policy guidelines on climate change.

We work with the boards and management teams of companies that we invest in directly to address climate-related issues. Where we work with external managers, we include climate-related clauses into investment mandates, to the extent possible and relevant.

As part of ongoing monitoring, external managers are asked about their climate change activities through ESG due diligence surveys approximately every two years. We also ask our external managers to report on their portfolio GHG emissions intensity.

From time to time, we engage with policy makers through public consultations, including in New Zealand, in areas that are relevant to our investment mandates. We have made submissions supporting increased climate action, including on the XRB's climate standards.

Engagement activities specifically on climate change include the following:

- We use the Columbia Threadneedle Investments' Responsible Engagement Overlay service to lead engagements with companies in our global equities portfolio. In 2023/24, the service engaged with 108 companies on climate change on our behalf, with 153 engagement activities and 17 milestones achieved. Quarterly engagement reports are published on our website.
- In 2023, the CFIs launched an initiative to engage on climate change with listed New Zealand companies, in particular the NZX50. As at the end of June 2024, we have seven engagements under way and three planned.
- In addition to being a signatory to the Net Zero Asset Owner Commitment, our memberships include: Climate Action 100+, an investor-led initiative to engage with the world's largest corporate GHG emitters take action on climate change; the Investor Group on Climate Change (IGCC), and Australian Council of Superannuation Investors (ACSI), which engage with

companies on climate-related issues on behalf of institutional investors in Australasia; and CDP (formerly Carbon Disclosure Project), which provides a framework through which companies are requested to disclose their carbon footprints as well as other environmental impacts.

- We play an active role in other organisations that are working to address responsible investment and climate change, including: the United Nations-backed Principles for Responsible Investment; the Responsible Investor Association of Australasia, and; the One Planet Sovereign Wealth Fund initiative - established in 2017 to accelerate efforts to integrate financial risks and opportunities related to climate change in the management of large, long-term asset pools.[2]

2 *oneplanetswfs.org/wp-content/pdfjs/web/viewer.html?file=https://oneplanetswfs.org/download/185/jan-2024/3221/opswf-network_companion_doc_2024.pdf?lang=all*

(D) SEARCH

The Search pillar is about taking advantage of opportunities presented by the prospects of a transition to a lower-carbon and more climate-resilient world. Investing in climate solutions plays a role in mitigating or adapting to climate change, supporting national and international climate goals and commitments, and reducing systemic risks to the economy.

As part of the Fund's 'Total Portfolio Approach', we set how much risk we allocate to each of our 'Opportunities' through a periodic Risk Budget Review process. The output of this process informs the nature, scale, and risk/return profile of subsequent asset buy/hold/sell decisions across the portfolio.

In 2022/23, we adjusted our Risk Budget Review approach by incorporating judgements on the inherent ESG profiles of each of the portfolio opportunities. In line with our investment beliefs, ESG factors – with a focus on climate change - were considered, alongside the expected 'Information Ratio' and alignment with our endowments. This process determined the risk budget allocation for each opportunity.

The review outcome included upweighting budgets for 'Infrastructure' and 'Sustainable Transition' (private equity) on the basis of the expected positive environmental and social outcomes linked to our investment strategy. Conversely, 'Distressed Credit' was down-weighted. Leveraging upweighted risk budgets for opportunities with inherent potential for both positive investment returns and climate outcomes meant we were able to increase capital investment in sustainable transition solutions in 2023/24.

Impact investments in climate solutions

The Guardians defines Impact Investments as: ***"Investments made with the intent to deliver measurable positive social and/or environmental impacts, and the Fund's required financial return."***

In assessing new prospects, our objective is to scale impact investments through integration across our team and set of opportunities, whilst maintaining our usual investment discipline.

We see potential impact investment opportunities in areas such as low-carbon or transitional infrastructure, private equity, and other assets that may benefit from the system change and capital required to address systemic risks and opportunities in the coming years.

A selection of climate-related impact investments are included as case studies below, with additional investments and information available in the 'Sustainable Investment' section of the Annual Report.

Industrial Decarbonisation & Circular Economy, USA

In 2023, the Fund committed approx. NZ$170 million to Ara Partners' Fund III targeting industrial decarbonisation and circular economy investments (arapartners.com). Ara seeks growth equity investments in US companies committed to greening large-scale industrial and manufacturing; chemicals and materials; energy efficiency; and food and agriculture sectors.

For example, Ara company Genera is scaling up the use of agricultural residues to produce biodegradable moulded fibre pulp, products and packaging. Genera's business model directly replaces carbon-intensive and wasteful plastic packaging systems, whilst reducing land conversion, water use and pollution by promoting more sustainable agricultural and industrial production practices.

Taranaki Offshore Wind Power Partnership, New Zealand

The Taranaki Offshore Partnership (taranakioffshorewind.co.nz) is a joint venture between the Fund and Copenhagen Infrastructure Partners to assess the feasibility for a large-scale investment in New Zealand's transition to a lower carbon, more energy secure future.

