


TCFD Implementation

Practical Insights and Perspectives from
Behind the Scenes for Institutional Investors



**INVESTOR
LEADERSHIP
NETWORK**



Climate change is a major systemic risk and perhaps one of the most daunting challenges of our time. We are eager to act together to address this global challenge head on.

CONTENTS

FOREWORD	01
SETTING THE SCENE	03
GOVERNANCE Having accountability at the Board, executive, and management levels	05
STRATEGY Using climate risks and opportunities to inform strategies	11
SCENARIO ANALYSIS Assessing the resilience of strategies against global warming scenarios	19
RISK MANAGEMENT Integrating climate change into existing risk management processes	27
METRICS Defining metrics to measure climate risk exposure and opportunities	33
TARGETS Setting targets that contribute to a low carbon economy	43
WHAT'S NEXT ON THE HORIZON	49
CONTRIBUTORS	52

ABOUT US

The Investor Leadership Network (ILN) is an open and collaborative platform for leading investors interested in addressing fundamental, long-term sustainability and systemic challenges. As a direct outcome of Canada's 2018 G7 presidency, the ILN focuses on concrete actions and global partnerships.

Working together, we are committed to providing resources, expertise, and networks to help address three significant global problems: climate change, gender equality, and the infrastructure gap.

Our aim is to accelerate collective action and offer robust, practical solutions.

FOREWORD

This document is a reflection of the thinking that has gone into the ILN Climate Change Initiative, with the goal of speeding up the implementation of uniform and comparable climate-related disclosures.

It is a "behind the scenes" view of our experiences and lessons learned implementing the Task Force on Climate-related Financial Disclosures (TCFD) recommendations.

Join us as we uncover the diverse approaches we took, the challenges we faced, and the reasons behind our choices.

While we certainly don't have all the answers, we hope you find our experiences useful.

Climate change is a major systemic risk and perhaps one of the most daunting challenges of our time. With more than \$6 trillion in assets under management, we are eager to act together to address this global challenge head on. We believe that a better understanding of climate-related risks and opportunities through increased disclosure will help us make more informed investment decisions.

In December 2015, the TCFD was established by the Financial Stability Board to develop a set of voluntary, consistent disclosure recommendations for use by companies in providing information to investors, lenders, and insurance underwriters about their climate-related financial risks. After considerable stakeholder consultation, the TCFD recommendations were launched in 2017.

Since the launch, it has been encouraging to see the TCFD recommendations gain widespread adoption among global investors. However, we recognize there is still a lot to be done to get us closer to a more uniform and comparable approach to disclosure.

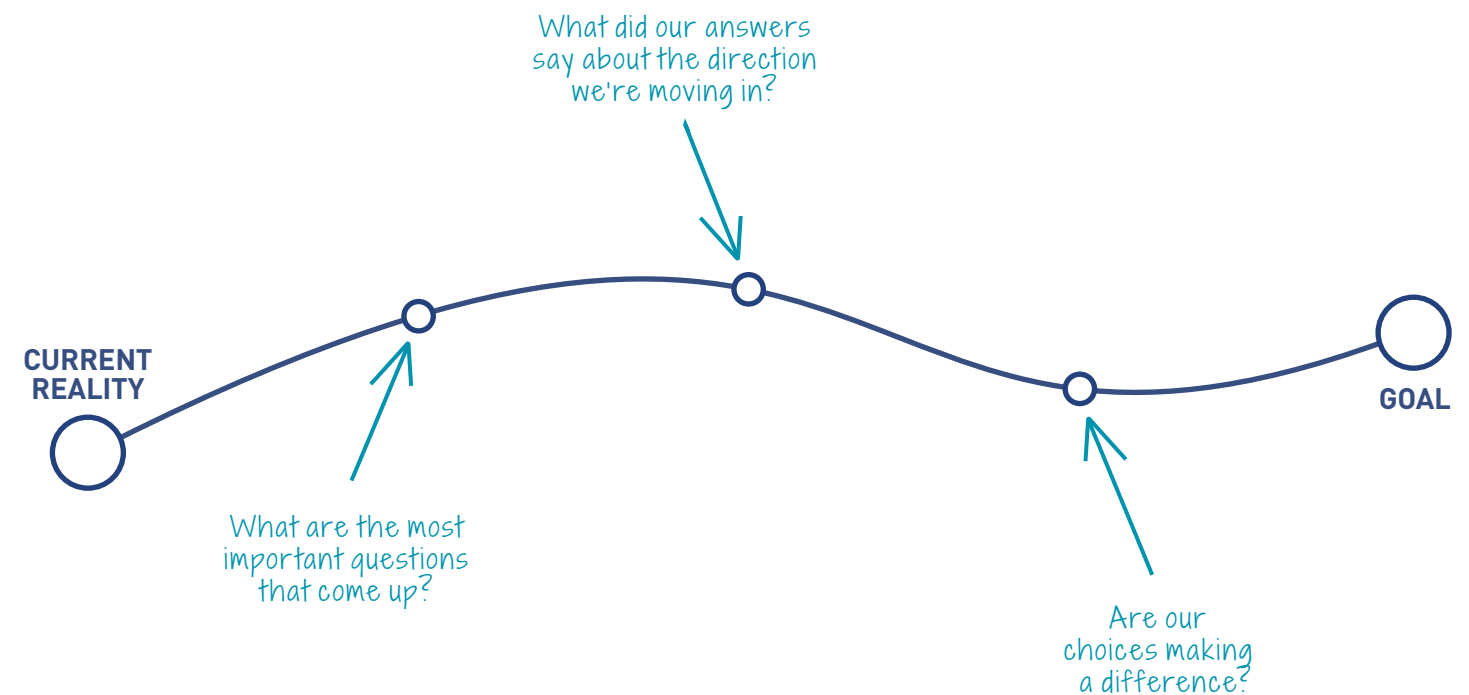
Following Canada's 2018 presidency of the G7, we launched our Climate Change Initiative with this very question in mind: "What could we do to accelerate the implementation of the TCFD recommendations to bring us closer to a more unified approach?"

We started by setting up a working group and reflecting together on our shared experiences implementing the TCFD recommendations. We set out to discover where we could be of most use to other investors, and realized that

our strength was in the details underlying our experiences. It was not what we were disclosing publicly on the TCFD recommendations that was insightful, but rather how we approached the TCFD recommendations and why we implemented them the way we did. What makes our perspective unique is the process behind our choices, the challenges we faced along the way, and the lessons we learned.

By writing this document, we want to share these "behind the scenes" experiences with you to shed some light on how we have been approaching the TCFD recommendations. We hope you gain a fresh perspective and find our experiences both practical and insightful!

THE JOURNEY TOWARDS BETTER DISCLOSURE



DISCLAIMER: The views and opinions expressed in this document do not represent the position of all the ILN partner organizations. Throughout the document, references to "we", "most of us", "many of us", and "a few of us" are used to provide the reader with the scope of perspectives reflected. This document in no way constitutes an offer or a sales promotion, or an advice service, in particular an investment advice.



SETTING THE SCENE

Disclosure on climate-related risks and opportunities is critical if we, as investors, are to make informed and efficient capital allocation decisions.

For many years now, most of us have been engaging with companies on disclosure while strengthening how we integrate climate-related risks and opportunities into our decision-making and investment processes.

The 2017 release of the TCFD recommendations was warmly welcomed. It provided an important foundation and common language to build upon, allowing us to chart a path towards the future of climate-related disclosures. We believe that sharing our experiences will help others move forward on their disclosure and hopefully build momentum along the way.

Consistent with the TCFD recommendations, we believe that better disclosure on climate change will contribute to better risk management and make markets more

efficient by providing investors with access to more accurate information. We also recognize the important role we have to “walk the talk”. If we encourage disclosures from others, then we too should do our part to be transparent and clearly disclose our information in line with the TCFD recommendations.

Since the launch of the TCFD recommendations, many of us have been using them to shape our engagement and disclosure activities. While we are at different stages in our climate journey, we have found the recommendations to be useful as we evolve our approach. Along the way, we uncovered unique experiences and valuable insights that we believe could help others on their journey.

Using the common language of the TCFD, we decided to anchor this document in the following thematic areas as a basis for sharing our experiences: governance, strategy, scenario analysis, risk management, metrics, and targets.

GOVERNANCE

Board oversight on risks related to climate change, coupled with clearly defined senior management responsibilities are imperative if financial risks and opportunities are to be effectively identified, assessed, and managed. Boards should stay informed on climate-related matters if they are to appropriately oversee and consider management’s assessment of climate-related risks.

The TCFD recommendations emphasize the importance of having appropriate Board attention and management support to properly understand and manage climate change risks and opportunities: it is the best way to ensure accountability. The Board’s role includes oversight of climate-related materiality assessments, methodological approaches and disclosure protocols for climate-related risks.

Clearly assigned roles and responsibilities, as well as processes to regularly monitor and assess performance can provide confidence that climate change risks and opportunities are well governed.

STRATEGY

To better align the future performance of an organization, the TCFD recommendations set clear expectations for understanding the effects that climate change issues could have on the business, its strategy, and its financial planning over the short, medium, and long term. It is important to view the impacts broadly touching not only products and services, but also supply chains or value chains, adaptation and mitigation activities, and operations. Once understood, the financial implications should be quantified by taking into consideration operating costs and revenues, divestments and acquisitions, as well as capital expenditures and access to capital.

SCENARIO ANALYSIS

One of the key TCFD recommendations focuses on the resilience of the strategy to address climate-related risks and opportunities. There is an expectation to demonstrate how strategies have been assessed against climate change warming scenarios, including a 2° C world above pre-industrial levels as agreed to in the Paris Agreement. Given the complexity of climate scenario analysis, we are all at various stages of implementation.

RISKS

Processes to identify, assess and manage climate-related risks should be well-defined, integrated into existing risk management processes, and have clear parameters for determining their relative significance in relation to other risks. This type of integration is to be considered at the asset, portfolio, and enterprise level of an organization. Once integrated, it promises a more systematic and structured process for disclosing how materiality determinations are made and the rationale regarding whether to mitigate, transfer, accept, or control climate risks.

METRICS AND TARGETS

Metrics and targets help inform an understanding of the exposure and performance on climate-related risks and opportunities. The TCFD recommends metrics to assess climate-related risks and opportunities, adopting carbon footprint metrics covering direct (Scope 1 and 2) and, if appropriate, indirect greenhouse gas (GHG) emissions (Scope 3), as well as the use of targets to manage climate-related risks and opportunities.

PURPOSE OF THIS DOCUMENT

We structured this document on the TCFD thematic areas to provide a useful starting point to share our experiences with implementing the recommendations. We discuss our different perspectives, sketched ideas, and present examples to showcase what we did, why we approached it that way, the lessons we learned and the questions we continue to ponder. Our aim is to bring to life our experiences in a way that is practical and insightful.

As early adopters of climate-related disclosures, many of us have taken the TCFD recommendations as a chance to rigorously analyze our existing practices for overlaps and gaps. The TCFD recommendations give us a framework to look at how and why we do things and where we can improve our processes.

TCFD RECOMMENDATIONS



Source: TCFD Recommendations

- Governance
 - Board oversight
 - Management responsibility

- Strategy
 - Climate-related risks and opportunities
 - Impacts on businesses, strategy, and financial planning
 - Climate scenario analysis

- Risk Management
 - Process to identify and assess risks
 - Process to manage risks
 - Integration into overall risk management

- Metrics and Targets
 - Metrics to assess climate-related risks and opportunities
 - Scope 1, 2 and, if appropriate, Scope 3 emissions
 - Targets to manage climate-related risks and opportunities

GOVERNANCE

Having a climate governance structure in place with clear lines of accountability at the Board, senior executive, and management levels is an important part of the journey to embed climate risks and opportunities into investment decision-making processes.

While there is no “one-size-fits-all” approach to climate governance, we have uncovered interesting insights regarding how we structured our teams; what we did to build consensus, ownership and engagement; and what we learned along the way.

BOARD OVERSIGHT

Driven by a heightened interest in climate change risks, many of us had started to formalize Board accountability well before the TCFD recommendations were published. Over the years, we have seen climate change become an important topic for our respective Board of Directors, given the broad implications across operations, risk management, investments, audit, and reporting.

For some of us, climate change responsibilities have become part of the mandates of Board sub-committees. For example, CDPQ’s Governance and Ethics Sub-Committee of its Board is responsible for climate-related matters as part of its broader responsible investment mandate and its Investment and Risk Management Sub-Committee is responsible for the oversight of risk including climate risk.

Meanwhile, Ontario Teachers’ Investment Committee of the Board has formalized climate change as part of its mandate to oversee their investment strategy and risks.

While Board-level oversight for climate is not new, what has changed since the TCFD recommendations is the level of Board involvement and engagement. Some of our Board members have strong personal interests in the topic, while others recognize climate change as a systemic risk that should be addressed by us, as long-term fiduciaries.

Our Board meetings have moved from brief updates to healthy debates; with challenging questions and greater scrutiny on climate risks and opportunities. Many of us now include pre-read educational materials so that our Board members are even more equipped to have meaningful conversations. Today, Board-level accountability on climate matters is alive and well.

EXECUTIVE DIRECTION

Embedding climate change into all aspects of business decision-making processes is crucial to delivering risk-adjusted returns. Practically speaking, it starts with inclusive leadership. When the CEO takes a leadership role and commits to climate action, it sets the tone for the whole organization and permeates decision-making in surprising ways. Many of our CEOs recognize the critical importance of climate action and, despite high levels of uncertainty, there is now a new sense of urgency in the C-suite.

CEO buy-in did not just happen overnight. It took time and education. Considerable work has gone into building awareness, demonstrating financial impacts on investment portfolios and returns, and strategizing on credible and reliable climate measures for decision-making. In the end, we have found the CEO’s vision and commitment to be instrumental in pushing the agenda forward and inspiring action.

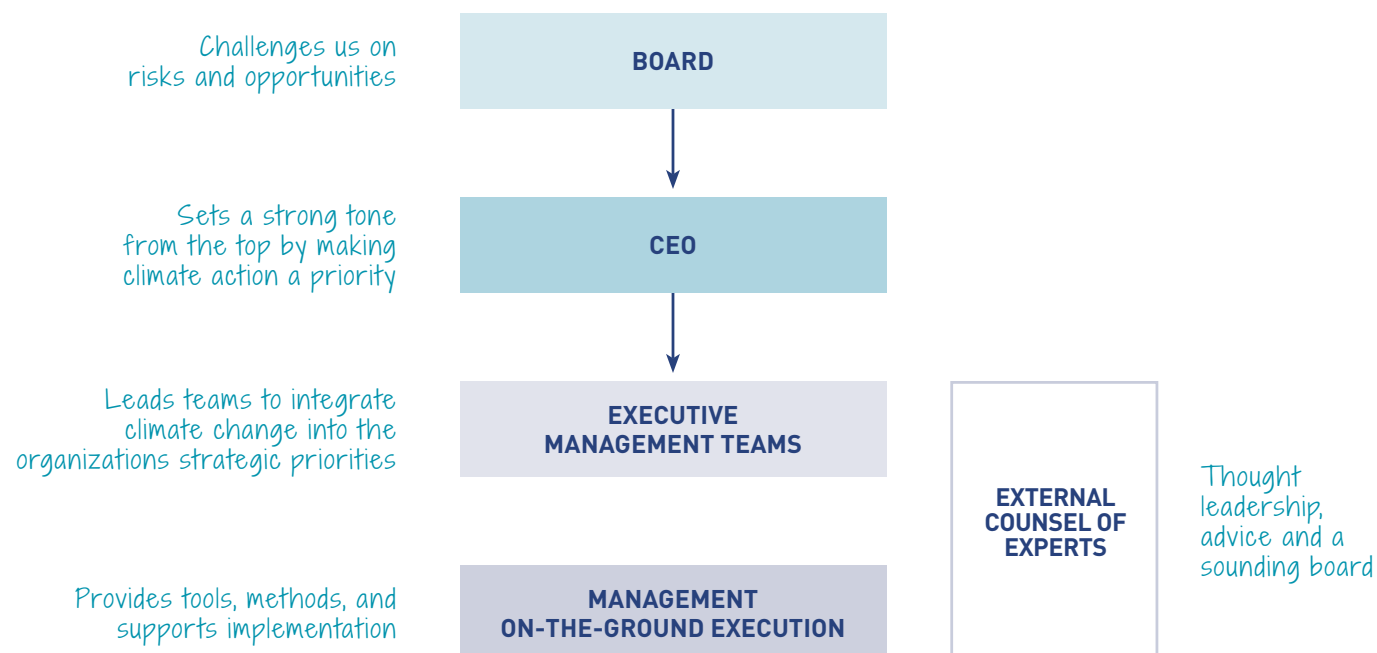
Many of us have formalized climate change accountability within the C-suite, with specific responsibilities assigned to the Chief Risk Officer and/or the Chief Investment Officer to ensure alignment and integration across the business. Some of us have dedicated executive climate change committees, while others have made climate change a key agenda item at existing executive steering committee meetings.

Given the multi-disciplinary nature of climate change, this type of dedicated executive-level oversight enables cross-departmental knowledge and better decision-making. Climate change can be a very complex topic, so having a layer of senior executives involved can go a long way to overcome organizational pressures, accelerate decisions, and facilitate Board-level approvals.

CEO and executive-level commitment is not a given, and is hard to do without, especially when trying to make fundamental changes. For example, when CDPQ set out to define a decarbonization target, their CEO’s commitment was critical. Trying to make fundamental changes that go beyond risk assessments would not be possible without both executive buy-in and endorsement.

GOVERNANCE OVERSIGHT ON CLIMATE CHANGE

IS MULTI-TIERED, COMPRISING BOARD, EXECUTIVE, AND MANAGEMENT-LEVEL RESPONSIBILITIES



In early 2016, when our CEO asked for a credible and realistic climate strategy for action, it gave us a powerful opportunity to set ambitious targets, build capacity, and drive action across our investment teams.

- CDPQ



The tone from the top is critical. You really need your CEO to be leading the charge and making climate change a priority.