Taranaki is the preferred location due to the world-class wind resource in the South Taranaki Bight, extensive existing maritime and energy infrastructure, and a workforce with transferable skills from the legacy oil and gas industry.

The project is potentially scalable, generating between 1 and 2 gigawatts of low carbon electricity, requiring investment of up to NZ$5 billion.

Taranaki Offshore Partnership feasibility study deploys marine mammal detection devices

3.4 CLIMATE ACTION PLAN

Rather than seek to optimise our portfolio based on a specific normative or 'base case' future scenario, the Guardians of the Future, our Sustainable Finance Strategy, CCIS and Climate Action Plan aim to establish the basis for the Guardians' integrated, adaptive approach to positioning the Fund in readiness for a range of uncertain global and local climate and socio-economic pathways and outcomes (see Box 2).

Adoption Provision 3 - Transition Planning [CS2-15]

The Guardians has opted to disclose transition-related aspects of our strategy covering approximately 75% of the Fund's assets under management in Section 3.3. Climate Change Investment Strategy and 3.4. Climate Action Plan. We will continue to review and revise our approach to climate-related strategy, transition / action planning, and disclosure.

The Guardians and other CFIs signed up to the Paris Aligned Asset Owners Net Zero Commitment, involving more than 57 investors representing US$3.3 trillion in assets under management. This means we will take deliberate actions to help put the world on a path to achieving net zero emissions by 2050. The Commitment requires us to:

- review and update our targets every five years or sooner
- report annually on the strategy and actions implemented
- track progress towards achieving objectives and targets
- disclose in line with the TCFD (or equivalent).[3]

Under this Commitment and informed by our existing CCIS, we submitted a Climate Action Plan in 2022 prioritising the most material climate-related risks and opportunities across our largest asset classes. These were determined to be Scope 3 emissions under the following:

1. Passive global listed equities portfolio, representing approximately 40% of the Fund's total assets under management (AuM)
2. Active quantitative multi-factor strategies (~19% AuM)
3. Corporate portion of our passive fixed income / bond portfolio (~7% AuM).

We address other climate-related risks and/or smaller asset classes on a case-by-case basis, as appropriate.

3 *PAAO publishes signatory disclosures and progress reports on its website (https://www.parisalignedassetowners.org/signatory-disclosures)*

(i) Passive global listed equities

Following extensive research, analysis, testing and consultation, the Board approved a wholesale shift of our passive listed equities portfolio into Paris Aligned Benchmark indices in 2022. This involved applying an off-the-shelf methodology from MSCI aimed at reducing exposure to climate-related risks, supporting transition of high impact sectors, and increasing exposure to climate solutions.

Practically, this involved changing the benchmark of our passive equities portfolio from the MSCI ACWI IMI (Investable Markets Index) to a combination of MSCI: World Climate Paris Aligned Index, and the Emerging Markets Climate Paris Aligned Index.

The Paris Aligned Benchmark indices are designed to enhance overall ESG performance beyond emissions reductions, through inclusion of additional criteria and characteristics (Figure 4). This includes increased capital allocation to climate solutions and reducing estimated 'Climate Value-at-Risk' associated with the portfolio – based on an approximation of transition and physical risks from climate change.

While these Paris Aligned indices should ensure that the Fund's passive global equity positions are better aligned with net zero objectives, they do not fully eliminate exposures to fossil fuel reserves. As such, we continue to apply a custom negative screening overlay to our passive equity holdings to further reduce exposure to potential emissions from fossil fuel reserves, in line with our targets.

We believe that being one of the first asset owners to adopt a Paris Aligned Benchmark at scale will help facilitate market adoption of this and similar low-carbon indices. Market participants are also able to trade derivatives on the index which is part of the measure of success for a benchmark.

NEGATIVE ESG SCREENING	TRANSITION RISK		GREEN OPPORTUNITY	1.5°C ALIGNMENT	PHYSICAL RISK
Controversial weapons	Carbon intensity reduction (Scopes 1, 2 and 3)	Neutral exposure to high-impact sector	At least double the green revenue exposure	Self-decarbonisation at 10%	Physical Risk Climate VaR is at least 50% lower
Societal norms violators	Immediate Scope 3 phase-in	Higher allocation to companies with credible emissions-reduction targets	Green/fossil fuel-based ratio – 4x higher than parent	Neutral Aggregate Climate VaR under 1.5°C Scenario	
MSCI ESG Controversy Score	Underweight companies facing transition risk	Significant improvement in Low Carbon Transition (LCT) Score	Overweighting of companies providing solutions		
	Lower fossil fuel exposure	50% minimum reduction in Potential Emissions Intensity			

Figure 4: ESG characteristics of the Fund's passive equity portfolio benchmark

(ii) Active quantitative multi-factor portfolio

During 2023/24, we further advanced our Climate Action Plan by working with our external managers of active quantitative multi-factor investment strategies. This involved testing a range of options for meeting our carbon reduction targets and addressing similar ESG objectives to the (passive) Paris Aligned Benchmark indices (Figure 4).