– CPPIB



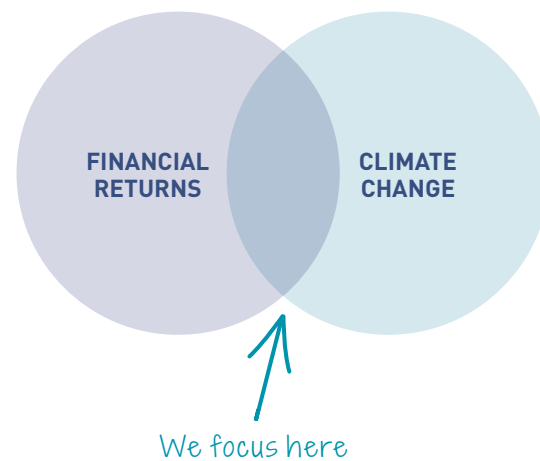
SETTING THE TONE FROM THE TOP

The evolution of our journey towards better climate disclosure goes back to the strong tone from the top set by our CEO and Board more than two years ago. At that time, climate change was defined as a top issue facing our organization as a long-term investor – one that must be considered and fully integrated into our investment decisions.

The heightened interest in climate change led us to set up a formal Climate Change Program in 2018 to be overseen by our Climate Change Steering Committee (CCSC). The CCSC is mostly made up of Senior Managing Directors, who lead our various business lines. We deliberately set up the CCSC this way to reflect the cross-disciplinary nature of climate change and to support our firm-wide effort to be coordinated and informed.

When we go to the CCSC for approval on initiatives, they ask us tough and challenging questions to ensure that our teams are doing their homework. Their close proximity to the Board, knowledge of the business, and decision-making authority have helped us prioritize and accelerate action.

The CCSC oversees our Climate Change Program Management Office (CCPMO) and Climate Change Management Committee (CCMC), which in turn guide and support the Program’s six climate-related work streams. The CCMC comprises more than a dozen senior professionals from various investment and core services departments and meets monthly to discuss key milestones and our progress on various work streams. The presence of an on-the-ground team has really helped embed climate change deeper into our business.



Taking the time to engage executives on climate change trends, risks, and opportunities can build awareness, drive consensus, and gain buy-in. In the meantime, focusing on just a few tactics to embed climate change thinking into existing processes can be worth its weight in gold. We have had good results by just starting discussions with our risk and investment teams on the importance of integrating climate change risks and opportunities into existing Enterprise Risk Management (ERM) frameworks and investment due diligence assessments.

CLIMATE POLICIES AND RESPONSIBILITIES

One of the key first steps to embedding climate change is to formalize commitments, establish clear processes, and define roles and responsibilities.

Many of us began by articulating our responsible investment policies and underscoring the importance of climate change under the broader Environmental, Social, and Governance (ESG) umbrella. For example, at OMERS, taking steps to strengthen their climate governance processes was an important part of their journey. By formalizing their Sustainable Investing Policy and defining specific

guidelines on climate change, OMERS was able to clearly articulate their climate change beliefs, document what was already part of their day-to-day business, and engage their investment teams.

Climate change roles and responsibilities usually sit within the broader ESG mandate. Our ESG teams have up to a dozen people. Some of us have a few individuals within our ESG teams who dedicate a majority of their time solely to climate change. These are individuals with climate experience and expertise combined with some knowledge of risk management and investments. For example, Ontario Teachers’ has one individual from their ESG team dedicated to climate change. Having specific climate and energy expertise on the team has provided Ontario Teachers’ with greater credibility when engaging investment teams, while supporting the integration of climate change risks and opportunities into investments. It also helps them get more done in-house in terms of climate risk assessments, tools, and frameworks before having to bring in outside expertise.

Whether they are climate change generalists or specialists, our professionals are rolling up their sleeves to uncover the tools, methods, and processes to help us identify, assess, and

manage climate risks and opportunities. While climate change responsibilities often sit in the ESG group, some of us are considering integrating climate change into our risk groups in alignment with TCFD recommendations.

CROSS-FUNCTIONAL COLLABORATION

Given the multi-dimensional nature of climate change, many of us have also formed committees bringing various functions together in one forum, instead of doing things in silos. For example, CPPIB’s Climate Change Steering Committee comprises almost half of their senior executive team. It includes Senior Managing Directors who lead various functions within CPPIB, from Public Affairs and Communications to Finance Analytics & Risk, Real Assets, Active Equities, and Total Portfolio Management.

Getting the business lines involved has been a key success factor for many of us. Some of us have identified champions across the organization to help embed and support the integration of climate change in existing processes. Taking both a top-down and bottom-up approach has been effective in accelerating climate action.



EXTERNAL ADVISORS

We supplement our internal ESG teams with support from external advisors on climate change, who play an important role in providing advice on best-in-class strategies and methodologies. They also act as the sounding board. Where an in-house dedicated ESG team is not an option, external advisors can be a useful means of navigating the myriad of approaches to address climate change.

PERFORMANCE INCENTIVES

We have debated whether tying performance on climate change to financial incentives drives accountability and results. Perspectives are mixed. A few of us have set clear climate change targets for our teams, linking them directly to financial incentives. Holding our teams accountable in this way has resulted in more engagement – provoking a greater level of interest. Others among us feel incentives can be stifling and may not always drive the right behaviours.

CULTURE SHIFT

Having a strong climate governance structure will only take you so far. For those of us that have been at this for a few years now, change happens when our people’s mindsets shift and a climate change culture emerges. Practically speaking, it starts with educating and bringing the right level of awareness to the teams most impacted by climate change.

As part of capacity building, it is important to work collaboratively with multi-functional teams to explain climate change methodologies, identify and assess climate risks and opportunities, and work together on plausible climate scenarios that make sense to our asset classes. In this way, you equip teams to make informed decisions in a way that aligns with climate objectives and strategies.

From there, it is a culture shift. This is no side-of-the-desk initiative. Embedding climate change needs to be central to how all organizations are going to operate going forward, looking at both the risks and the opportunities on the horizon. It is this mindset, combined with a strong culture that will lead to more successful implementation.

OMERS

FORMALIZING OUR CLIMATE CHANGE GUIDELINES

Through the strong leadership and commitment of our senior executives and Board of Directors, we formalized our Sustainable Investing Policy and processes over a period of just a few months. Integrating ESG factors, including climate change, into our investment underwriting and management is not new for OMERS. However, this process helped to formalize and enhance our approach and governance to these issues to ensure we have a consistent approach across our organization.

We started by setting up a working group to accelerate action on a framework. The working group allowed us to be flexible and nimble, with appropriate representation, including strong investment experience, and a reasonable size to get things done. Our goal was to develop an overarching Sustainable Investing Policy which sets strategic direction; Guidelines to provide further detail and guidance on items like specific ESG factors; and Procedures which were developed by each of our Business Units, outlining how they will implement the Policy and Guidelines in their investment and asset management processes, recognizing the unique nature of each Business Unit (e.g., Capital Markets versus Infrastructure). We also developed climate change guidelines which strengthened our focus on climate change explicitly based on two principles:

- a) that climate change will affect many industries and sectors, creating long-term risks and opportunities that could financially impact our pension plan and funding status; and
- b) the importance of collaboration with investors, governments and regulators to better understand the risks, opportunities and long-term impacts, and how they may affect our ability to meet our pension promise.

To execute on our commitments, we set up a cross-functional Sustainable Investing Committee which meets regularly to facilitate cross-enterprise communication, awareness of emerging sustainable investing issues and best practices, and to drive implementation of the framework across the enterprise. With climate change identified as a top emerging risk, quarterly updates are being provided to the Board of Directors.

Engaging our investment teams throughout this journey has been an integral part of our process. We formalized what they already do well, identified opportunities to improve, and ensured that knowledge and best practices are shared across our various businesses.

KEY LESSONS LEARNED

- Formalizing climate change policies, commitments, or guidelines can help articulate and clarify expectations.
- Taking the time to clarify the financial impacts of climate change can awaken the minds of the investment teams.
- Having executive sponsorship and buy-in sets the tone from the top, which helps to drive and accelerate climate action.
- Determining resource needs based on the business context and identifying key contacts in the asset classes can accelerate climate change integration.
- Setting up multi-functional committees to have conversations on climate change topics encourages shared learning, collaboration, and innovative solutions.
- Involving investment teams to embed climate change risks and opportunities in what they already do on a day-to-day basis has been instrumental in driving buy-in and engagement.
- Educating cross-functional teams is key to building a strong climate change culture.



The most important benefits for us have been the increase in awareness on climate change and the culture change of our people. Our teams have started to think differently, stretching their thinking about how climate risks and opportunities could impact our investments, and creating a common language within our teams.

- Ontario Teachers’

STRATEGY

Actual and potential short, medium, and long-term climate-related risks and opportunities need to be well understood to inform the impacts on a business, its strategy and financial planning. It is important that strategies are resilient to climate change, taking into consideration the transition to a low-carbon economy consistent with a 2°C world as defined in the Paris Agreement.

Determining how climate change risks and opportunities may affect our business operations, investment strategies, and long-term financial planning is an ongoing process. Due to the multi-dimensional impacts of climate change, we need to think broadly on how it could inform our diverse strategies, including top down asset allocations, bottom up ESG screening and due diligence, portfolio analysis, stewardship and engagement, advocacy and collaboration.

The diverse nature of our investments in both public and private markets, and the huge variations in climate change that occur from an asset, sector, and geographic level can further compound the issue. Regardless, many of us have put the work in motion to embed climate risks and opportunities, at both a portfolio and asset level, in strategies we believe will further future-proof our businesses.

CLIMATE RISKS AND OPPORTUNITIES

The scale and multi-faceted nature of climate change poses systemic risks and opportunities for our investment portfolios, affecting how financial systems deliver long-term returns.