The outcome included amending some large investment mandates to more explicitly reflect our sustainable finance goal, whilst allowing our managers flexibility in how they address ESG objectives as part of their custom strategies and investable universe.

(iii) Corporate fixed income / bond portfolio

We reviewed our Fixed Income portfolio in 2024, seeking opportunities to improve ESG incorporation and outcomes. The global bond market is evolving rapidly, and low-carbon or carbon-efficient bond indices are being developed.

As part of the review, we considered: approaches to ESG integration in the approximately 15% of our portfolio in fixed income assets (bonds); options for aligning our fixed income portfolios with our net zero commitment, and; explored bringing our fixed income portfolio in scope of our carbon footprint methodology.

We opted to shift the corporate portion of our passive bond mandate to a Paris-Aligned Benchmark in the first quarter of 2024/25. Similar to our passive equity index, this new index will create a range of improvements to the ESG performance of our corporate fixed income portfolio, including reducing emissions intensity, increasing holdings from companies actively investing in climate solutions, and removing holdings of a number of companies facing severe controversies. Corporate bonds represent approximately 7% of the fixed income portfolio.

We will continue to monitor options for other types of bonds as index solutions develop.

Risk Management

The Sustainable Investment Framework addresses investment risks to the portfolio, guides our role in supporting the shift to a sustainable finance system, and helps manage climate-related reputational, legal and regulatory risks

4 RISK MANAGEMENT

4.1 OVERVIEW OF RISK MANAGEMENT APPROACH

Our Board has established it is willing to take risks to achieve the Guardians' Mandate, Purpose and Vision, commensurate with the return objective and time horizon of the Fund. The Board expects the Guardians to use all reasonable measures - without imposing excessive costs or constraints - for managing across four categories of risk: Culture, Governance, People, Processes.

Our Annual Report describes the Guardians' risk appetite, culture, and general approach to risk assessment and management. Our Risk Management Framework states that accountability for investment and enterprise risk identification and mitigation sits across all parts of our team.

Investment risk is managed by the adoption of the Reference Portfolio, approved investment constraints, and the SIPSP. The Investment Risk Allocation Policy and Risk Management Policy and Procedures are reviewed annually by management, and at least every five years by the Board. The Board and leadership of the Guardians are responsible for the oversight of key risks, supported by a Risk Committee and Investment Committee.

The Board receives an Enterprise Risk report every six months, reflecting the strategic and emerging risks identified by the Guardians' business units and

Leadership Team. Each business unit conducts periodic Business Environment Scans and Risk Register Reviews that identify the risks, controls and action plans relevant to its specific objectives and activities.

The Risk Committee oversees identification and management of existing, evolving or emerging risks, determining which should be escalated. The Leadership Team and Board review the top risks and evaluate the effectiveness of our risk management plans and if any further action is needed.

4.2 CLIMATE-RELATED ENTERPRISE RISK MANAGEMENT

We recognise climate change as a strategic risk to the organisation. In 2023, we conducted a Risk Control Effectiveness Assessment, determining that the nature of climate-related enterprise risk could be more accurately defined as: *'the Guardians does not effectively manage climate-related risk'* over which we have agency (as opposed to the inherent climate change risks themselves).

The assessment considered climate risk causes, impacts and transmission pathways – especially in terms of how climate-related investment risks may translate into enterprise risk. The following six climate-related risks were determined to have the potential to lead to unpredictable impacts on our portfolio and/or organisation:

- Potential investment underperformance due to miscalculated climate risk, along with concerns related to reporting
- Market volatility affecting public/private climate commitments and/or investments in vital climate change mitigation and adaptation initiatives
- Reputational damage if our climate change response actions are perceived as insufficient or excessively ambitious and financially imprudent
- Legal or quasi-legal actions being taken against the Guardians
- 'Greenwashing', where our climate metrics, standards and/or reporting overstate our position relative to evolving good practices over time
- Organisational disruption due to more frequent or severe natural hazards linked to climate change.

Along with the six causes and impacts, the assessment identified 12 core risk controls and several other activities / actions that support the Guardians in managing and monitoring this risk (Figure 5). The findings of the assessment demonstrated that our SIPSP, Sustainable Investment Framework and CCIS collectively act as core risk controls; addressing climate-related enterprise risks and supporting the delivery on our mandate.