Evidence of acute and chronic physical impacts, such as extreme weather events, rising sea levels, heatwaves, and droughts, alongside systemic changes from the transition to a low-carbon economy are emerging. Stringent climate policies, new cleaner technologies, and changing market sentiments have the potential to affect entire economies and business models, which in turn could affect the market value of our financial assets.

As long-term institutional investors, with significant stakes in global economies, companies, and sectors, we recognize the important role we have to ensure risks are identified, understood and mitigated. We want to do our part by developing strategies that are future-proof and enable the shift to a resilient, low-carbon economy.

LOW CARBON AND JUST TRANSITIONS

If we are to achieve the 2015 Paris Agreement of limiting global warming to well below 2°C, we will need a transition that is both fast and fair. This is why most of us are integrating a *Just Transition* perspective into our climate change investment beliefs, recognizing that a successful transition depends on a well-functioning economy that delivers broad social value.

The *Just Transition* builds on, and deepens the core investment case for action on climate change. It focuses on the management of the social aspects of climate change in the workplace and the wider community so that rapid decarbonization is achieved in ways that contribute to inclusive and resilient growth.



Engagement takes time and effort, but might be the most effective way to accelerate the transition to a low-carbon economy while avoiding the creation of stranded workers and communities.

- Generali

CLIMATE-RELATED RISKS, OPPORTUNITIES, AND FINANCIAL IMPACT



Source: TCFD Recommendations

CLIMATE STRATEGIES

Recognizing the potential impact of climate change, many of us have either successfully launched, or are in the process of developing, strategies to manage the risks and opportunities we have identified over the short, medium, and long-term.

In our experience, developing climate strategies requires time and effort. For example, CDPQ spent a lot of time talking about and thinking through possible strategies, gaining buy-in, and building consensus. They took the time to engage internally, including with investment teams, human resources, IT, and data analysts. They also sought external counsel to really challenge their assumptions.

A year later, in 2017, they arrived at a strategy tailor made to fit CDPQ's investment philosophy, processes, and organization focusing on: factoring climate change into investment decisions; increasing low-carbon investments by 50% by 2020; reducing their carbon footprint per dollar invested by 25% by 2025; and exercising stronger climate leadership within the industry and portfolio companies. The fact that the strategy was tailored to the organization facilitated buy-in – a process that developed through an evolution rather than a revolution.

Four strategic priorities that define how we are embedding climate change into our investment decision-making processes stand out:

Engagement and Advocacy – Pursuing active management strategies to encourage improved climate-related disclosure from investee companies, including advocating with policy-makers, regulators, industry associations, and others to encourage better climate disclosures.

Climate Resilience – Future-proofing our investment portfolio for climate-related physical and transition risks and opportunities.

Carbon Mitigation – Reducing the carbon emissions exposure of investment portfolios.

Low Carbon Finance – Allocating capital to finance the transition to a low-carbon economy, including investing in renewables, demand-side efficiency projects, low-carbon energy, and climate resilience.



SUPPORTING A JUST TRANSITION

More than a year ago, in line with our support of the COP 21 Paris Pledge for Action, we made a strategic commitment to stop investing in coal and to reduce our existing €2 billion exposure by disposing of equity investments and gradually divesting ourselves of our bond investments.

In support of a *Just Transition*, we want to ensure the existence of a healthy, resilient, and sustainable society, where no one would be left behind. This is why we plan to engage in countries where the economy and employment depend heavily on the coal sector, representing 0.02% (or 6 companies), of our general account investments.

We are involving issuers, clients, and other stakeholders through constant dialogue, monitoring their environmental impacts, their strategies to shift to low-carbon activities, and the measures for protecting the community and citizens. This process will enable us to decide whether to continue insuring the coal-related activities of these companies, based on a credible transition plan and progress level of implementation.

ENGAGEMENT AND ADVOCACY

Engagement on climate change is now an integral part of our active management strategies. Given the sheer volume of public assets that many of us own with relatively low equity interest (usually less than 1%), collective investor engagement can be an important way to influence public markets. We are exercising our shareholder voice to encourage better corporate disclosure, carbon mitigation, and climate resilient strategies.

Many of us are joining forces with other investors to encourage climate disclosure and mitigation through investor coalitions. Climate Action 100+ was an important endeavour for CalPERS, who worked together with global investor networks (Asian Investors Group on Climate Change (AIGCC), Ceres, Investors Group on Climate Change (IGCC), Institutional Investors Group on Climate Change (IIGCC), and UN Principles for Responsible Investment (PRI)).

Today, Climate Action 100+ is supported by more than 300 investors representing US\$ 33 trillion in assets. It focuses on the world's top publicly traded and systemically

important carbon emitters or companies with significant opportunity to drive the transition to a low-carbon economy.

Among other things, investors sign on to Climate Action 100+ to ask companies to disclose in line with the TCFD recommendations.

Most of us are part of Climate Action 100+ as well as other collaborations such as the Transition Pathway Initiative, PRI, and the Portfolio Decarbonization Coalition, which also help to encourage, define, and implement climate strategies in line with climate science in energy-intensive sectors.

While progress has been made through engagement, challenges remain. For example, climate change resiliency plans are still in their infancy, and many companies still don't record and track climate-related risk and opportunity data. To affectively manage climate change risks in our portfolios, companies across markets and industries will need to provide better disclosure on their climate change resiliency and decarbonization efforts.

We acknowledge, though, that the translation of TCFD reports by investee companies into asset allocation and portfolio management remains challenging. As a result, it is not always clear to companies how their TCFD reports are used by investors. As investors asking for TCFD disclosures, we recognize our responsibility to be transparent and explain to investee companies how their information is being used in our investments decisions.

In addition to direct engagement with investee companies, some of us are also engaging on public policy. For example, through public engagement and in position papers, PGGM is calling for effective public policies that internalize externalities, including carbon pricing.

Meanwhile, AIMCo advocates with policy makers, regulators and stock exchanges to encourage industry-specific climate-related disclosure guidance for companies. They also play an active role in collaborative research and are working to understand the appropriate management of key climate change elements such as methane and water, and how to assess performance with respect to these elements over time.

IN FOCUS

ENGAGING COMPANIES ON CLIMATE CHANGE

Engagement is a tool that we use to evaluate and better understand how a company considers climate change through its operations. It helps us identify a company's level of maturity on climate change issues. Most of us are using the TCFD's recommendation as a standard to focus our engagement efforts.

Some of us are also engaging companies on having a carbon transition strategy in place. In this case, we are looking to see how investees have reflected on climate scenarios, global positioning, R&D, marketing, energy efficiency, value chain considerations, and human resources. Once articulated, the climate strategy should be supported by the company's overall strategic vision.

Engaging companies is an important lever for us to educate and influence investees positively to improve their practices around climate. Examples of how some of us are engaging with investee companies include the following expectations:

- **Board Climate Change Expertise** – especially for companies where climate risks are material;
- **Climate Policies and Related Commitments** – describing processes to address climate risks and opportunities;
- **A Transition Plan** – taking into consideration a 2°C scenario;
- **Carbon Emissions** – including Scope 1, 2, and 3 emissions that are third-party verified;
- **Carbon Reduction Targets** – in line with the Paris Agreement and climate science; and
- **Public Disclosure** – in line with the TCFD recommendations.



ENGAGING INVESTEE COMPANIES ON DECARBONIZATION PATHWAYS

An important lever for achieving our net-zero-emission investment goals and creating an impact in the real economy is through engagement. We have active dialogues with companies to define and implement their own climate protection targets, starting with four particularly energy-intensive sectors: Energy, Transport, Industry, and Materials.

We are also joining forces with other asset owners in encouraging companies to implement such pathways. Our participation in the Transition Pathway Initiative, the engagement platform of Climate Action 100+, the Portfolio Decarbonization Coalition, and PRI connects us with like-minded investors and offers platforms for collaborative engagements.

One of the challenges that we face at present is that many companies are still unable to make precise statements about their carbon performance or the performance of their supply chain, due to a lack of data and procedures. This is why it is so important to use engagement to set clear expectations for measurable and verifiable climate targets that are transparently pursued – for example by joining the Science Based Targets initiative (SBTi).



We are engaging with our companies and fellow investors to understand and address the myriad aspects of climate-risks.

– CalPERS

CLIMATE RESILIENCE

In aiming to protect our portfolios from both catastrophic physical risks like hurricanes or floods and from longer-term chronic weather pattern changes like drought or sea level rise, we are creating strategic opportunities to improve our climate resilience. A few of us are exploring physical risks, in the same way we create strategies for risk factors such as interest rates, equity prices, and inflation. For example, CalPERS is assessing how financial indicators in specific geographies can be tied to climate science to inform spatial finance strategies. Meanwhile, Allianz is using actual and future impacts of climate change to provide risk advice to society and its customers and to develop new products to support climate resilience.

Most of us however, are mainly looking at physical risks on a case-by-case basis. Even then, it can be difficult without company specific data. Because we do not have a way of aggregating physical risks at a portfolio level, many of our climate resilience strategies remain at the asset level.

CARBON MITIGATION

When applying carbon reduction strategies, we have found that some investment sectors are more advanced than others. For instance, in many of our real estate investment portfolios, we are already seeing improved carbon efficiency from energy optimization, and renewable energy investments.

Notably, OMERS' real estate investment arm, Oxford Properties, has managed climate-related risks and opportunities through energy efficiency and sourcing. After extensive financial modelling and analysis, Oxford committed to develop 1 million square feet of rooftop solar projects across North America (building on the 120,000 square feet of rooftop projects already built at the end of 2018). While it took time to build internal understanding and consensus around longer term renewable energy projects, they successfully delivered a compelling business case demonstrating reduced operating costs and accretive returns for their assets. An important factor in their success was the engagement of their internal stakeholders and the commitment they received from their Executive Steering Committee.

The Energy Optimization Initiative of CalPERS' real estate portfolio enables the systematic identification, implementation, and tracking of economically attractive energy-related opportunities. By reducing the carbon intensity of the real estate portfolio, the Initiative is helping mitigate the systemic risk of climate change more broadly to CalPERS' Total Fund, while enhancing returns and the long-term value of CalPERS' investments from energy cost savings and improved attractiveness of the assets to tenants.

In other sectors, particularly those that are relatively more carbon intensive, carbon reduction strategies can be challenging. For example, when engaging with emission-intensive sectors, Allianz found many companies unable to make precise statements about their carbon performance or those of their supply chain. This is why, going forward, they have started to set clear expectations for companies to commit to verifiable climate targets that are pursued and made transparent to not only drive down their portfolio emissions, but, more importantly, to achieve real-world emissions reductions. Companies that do not succeed in adjusting their GHG emissions to the Paris Agreement

target in the mid-term will be gradually removed from their portfolio. However, exclusion or divestment is a last resort at Allianz, restricted to sectors or companies that they believe do not have a place in a decarbonizing economy, such as coal-based businesses.

Most of us choose not to pursue direct divestment strategies, preferring to follow a "voice over exit" approach to encourage climate resilient strategies rather than to divest and unnecessarily reduce the investible universe. While divestment strategies can be an effective risk management instrument, many of us believe divestment is limited in its ability to bring real change. We recognize our power of influence and the opportunity to engage companies regarding how they are managing climate risks and disclosure.

Where climate-related divestments occur, these tend to be driven by policies on coal energy generation and coal mining. A few of us are pursuing coal divestment and exclusion strategies, divesting from companies for example that generate a certain percentage of their revenue from coal or a certain share of their electricity from coal.



WORKING TOWARDS OUR CARBON REDUCTION STRATEGY

We knew at a relatively early stage that we would be including a portfolio carbon reduction goal in our strategy. Our decision-making process took into consideration the possible transition risks we faced.

Our short-term risks were moderate, specific to certain companies and jurisdictions, which we analyzed on a case-by-case basis. Our medium-term risks (less than five years) were mainly of a technological, regulatory or market-related nature or pertained to carbon pricing, which could potentially affect the competitiveness of carbon intensive companies. Meanwhile, our long-term risks (greater than five years) were associated with high carbon intensity sectors for which lower carbon substitutes or disruptive technologies exist.

We spent considerable time thinking and talking about possible strategies and finally settled on a realistic yet ambitious target to reduce our carbon footprint per dollar invested by 25% by 2025. We created a taskforce made up of private and public equity market heads and included the insights from broader internal and external strategy experts. We consulted with our portfolio teams to set carbon budgets for every asset class.

Today, we are on track to meet our carbon reduction strategy and are now actively engaging with companies to understand their carbon transition plans.



Engaging investment managers on our carbon reduction strategy was brought to life when we linked it to their individual financial incentives.

- CDPQ





CLIMATE FINANCE

Many of us are growing our investment portfolios in climate finance by taking advantage of investments in low-carbon and climate-resilient solutions, including energy, water, transport, and agriculture sectors. We are seeing growth in renewable energy markets, as well as in new ancillary markets, such as electric vehicle charging stations, cleaner transportation, industrial efficiencies, and carbon-capture projects.

It is important to actively pursue these climate change opportunities at the bottom-up level, within key functions. For example, CPPIB's Power and Renewables Group is capitalizing on renewable energy opportunities, which today represents more than C\$2 billion of their investments. Their Energy and Resources team, which has been focused on traditional energy and mid-stream assets has set up an

innovation, technology, and services strategy to seek opportunities resulting from the transition to lower-carbon energy sources, including electric vehicles.

As part of our climate finance strategies, some of us are now exploring "transition bond" opportunities to finance the transition to a low-carbon economy by inviting carbon-intensive companies that could achieve substantive emissions reductions to participate in the green and carbon bond markets. Much of the green bond issuance to date has been focused on green buildings, renewable energy, and energy efficiency. By investing in brown companies, including companies committed to industrial efficiency, fuel switching, and new clean technologies, we can play an even bigger role in facilitating the arrival of the low-carbon economy.



SUPPORTING TRANSITION BOND INVESTMENTS

If we are to meet our ambition to finance the climate transition, we should be including the brown sector. Today's green bonds are dominated by top-rated government-related entities, energy utilities, and real estate and financial corporates geared towards green buildings, renewable energy, and energy efficiency. While important, many of these projects are limited in supply and do not fully reflect our real economy or mainstream investment benchmarks.

This is why we are joining forces with others in the Climate Bond Initiative to invite brownish corporates to make transition plans and issue green bonds to finance these plans. These are sectors that are polluting now but that have huge emissions reduction potential. For instance, the metals and mining sector is key for the production of solar panels, wind turbines, and batteries for electrical vehicles. In addition, oil and gas producers and refiners will play an important role in supplying biofuel to aviation and heavy transport companies.

By inviting the brownish corporates to take advantage of green bonds, we are looking for issuers committed to strategic change – where green intentions turn to tangible and verifiable climate-relevant measures that relate to a company's core business activities.

To be credible, brownish corporates will need to demonstrate:

- what a transition to a lower-carbon business model may look like;
- what key mitigation and adaptation issues have to be addressed;
- what strategies need to be developed in response;
- what governance frameworks need to be put in place;
- what capital funding is necessary; and
- what funding is to be attracted to deploy such capital expenditure.

KEY LESSONS LEARNED

- A climate strategy starts with objectives. Is it our objective to manage financial risks and returns or do we want to contribute to a low-carbon world? These objectives overlap, but not fully. Differing investment objectives lead to different strategies and, hence, different investment decisions.
- Be cognizant of the risks and opportunities associated with climate change and the low-carbon economy and be positioned to be able to respond with agility.
- Climate change is a material financial risk, but – depending on portfolio composition – other, more traditional risks may still dominate in financial terms.
- Integrate climate change assessment into the investment process to strengthen investment acumen as it relates to transition and physical risks, and energy transition opportunities.
- Pick the right teams with strong and diverse backgrounds in finance, economics and ESG to drive climate strategies forward.
- Consider broader strategies to complement green financing, including how assets can be repurposed into low carbon and climate resilient business models.
- Focus on efficiency strategies that include both carbon emissions and energy management
- Real world decarbonization can be achieved through primary markets, and by changing companies. Secondary-market trading merely changes ownership.
- Work constructively with both large GHG emitters and "decarbonization leaders" in all sectors to achieve the wide-ranging outcomes to reach the Paris Agreement target.
- Engagement takes time and effort, but might be the most effective way to accelerate the transition to a low-carbon economy while avoiding the situation of stranded workers and communities.
- Exclusions and divestment can be effective risk management strategies, but the real-world impact of divestment is limited, as selling an asset merely changes its ownership. Moreover, divestment means giving up influence, for instance over an investee's decarbonization pathway.
- Translating companies' TCFD reports into investment decisions remains challenging, yet we understand that as investors requesting this information we also have a responsibility to explain how this information will be used.

SCENARIO ANALYSIS

As defined in the TCFD recommendations, scenario analysis is a method for developing strategic plans that are more resilient to a range of plausible future states.

Given the forward-looking assessments required to understand climate change impacts, the TCFD believes that scenario analysis is an important and useful tool for both assessing the potential business implications of climate-related risks and opportunities and for informing stakeholders about how we are positioning our organizations in light of climate-related risks and opportunities.

Many of us have begun to explore the possibilities of applying scenario analysis, either by experimenting with it on our own or through collaborations with our peers to understand what is being done and how we could learn from it. Through experimentation, we are testing multiple ways of looking at scenario analysis and thinking about the impacts on our investments.