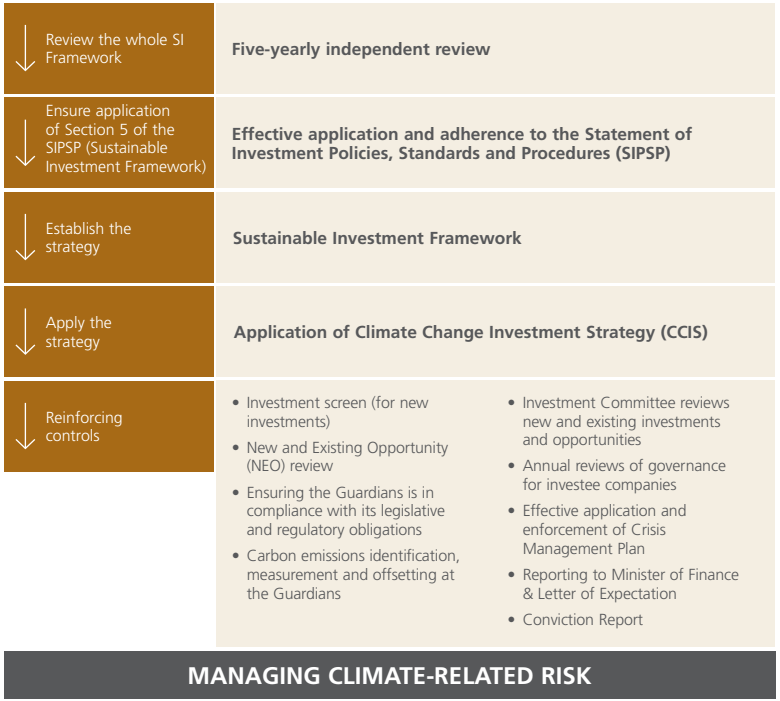


Figure 5: Nested controls for managing climate-related risk to our enterprise

The Sustainable Investment Framework (contained within the SIPSP) addresses investment risks to the portfolio, assists the Guardians in playing our role in the shift to a sustainable finance system, and helps manage climate-related reputational, legal and regulatory risks. The CCIS is an underpinning strategy in the SI Framework. The SIPSP and SI Framework are approved by the Board and are the main controls for investment-related ESG risks, including climate change. The Board's approval of the Paris-Aligned Benchmark portion of the Reference Portfolio itself reflects recognition and action on climate change risk and opportunities.

The assessment noted that our investment teams and committees frequently identify areas for further climate research and refinement of systems, processes and tools - emphasising the importance of professional judgement often required when assessing the complex area of risk. It determined that the current design and operating effectiveness of the control environment we rely on to manage climate risk was adequate for managing the defined risk. Figure 5 is not exhaustive but highlights the primary controls used in managing the Guardians' climate risk effectively. These will be reviewed on an annual basis as part of our CRD process.

Third party risk

The key third parties linked to the Guardians climate-related activities and disclosures include: MSCI, external investment managers, and the NGFS.

MSCI is our principal ESG data service provider, covering carbon emissions data for listed equities, CVaR analysis and provision of our Paris-aligned benchmark information. Risks regarding the quality/accuracy of third party supplied data are difficult to fully mitigate, with the potential for results to vary from an under- to an over-reporting of climate-related risks.

MSCI looks at a broad range of dimensions when assessing the quality of input data used in their ESG and climate models, including completeness, timeliness, accuracy and traceability back to sources. Section 6 discusses the methods, assumptions and limitations in more detail.

We expect our *external investment managers* to consider relevant climate change risks and impacts when investing on our behalf. Before we invest we undertake due diligence with managers, communicate our belief about the materiality of climate change and ask managers to integrate consideration of climate change in their investment process, as appropriate. We monitor managers' performance on these issues over time. In 2023/24, we developed a new rating framework to make our ESG expectations of managers clearer and allow us to more effectively and objectively monitor their sustainable investment performance. This framework explicitly considers managers' practices on measuring and improving the climate performance of their portfolios

The *NGFS* is the key climate change scenario source for the majority of central banks and financial supervisory agencies in the markets where we invest. Given our awareness of the limitations and estimation uncertainty inherent in NGFS outputs, we have not prioritised specific third-party risk analysis for NGFS.

Fraud risk

The risk of climate-related fraud was discussed by the climate working group and determined as very low likelihood due to lack of any direct incentive or opportunity by any Guardians' individuals, groups, or suppliers. We will continue to monitor and assess fraud risk as our climate-related strategies, practices and targets evolve.

Metrics and Targets

We estimate the carbon emissions intensity, potential emissions from fossil fuel reserves, and climate value-at-risk of the Fund's portfolio each year.[1]

1 *See Box 3 and Box 4 for limitations.*

5 METRICS AND TARGETS

5.1 CARBON EMISSIONS INTENSITY

We determined the Fund's financed emissions (Scope 3; Category 15) as the most material aspect of climate-related risk from across the Guardians value chain, comprising the underlying securities and investee companies in the Fund (see Box 3). The Scope 1, 2 and 3 emissions arising from the Guardians' operations - including investment management and fund administration - are considered relatively immaterial and are not disclosed in this report.

Box 3: Adoption Provision 4 and 5
Adoption Provision 4 - Scope 3 GHG emissions [CS2-17]
The Guardians calculate and disclose the emissions intensity and potential emissions from fossil fuels for the majority of our material (Scope 3; Category 15) GHG emissions. A subset of emissions sources have been omitted based on specific criteria. We have opted not to disclose our gross GHG emissions. See Appendix and our Carbon Footprint Report for more detail.[1]
Adoption Provision 5 - Comparatives for Scope 3 emissions [CS2-18]
The Guardians disclose comparative Scope 3 GHG emissions intensity and potential emissions from fossil fuels for the preceding two reporting periods (Table 2).

1 nzsuperfund.nz/how-we-invest/sustainable-finance/climate-change/

The Board sets the Fund's carbon emissions reduction targets and methods. They monitor progress against these targets through an annual Sustainable Finance Report (internal only), and dedicated portfolio Carbon Footprint Report (published annually on our website).

Our 2025 emissions reductions targets - measured against the Fund's unadjusted Reference Portfolio as at 30 June 2024 - are to:[2]

- ***reduce the carbon emissions intensity of the Fund by at least 40%***
- ***reduce potential emissions from fossil fuel reserves owned by the Fund by at least 80%***

We achieved these targets ahead of time (June 2023) and opted to continue seeking opportunities for further reductions. See our Climate Action Plan (3.4) and 2024 Carbon Footprint Report for further detail.

2 *See Glossary for definition of the 'Unadjusted Reference Portfolio'*

The Fund's approach to carbon foot printing, associated assumptions and methodologies, and the resulting outputs (Table 2) have been externally assured (refer to the independent Assurance Opinion for details).[3]

To ensure we are on track to meet our carbon reduction targets, we calculate the carbon footprint of the Fund's portfolio and its potential emissions from reserves each year using MSCI ESG Research.

Our goal is to produce a carbon footprint covering the whole portfolio, however, we currently attribute nil emissions, revenue, and potential emissions from fossil fuel reserves to: bonds; positions which are market neutral over the long term, or; investments which have no clear carbon footprint, such as life settlements, currency exposure, wireless spectrum, and natural catastrophe insurance.

3 *nzsuperfund.nz/how-we-invest/sustainable-finance/climate-change*

	30 Jun 2020	30 Jun 2021	30 Jun 2022	30 Jun 2023	30 Jun 2024
Emissions Intensity (tonnes CO_2e / $USm in sales)					
Unadjusted Reference Portfolio	212.9	207.1	194.8	175.8	167.2
NZ Super Fund	127.6	109.5	99.4	70.9	59.6
% reduction	**-40.0%**	**-47.1%**	**-49.0%**	**-59.7%**	**-64.4%**
Potential emissions from fossil fuel reserves per USD million invested (tonnes CO_2e / $USm Net Asset Value)					
Unadjusted Reference Portfolio	2,324	1,663	1,524	1,331	1,247
NZ Super Fund	233	106	134	16	23
% reduction	**-90.0%**	**-93.6%**	**-91.2%**	**-98.8%**	**-98.2%**

1 See Glossary for definition of the 'Unadjusted Reference Portfolio'. See our Carbon Footprint Report for more information.

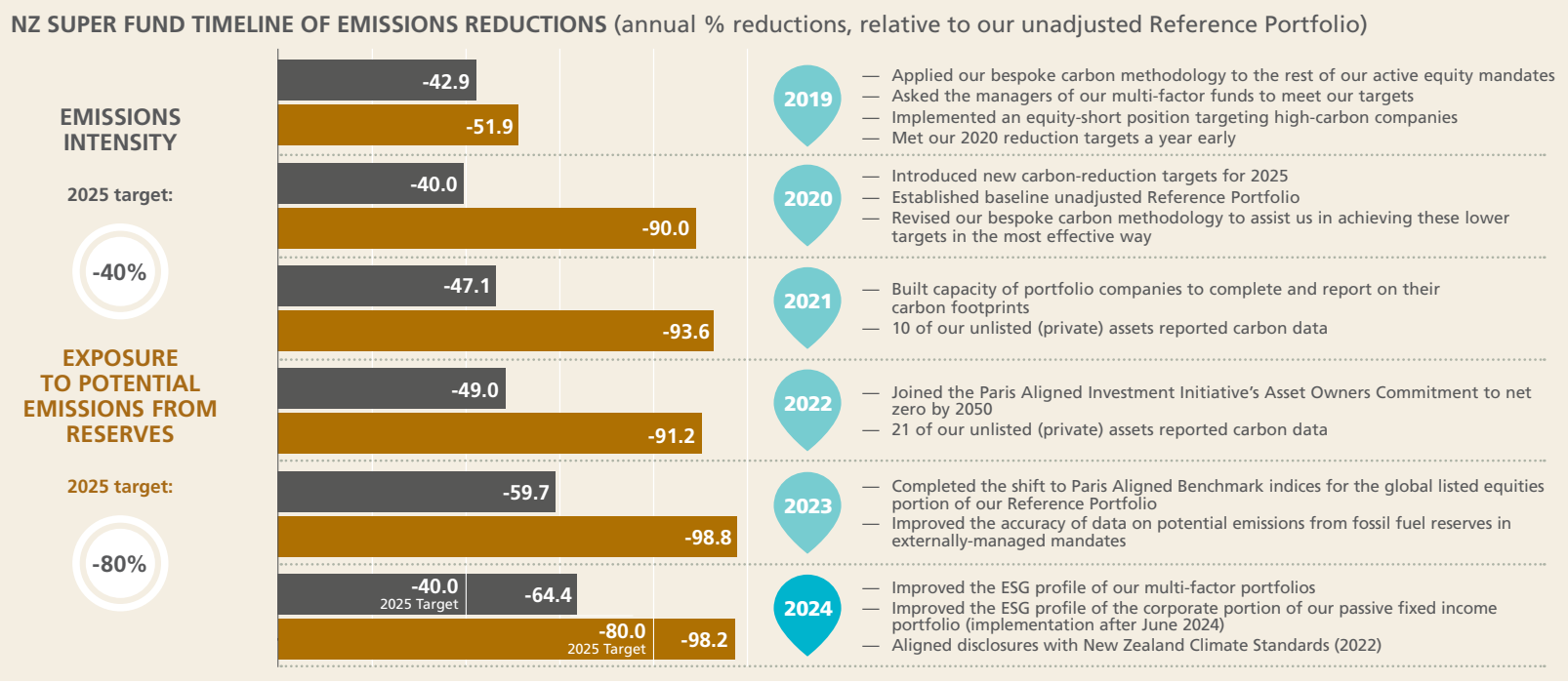
Table 2: Annual estimated emissions intensity and potential emissions from fossil fuel reservces of the Fund (2020-24) relative to an unadjusted Reference Portfolio[1]