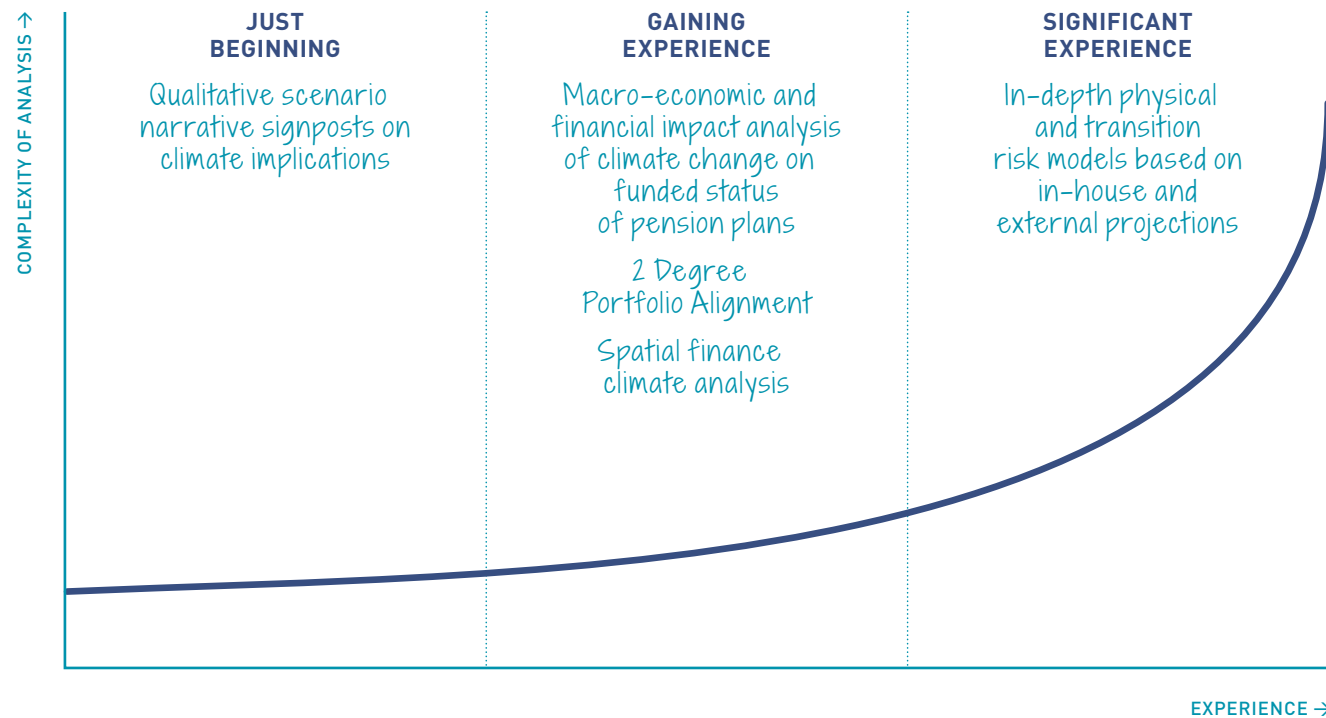
Because it is early days, we have found that scenario analysis is not an easy off-the-shelf one-off approach. It is an iterative process, so it is important to start by really understanding what scenario analysis means and how it can be applied. At present, we are all at different stages of the journey. We recognize we are doing early work and that we may need to adjust as we progress.

JUST BEGINNING

For those of us who are just beginning, we have found a narrative-based approach to be a good starting point. This type of scenario analysis uses qualitative storylines to help explore potential climate change implications. For example, Ontario Teachers' has developed a Low Carbon Economy Transition Framework with 12 signposts that it uses as part of a qualitative climate scenario analysis.

These types of narratives describe plausible trajectories of different aspects of the future that are constructed to investigate the potential consequences of climate change over time. They focus on qualitative descriptions of the relationships among different trends, including technological and socio-economic developments, and policy futures assumed in a scenario.

HOW ARE WE WORKING WITH CLIMATE SCENARIO ANALYSIS?



LEARNING FROM NARRATIVE-BASED SCENARIO ANALYSIS

We developed our Low Carbon Economy Transition Framework (LCE Framework) to help our colleagues stretch their thinking about the breadth of possible futures around how the world responds to climate change. The LCE Framework was built to be a flexible tool that would be applicable across all of our investment teams. We considered how the world might unfold within three scenarios: an orderly transition to a low-carbon world; status quo based on pre-2018 world commitments; and a highly disruptive climate scenario of a high-carbon world. The scenarios run to 2030 and are driven by 5 catalysts: policy, technology, consumer preferences, capital, and physical impacts. We also identified 12 signposts as leading indicators to tell us how the catalysts are changing and which scenario we are trending towards.

We deliberately chose to provide minimal direction to our teams on how to use the framework so they would take ownership and do their own reflection on how climate change, and the response to it, could impact their area of work. The LCE Framework has proven to be an excellent starting point for our portfolio managers and deal teams to begin understanding climate change risks and opportunities. Deal teams are leveraging the pieces that are most material to their sectors. For example, most fossil-fuel-focused deals use the carbon-pricing signposts as a stress test, while our infrastructure team has dedicated resources to better understanding physical climate change impacts.

12 SIGNPOSTS FOR CLIMATE SCENARIO ANALYSIS

LOW-CARBON WORLD	PRE-2018 WORLD COMMITMENTS	HIGH-CARBON WORLD
Fossil fuel subsidies	Climate policy commitments	Interconnectivity of electricity networks
Batteries for electric mobility	Carbon price level and coverage	Carbon capture and storage
Levelized cost of electricity	Smart city technologies	
Distributed electricity systems	Average annual meat consumption	
Deforestation		
Building energy efficiency		

The signposts help us understand how the catalysts are changing and which scenario we are trending towards.



Scenario analysis is perhaps the most technically difficult and complex of the TCFD recommendations. This is why, for the initial phase, we wanted to leverage the expertise of an external provider to really get on with it, see the validity of the results, and go from there.

- CPPIB



CONDUCTING RESEARCH TO COMBINE SPATIAL FINANCE WITH CLIMATE SCIENCE

Recognizing the importance of understanding physical risks to our global portfolio, we looked for tools that could help us leverage insights from the climate science literature.

Unfortunately, there were no off-the-shelf products available that would allow us to analyze multiple asset classes with the rigor we sought. Furthermore, existing tools lacked visibility into the assumptions research providers were making. So, we forged a unique partnership between Wellington Management and Woods Hole Research Center to work on translating climate science research into useful insights on financial implications for the capital markets.

We're hopeful that this research partnership yields useful spatial finance tools that enable our investment team to bring a better understanding of physical risk into the investment decision-making process.

GAINING EXPERIENCE

Many of us are cautiously developing our approach to scenario analysis, testing multiple pathways so that we can choose an appropriate methodology. A number of off-the-shelf tools are being made available to investors, including the 2 Degrees Investing Initiative (2Dii) Paris Agreement Capital Transition Assessment (PACTA) tool that focuses on carbon-intensive sectors.

Some of us have found these tools to be highly complex, relying on multiple discrete factors such as the probability of natural catastrophic weather events, chronic weather changes, consumer demand, technological changes, and regulatory responses, all with varying sensitivities across portfolios, geographies, sectors, and time. We have often found the data quality to be questionable – clouded by assumptions that can stifle real-life investment application.

Others are just beginning to assess the use of scenario analysis and have found limited off-the-shelf products currently available that can be consistently applied across asset classes. Specifically, studies are underway to combine established climate, macro-economic, and financial modeling to inform forward-looking strategic investment decision-making.

Some of us are undertaking research studies through strategic partnerships to further advance the practical application of scenario analysis. These types of collaborations are enabling us to move forward and become more familiar with various climate change scenarios that have already been developed in the marketplace, including 2°C portfolio analysis and macro-economic impact analysis.



CONDUCTING MACRO-ECONOMIC AND FINANCIAL IMPACT ANALYSIS

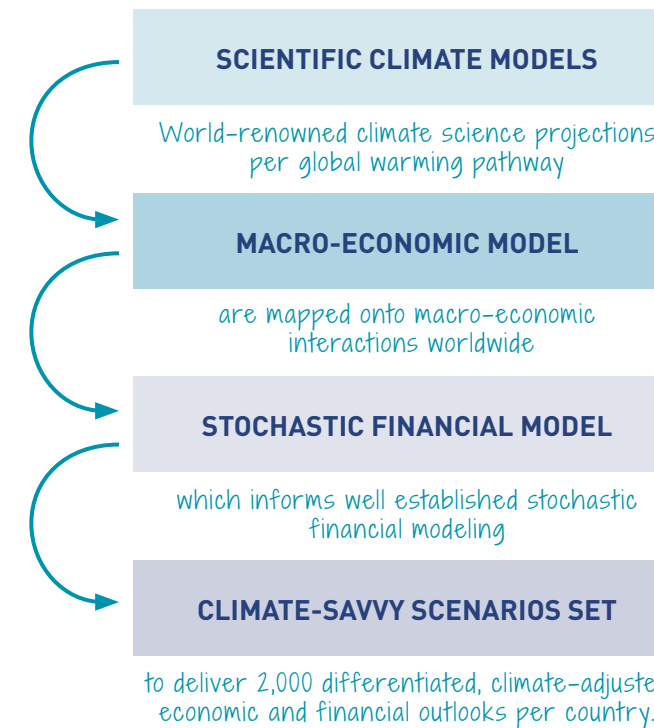
As part of our top-down approach, we conducted a pilot to explore this type of macro-economic analysis from a total portfolio fund perspective. As climate change is a serious risk for investments, we felt that we needed to be prudent in understanding it if we are to protect our members' interests.

The goal of the project was to integrate quantified physical and transitional risks and opportunities within different global warming pathways (1.5°C, 3°C, 4°C+) on three traditional multi-horizon, real-world macro-variables to draw inferences on strategic asset allocation: GDP, interest rates, and inflation.

The results showed that:

- a) For a globally diversified investor, a transition to stay under 1.5°C warming is preferable over a 4°C+ scenario
- b) A steep economic transition to limit warming to 1.5°C may entail significant opportunities for economic growth, perhaps even above current market expectations
- c) If action fails today, our economies will be locked into a higher global warming pathway where the global economy is likely to increasingly slow down

We were pleased with the results, which provided us with a current state assessment of climate risks to our fund. We saw important opportunities going forward to enrich our existing risk-factor framework and inform decisions on our strategic plan's sustainability and stability.





It's crucial for investors to consider the macro-economic and systemic implications of different global warming pathways. Our main goal is to understand the impact on the funded status of the portfolio.