Consistent with New Zealand's other Crown Financial Institutions, we also calculate figures for the reduction in the Fund's carbon intensity and fossil fuel reserves relative to a 2019 baseline; defined as the carbon footprint of the (unadjusted) 2019 Reference Portfolio. See our Carbon Footprint Report for more information.

Whilst our current carbon foot printing methodology is generally aligned with global good practice (as represented by the TCFD)[4] and has been subject to annual external limited assurance since 2018, limitations in our emissions data and foot printing methodologies remain. Carbon accounting methodologies have continued to evolve since the current targets were established.

We are in the process of reviewing alternative approaches as part of our scheduled review of our carbon targets beyond 2025, including methods from the Partnership for Carbon Accounting Financials (PCAF). The main differences between PCAF and our current methodology relate to the treatment of fixed income, and the choice of adopting a market cap versus a revenue-based approach.

4 *Table 3 (p53), TCFD, 2021. Implementing the Recommendations of the Task Force on Climate-related Financial Disclosures (https://assets.bbhub.io/company/sites/60/2021/07/2021-TCFD-Implementing_Guidance.pdf*



Our first carbon footprint was published in 2017.

Figure 6: The Fund's emissions reduction journey (2018-2024)

5.2 CLIMATE VALUE-AT-RISK

We run the CVaR model on our actual listed equities portfolio using the three NGFS scenarios outlined in Section 3.3; Table 1: *Net Zero 2050, Delayed Transition, and Current Policies* and compare these results (Table 3) to our unadjusted Reference Portfolio (as at 30 June 2024.

		SCENARIOS[1]		
PORTFOLIOS		Net Zero 2050	Delayed Transition	Current Policies
Unadjusted Reference Portfolio *(ACWI IMI + NZX50)* [2]	**Total VaR %**	**-26.02**	**-18.57**	**-20.85**
	Physical Risk %	-5.60	-8.15	-15.57
	Transition Risk %	-20.41	-10.42	-5.28
Actual portfolio *(as of 30 June 2024)*	**Total VaR %**	**-2.23**	**-2.86**	**-3.30**
	Physical Risk %	-2.71	-3.56	-4.90
	Transition Risk %	0.48	0.71	1.60
Overall difference in % VaR		**-23.79**	**-15.72**	**-17.56**

1 NGFS Scenarios (Table 1)
2 MSCI All Country World Investable Market Index (ACWI IMI); NZX50 refers to 50 largest companies (by market cap) trading on the NZ Stock Exchange

Table 3: Difference between the estimated Climate Value-at-Risk of the Fund's actual portfolio (as at 30 June 2024) versus an unadjusted Reference Portfolio

CVaR links listed companies' net present value with an estimate of indicative value-at-risk under a range of climate change scenarios and time horizons.

The CVaR method is subject to limitations due to data gaps, necessary over-simplifications, assumptions and approximations. However, the outputs can be useful for providing high level insights and indications for further analysis. Based on our year-end listed equity holdings:

- Total estimated CVaR under the Net Zero 2050, Delayed Transition, and Current Policies scenarios appears similar under each of the actual and unadjusted Reference Portfolios, though relative contributions from transition and physical risk show distinct variation.
- The higher transition CVaR under the Net Zero 2050 scenario is likely driven by the upfront costs of climate-related policy and technology. Financial models tend to place greater relative emphasis on nearer term impacts, whilst discounting impacts on earnings or asset values over a longer timeframe (i.e. those arising from some chronic physical risks).
- In every scenario, our actual (Climate Paris Aligned) portfolio appears significantly better at reducing physical and transition CVaR than an equivalent market-weighted unadjusted Reference Portfolio. We can infer that the Fund faces less climate-related risk than if we had not implemented our CCIS / Climate Action Plan.
- Under all scenarios, the Fund remains exposed to significant physical climate risk alongside projected positive net benefits from the policy and technology transition.