- OPTrust

SIGNIFICANT EXPERIENCE

Only a few of us have moved towards more sophisticated uses of data sets and quantitative models to assess climate-related impacts on our assets and portfolios.

For example, Allianz, has been conducting climate-related scenario analysis across their lines of business to assess a variety of risks and opportunities. They look at different time horizons up to 2050, and various warming temperatures ranging from 1.5°C to 4°C using both internal models and those of external partners.

Various sources inform their analyses, including in-house and external projections such as by the International Energy Agency (IEA), International Renewable Energy Agency (IRENA), and the Intergovernmental Panel on Climate Change (IPCC). They test projections against each other to find common ground in the industry. Doing so helps them focus on the most reasonable scenarios.

The results are used broadly, including to determine:

- portfolio alignment with the target to limit global warming to well below 2°C and the decarbonization pathways of sectors and assets;
- potentially stranded assets and technology developments across sectors; and,
- forward-looking criteria for investment decisions for carbon-intensive business models as well as low-carbon opportunities.

For Allianz, it is important that a systematic analysis of long-term projections on the risks and opportunities of the low-carbon transition are incorporated into investment strategies. Additionally, they believe that applying a range of scenarios allows them to better assess the variety of risks and opportunities associated with climate change.

STILL NOT CONVINCED?

For a few of us, the results from scenario analysis are less than stellar – but this just shows that more work needs to be done. Take transition risks. Many of us have found it difficult to determine a set of parameters and assumptions that make sense at a macro or portfolio level. Too much depends on the specific sector or asset.

For example, one might expect that high-carbon-intensive sectors would lose value where subject to carbon prices. However, where these sectors lack substitutes, such as cement and steel, the companies may sometimes instead benefit from carbon price exemptions and or from being able to pass on the cost of carbon. So, we can conduct a scenario analysis with a seemingly good algorithm that spits out a number – but is it really a reliable number given the context of the specific product or service in the economy? As with all models, there are assumptions, exceptions and limitations.

Physical risk presents different complications. While challenging to assess at the portfolio level, many of us have a number of techniques to assess physical risks at the asset level. Even then, it can be difficult. For example, if a company has locations across the globe, it is not that easy to apply a model to quantify the risk.

Investee companies are in the best position to conduct their own scenario analysis, as they know their business and their supply chain better than anyone else. It is just too complicated for investors to obtain reliable data. In the future, investors should be able to rely on the results of company-specific scenario analyses based on standardized and recognized methodologies.

Whether we are exploring qualitative or quantitative scenario analysis, the key is to start somewhere. Getting started helps to uncover the questions and the challenges – we still have a long way ahead of us.

IN FOCUS

REMAINING QUESTIONS ON SCENARIO ANALYSIS

Overall

Perspectives on the use of scenario analysis have been mixed. Some of us have learned indicatively about the possible impacts on portfolios, but the detailed assumptions and approaches used by vendors tend to be a “black box” process that is difficult to own. As a result, many of us are trying to work in-house to develop our own scenario analysis methodology. There remain many questions on scenario analysis, and many of us are keen to see some kind of industry consensus on a common approach.

Warming Scenarios

Determining the physical climate parameters for a scenario analysis can be confusing. For example, the IPCC has set probabilities for achieving degrees of warming at 1.5°C, 2°C, 3°C and 4°C and the corresponding likely physical impacts. However, many of us are unsure as to the range of warming levels to use. We either use all four warming potentials in our analysis, or we focus on the 2°C scenario.

Data Sources

Long-term projections on the risks and opportunities associated with low-carbon transitions are being informed by various international organizations, including the IEA and IRENA. However, there is a lack of guidance on the best sources to use for transition risks and our respective strategies. For example, what should be the best source when developing a decarbonization pathway, assessing potential stranded assets, and/or when exploring low carbon opportunities?

Time Horizons

When conducting scenario analysis, the TCFD refers to short, medium, and long-term time horizons. There is no agreed or common approach to how time horizons are to be used in scenario analysis. For some of us, we are using more conservative short to medium-term time horizons, while others are much more ambitious in assessing their strategies against a 2050, or beyond, time horizon.

Asset vs. Portfolio Level

Applications of scenario analysis can be deployed at the asset or at the portfolio level. However, we are still mainly focused on the asset level given the data needs and the uniqueness of our investments from the perspectives of geography, sector, operations, and products and services. Currently, many of our teams are already using statistical models to “future-proof” real estate strategies against physical risks such as flooding. Additional work is now underway on other assets to assess broader physical and transition risks. We have also found it difficult to come up with a set of parameters that applies at the portfolio level. Some of us are working with third-party providers to understand how climate change scenarios could affect macroeconomic and other systemic factors, which could influence overall portfolio construction.

KEY LESSONS LEARNED

- Applying a range of scenarios surfaces the various risks and opportunities associated with climate change. Remember, this is a dynamic, iterative process that requires outcomes to be regularly updated.
- Taking the time to understand the methodologies and assumptions behind scenarios is important to help ensure they are practically applied within investment decision-making processes.
- Plotting the results of scenario analysis for each sector on heat maps can help inform decisions to mitigate risk.
- Which climate scenario unfolds depends in part on public policies (e.g. carbon pricing), which are inherently unpredictable. This underscores the need to prepare for multiple scenarios, while complicating the pricing of risk.
- Considering the macro-economic and systemic implications of different global warming pathways (top-down approach) is important. The currently dominant holdings-based focus (bottom-up approach), on its own, may be myopic in its scope, missing the structural impacts on the (global) economy as a whole, and how this in turn affects an investor's overall performance.
- Focusing on the portfolio view should be tailored to portfolio construction teams and be aligned with existing risk-adjusted return metrics to ensure a common language.
- Working collaboratively with others to better understand scenario analysis is key. This is a new field.
- Encouraging companies to conduct scenario analysis would be beneficial to promote climate resilience.

Despite the data limitations, it may be necessary for investors to become comfortable with less robust climate data and disclosure for the time being. The state of disclosure should not drive decisions to do or not to do scenario analysis. It's about starting the journey to explore how your organization fits into the transition to a low-carbon future.

RISK MANAGEMENT

Climate change has evolved into an important risk, which many of us now formally integrate into our investment and asset management activities. However, how we undertake this integration depends on whether it is at the enterprise, portfolio, or asset level.

ENTERPRISE LEVEL

Integrating climate change into Enterprise Risk Management (ERM) frameworks is critical to ensuring physical and transition climate change risks are understood from a corporate-wide perspective. Similar to other risks, some level of aggregation of these risks from the various business lines, both existing and emerging, is important. This aggregation can then be used to determine whether climate change represents a substantive impact on the business.

While many of us still have work to do, a few of us have made progress embedding climate change into the ERM framework. For example, Ontario Teachers' classifies climate change risk as an investment risk alongside geopolitical, disruptive innovation and technologies, extreme market events, and portfolio company risks. Their climate change risk is assigned to the Chief Investment Officer with the Chief Risk and Strategy Officer as a risk partner, placing responsibility for its management squarely in the hands of those making asset allocation decisions.

Allianz includes climate-related factors among others in their annual Top Risk Assessment process, which has the goal to identify and remediate significant threats to financial results, operational viability, reputation, and the delivery of key strategic objectives, regardless of whether they can be quantified or not.

Most of us have in place our own separate ESG risk frameworks that include climate change, but may not always be directly aligned with the ERM framework.

PORTFOLIO LEVEL

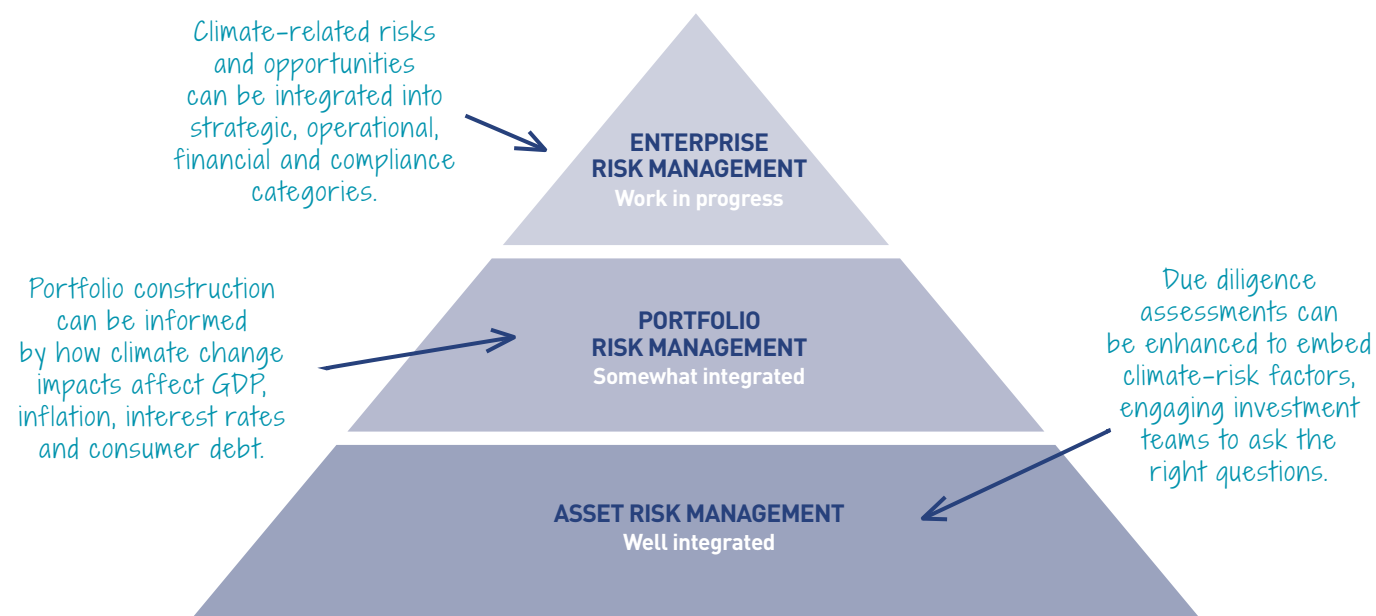
A portfolio view of climate risks is still in its infancy and tends to be mainly focused on carbon exposure. For example, most of us have some understanding of the carbon footprint of our investment portfolios, and a few of us are now using the data to set portfolio-level carbon-reduction targets.