The results are not predictive of the state that is most likely to occur. Like all climate change scenarios, the NGFS scenarios contain significant degrees of inherent uncertainty. The economic impacts of physical climate change are likely to be greater than anticipated by currently modelling. Chronic physical climate-related risks under Current Policies - including the impact of critical tipping points - are expected to take longer to emerge and be reflected in asset values, compared to nearer-term acute physical impacts and policy / technology shifts.

Companies have a greater degree of agency over their positioning relative to policy and technology risks and local, near-term physical risks, in comparison to the large-scale impacts from shifts in planetary processes.

CVaR analysis does not yet factor in companies' transition plans, meaning that some of the estimated value-at-risk from the transition may be overestimated for those with well-established and feasible plans.

The statement in the Appendix details some of the methods, assumptions, limitations and estimation uncertainties associated with climate scenarios and CVaR models applied.

5.3 CARBON PRICE

We do not use a common internal carbon price across the Fund given the range of sectors and geographies in which we invest. Carbon prices may be factored in as relevant data points for specific Opportunity / investment analyses.

5.4 OTHER CLIMATE AND ESG PERFORMANCE MEASURES

Our adoption of the MSCI Paris Aligned Benchmark indices has enabled us to establish additional climate-related measures for our global passive equities portfolios (see Box 4). The indices aim to track and improve portfolio ESG performance against their benchmark (market-weighted parent indices) by adjusting relative weightings based on:[5]

- Companies facing high transition and physical climate risk (underweight)
- Companies providing climate solutions (overweight)
- Companies with credible emissions-reduction targets (overweight)
- Exposure to 'green revenues' (overweight, by at least double)
- Low Carbon Transition (LCT) Score (improved)
- Physical Climate Value-at-Risk (at least 50% lower than benchmark).

5 *See MSCI for a detailed desciption and methodology for each of these performance measures and their benchmark (different to our unadjusted Reference Portfolio): msci.com/our-solutions/esg-investing/esg-indexes/climate-paris-aligned-indexes*

Our active multifactor portfolios aim to achieve many of the same performance improvements.

Box 4: Adoption Provision 6 and 7

Adoption Provision 6 - Comparatives for Metrics [CS2-20]
Adoption Provision 7 - Analysis of trends [CS2-22]

We do not currently disclose comparative information or trend analysis for climate-related metrics, other than the Fund's estimate Scope 3 carbon emissions metrics (Section 5.1). This is something we will consider in future as more and better data becomes available.

Appendix

STATEMENT ON METHODS, ASSUMPTIONS AND ESTIMATION UNCERTAINTY

This report contains disclosures that rely on incomplete or estimated data, partial or provisional assessments of current and forward-looking information, and related judgements, opinions and assumptions.

Climate change is an evolving concept with high levels of uncertainty - particularly over long-term horizons. Descriptions of the current and anticipated risks/impacts relating to climate change represent estimates only. In particular, this document contains forward-looking statements and opinions about the Fund, markets, our portfolio companies and the environment in which the Guardians operates - including climate-related scenarios, metrics, targets, and statements of the Guardians' and our partners' future intentions and performance relating to them.

We base our statements and opinions on reasonable information available to us at the date of publication. These statements and opinions necessarily involve assumptions, forecasts and projections about the Guardians' future strategies and operating contexts, which may be inherently uncertain and/or subject to contingencies outside of the Guardians' direct control, particularly as to inputs, available data and modelling which is likely to change.

The risks and opportunities described in this report, and our strategies to achieve our targets, may not eventuate or may be more or less significant than anticipated. There are many factors outside of the Guardians' control that could cause the Fund's actual performance or climate-related metrics (including targets) to differ materially from that described, including economic factors, technological developments, climatic shifts, and government, consumer and/or market behaviours.

The following sections provide additional detail on specific methods, assumptions and estimation uncertainty associated with key climate-related disclosures.

(i) Carbon emissions

Whilst the current carbon foot printing methodology is considered generally aligned with good practice and has been subject to successive annual external limited assurance engagements since 2018, limitations in emission data and methodologies remain.[1]

The Guardians' Carbon Footprint Report for the Fund (published on our website, alongside the independent Assurance Opinion) details the basis of preparation, including the full approach, methodology, assumptions, limitations and estimation uncertainties specific to our carbon emissions metrics and targets.[2]

(ii) Climate Scenarios - Network for Greening the Financial System (NGFS)

Most mainstream climate models and associated scenarios like the NGFS retain significant flaws due to inherent conceptual or practical limitations. This means approaches often underrepresent the degree of complexity, ambiguity and potential volatility in projected pathways.[3]

For example, the approach/assumptions underlying the NGFS scenarios are characterised by:

- Poor appreciation and integration of complex but real physical risks, such as non-linear changes via climate tipping points, feedback loops and compounding, cumulative and interdependent climate- and nature-related risks
- Frequent lack of data granularity, geographical resolution, and consideration of asset-level vulnerabilities – a major driver of real-world risk

1 *Table 3 (p53), TCFD, 2021. https://assets.bbhub.io/company/sites/60/2021/07/2021-TCFD-Implementing_Guidance.pdf*

2 *nzsuperfund.nz/how-we-invest/sustainable-finance/climate-change/*

3 *ngfs.net/ngfs-scenarios-portal/data-resources (model: REMIND-MAgPIE v3.2-4.6)*

- Absence of certain transition risks, such as acutely disruptive policy/ technology ('social tipping points'), extreme financial market volatility (climate change-induced or otherwise), and the implication of certain physical climate impacts on asset prices, for example
- Reliance on various assumptions about future social, economic, technological, and policy developments and pathways, which are inherently uncertain
- Absence of non-climatic drivers of risk such as civil unrest or geopolitical conflict over e.g. diminished and/or newly accessible natural resources, systemic vulnerabilities.

In reality, interrelated transition and physical climate risks may compound and be unevenly distributed across time, geographies and/or sectors of society, potentially leading to divergent, unpredictable outcomes.

As such, outputs from most high-level scenario analyses can be considered oversimplified and too benign in most cases, underestimating damages caused by climate change and associated loss of GDP.

(iii) MSCI Climate Value at Risk (CVaR)

The CvaR method is subject to key limitations due to data gaps, necessary oversimplifications, assumptions and approximations. However, the outputs can be useful for providing high level insights and indications for further analysis. The complete CVAR methodology is available from MSCI.[4]

Each scenario provides a point estimate of indicative value at risk. The point estimate MSCI have produced is based on various assumptions and scenarios that, if adjusted, could significantly alter the indicative value at risk. In particular, we note that CVaR assumes companies discount at their Weighted Average Cost of Capital, rather than the social discount rate. Therefore, CVaR results should not be interpreted as reflecting the full social cost, nor are they predictive of the state that is most likely to eventuate.

For the purposes of this CVaR analysis we include the same listed equity portfolio as for our carbon footprint. This excludes some of our synthetic positions. This is because there are data limitations, and because including derivative positions that can change significantly on a day-to-day basis, would introduce undesirable short-term fluctuations which could obfuscate the more material long-term trends. We note that including these derivative positions could have a material short-term impact on these measures so these results should be interpreted with caution.

4 *https://www.msci.com/documents/1296102/39141520/Updated_PUBLIC_CVaR_Meth+doc_EEC.pdf*

GLOSSARY

Term	Description
Asset class	A group of securities or assets that share common risk and return characteristics.
Climate scenarios	A series of assumptions, analyses and informed judgement used to establish plausible projected future pathways and outcomes for global climatic and socio-economic conditions.
Climate value-at-risk (CVaR)	A forward-looking and return-based valuation assessment to estimate climate-related risks and opportunities in an investment portfolio.
Endowments	A characteristic of the Fund that provides the Guardians with a natural advantage or edge over the typical investor.
Information Ratio	A measurement of return per unit of risk
Listed (company / equity)	A company is described as listed if its stock shares can be bought and sold through a public stock exchange.
Opportunity	Guardians term, referring to a distinct feature of the investment environment that is conducive to generating positive risk-adjusted active returns. This could be aligned with sectors, asset classes or more nuanced, custom investment concepts or strategies.
Passive management	Passive management, or 'index-tracking', is a style of investment management through which a fund's portfolio mirrors a selected market index. Stocks move in and out of the portfolio according to index inclusion rather than through an active investment decision.
Reference portfolio	A simple low cost, passively managed and well-diversified portfolio of listed asset classes that is consistent with the Fund achieving its return objectives without undue risk. Conceptually, the Reference Portfolio comprises a 100% cash position (NZD) plus a set of risk premiums or excess returns that also sum to 100%. The Reference Portfolio risk profile has an 80:20 split between growth and fixed-income investments.

Term	Description
Risk budget	Articulates the average amount of active risk that is expected to be allocated to an opportunity or group of opportunities. Risk budgets aggregate to the total active risk budget. Risk budgeting is a stage of the risk allocation process.
Synthetic portfolios	Obtaining exposures using derivatives. Generally does not require funding.
Unlisted	An unlisted security is a financial instrument that is not traded on a formal exchange.
Unadjusted Reference Portfolio	The term 'Unadjusted Reference Portfolio' links back to the benchmark indices in use as the Fund's Reference Portfolio (see above) when we established our current carbon emissions reduction targets in 2020. That benchmark comprises a combination of the MSCI All Country World Investable Market Index (ACWI IMI) and the NZX50. We consider what those original benchmark indices own at each subsequent year end (30 June 2024 in this latest case) as the 'unadjusted Reference Portfolio' - for the purposes of a baseline against which to compare performance of our actual portfolio on carbon metrics, targets and climate value-at-risk (only).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