We have also seen innovative pilots underway to assess the macro-economic and systemic implications of climate risk on an investment portfolio. For example, OPTrust has looked at how different climate pathways could impact GDP, which in turn could impact interest rates, inflation, and consumer debt across its portfolio.

ASSET LEVEL

At the asset level, most of us are now compiling climate-related data to inform risk assessments for both public and private assets. Our investment teams are engaged and have started to embed climate risk considerations as part of the due diligence process prompting more questions by our investment committees.

HOW RISK IS INTEGRATED INTO OUR EXISTING RISK PROCESSES?



“

Climate-related factors are being integrated, among others, into our annual Top Risk Assessment, which is our process to identify and remediate significant threats to financial results, operating viability, reputation and the delivery of key strategic objectives, regardless whether they can be quantified or not.

– Allianz

RISK IDENTIFICATION

The identification of climate risks typically relies on a broad data compilation and analysis process. Many of us access a variety of data sources, including external industry research, trends, regulatory reviews, climate-related future scenarios, as well as asset-specific data.

For example, at AIMCo, an internal TCFD working group (TCFD WG) with cross-departmental representation was assembled to map and address physical and transition climate risks and opportunities. The outputs of the TCFD WG served to inform their approach to climate-related reporting, including choosing plausible and relevant scenarios for risk assessment. This includes conducting sector exposure analysis, factoring in implications of regulatory trends and testing carbon footprint and related exposure methodologies. AIMCo is now in the process of implementing a new risk platform to measure financial and ESG risk data.

RISK ASSESSMENT

The process for assessing risks can be a multi-tiered process, taking place at the enterprise, portfolio, and asset levels. At the asset level, climate risk is assessed through due diligence processes, starting with an initial “red flag” screening to determine risk exposure, depending on an asset’s sector, geography, operations, and products and services. Higher-risk exposure would subsequently trigger a more detailed due diligence process. While more challenging to quantify, exposure assessments at the portfolio and enterprise level are typically understood by aggregating asset level climate risks to look for potential risk concentration.

Impact assessments enable us to prioritize one risk over another by taking into consideration probability, severity, and consequence factors. These analyses are conducted for many of us as part of our asset due diligence processes, particularly for

private equity assets where we have a greater stake and more control and influence. Some of us are also doing assessments in alignment with and/or embedded within our ERM frameworks.

A few of us use vendor statistical models to assess the financial impact exposure from both physical and transition risks. However, challenges remain. High levels of uncertainty in future climate change models and transition pathways combined with data access limitations make it difficult to quantify financial impacts.

The good news is that we have started the work, our teams are engaged, and many of us are now exploring quantitative methodologies.



INCLUDING CLIMATE HEATMAP SCORES IN ESG RISK ASSESSMENTS

When integrating the management of climate-related risks and opportunities into our liquid asset portfolios, we consider several layers: macro and sectoral analysis; risk management; investment decisions; climate change risk assessments; and, alignment. As part of the process, our fund managers and analysts consider climate change impacts in their company research and will take the time to consult with our responsible investment team.

The results are used to inform company heatmap scores. If a company is in a sector that has a high exposure to climate change then the weighting of climate change will be reflected in the company’s overall score. In the example, Company A has a higher overall score than Company B and is therefore performing better than in overall ESG considerations. We found there to be a growing suite of tools that can be used to assess climate change risk at a portfolio level, including the MSCI ESG ratings and carbon foot-printing information.

The information has been useful at an asset level when meeting with the senior management of the companies we invest in. Our fund managers and analysts challenge them about them about the key risks, including climate change impacts where relevant. We also integrate climate change impacts at a macro and sector analysis “our house view” to inform strategic allocation decisions across all portfolios.

AVIVA'S HEATMAP SCORES	COMPANY A	COMPANY B
Average Final Voting Score	F	D
Latest Voting Score	F D	D
Governance Rating Global	C	B
Governance Rating Home	C	B
ESG Rating	A	BBB
Controversies Overall Flag	Green	Yellow
Accounting Governance Risk Rating	B	C
Carbon emissions exposure	5.9	5
Carbon emissions management	5.7	5.8
Water stress exposure	3.9	3.5
Water management	3.4	1.4
AHA score	6.38	6.08

The AHA scores are used by fund managers and analysts in stock selection and recommendation decisions.

We use a range of tools to identify climate risks, including sector exposure analysis, ESG ratings improvements and controversies. Integrating ESG, financial and risk data is key.

RISK MANAGEMENT

Where higher impact climate-related risks are identified, we work with our investment professionals to consider appropriate risk management strategies. While it often depends on our individual investment philosophies, we take the time to consider how risks will be mitigated, transferred, accepted, or controlled.

For some of us, we can accept certain risks by maintaining a well-diversified portfolio and ensuring that we actively engage with our investee companies to promote better climate disclosure, risk mitigation, and resiliency.

A few of us are working to control climate risks on an asset-by-asset basis by putting in place improvement plans as part of the buy-side deal process. Others are focusing on decarbonizing the investment portfolio through various carbon reduction, low-carbon finance, and engagement strategies.

Getting our investment professionals thinking about various types of risk management approaches can be empowering. Already, our teams are starting to think differently, stretching their minds about how climate risks could affect their investments. We are also seeing more questions from our investment committees.



CPP
INVESTMENT
BOARD

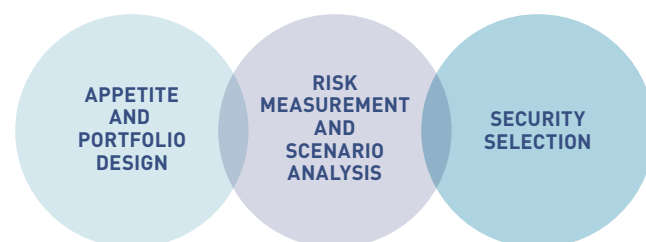
INTEGRATING CLIMATE RISKS INTO EXISTING PROCESSES

Climate change is an integral part of our Board-approved Integrated Risk Framework. We integrate climate-related risks through our Climate Change Program. Three of our six work streams have a particular focus on climate risk integration.

- **TOTAL FUND EXPOSURE – Appetite and Portfolio Design Work Stream** – This work stream takes a top-down approach with the goal of, eventually, directly factoring risks and opportunities into our investment strategy and total portfolio design. It works to understand potential climate change and energy transition pathways for various countries, as well as the resulting economic and market impacts. The work stream is also working to develop energy scenarios and reference cases to guide portfolio allocation decisions.
- **TOTAL FUND EXPOSURE – Risk Measurement and Scenario Analysis Work Stream** – This work stream's main objective is to identify, assess, and monitor climate change risks using several approaches, with the goal of ensuring the climate resilience of the CPP Fund. The work stream is also responsible for compiling our carbon footprint metrics and ensuring the process is aligned with emerging best practices.
- **SECURITY SELECTION WORK STREAM** – The Security Selection work stream takes a bottom-up approach to assessing climate change risks and opportunities. Enhancing the review process for our most material individual investments, the work stream designed a framework that allows investment teams and approval committees to identify and act on key climate change issues for these fundamentally driven decisions across geographies and sectors. This includes private assets – such as commercial real estate, toll roads, ports, property and casualty insurance and utilities.

We deliberately kept the assessment questions broad to stimulate thought. We also made sure to pilot the framework, reflect the input from our investment teams, and our investment professionals on our climate risk framework and its importance.

WORK STREAMS WITH A FOCUS ON CLIMATE RISK INTEGRATION



These work streams give us multiple ways of looking at climate risk from a portfolio and asset perspective.

KEY LESSONS LEARNED

- Formalizing climate change policies, commitments, or guidelines can help articulate and clarify expectations.
- Taking the time to clarify the financial impacts of climate change can awaken the minds of the investment teams.
- Having executive sponsorship and buy-in sets the tone from the top, which helps to drive and accelerate climate action.
- Determining resource needs based on the business context and identifying key contacts in the asset classes can accelerate climate change integration.
- Setting up multi-functional committees to have conversations on climate change topics encourages shared learning, collaboration, and innovative solutions.
- Involving investment teams to embed climate change risks and opportunities in what they already do on a day-to-day basis has been instrumental in driving buy-in and engagement.
- Educating cross-functional teams is key to building a strong climate change culture.



We engage our investment professionals on the risk identification process so that they own the risks. We provide the necessary knowledge, including in-house industry experts, climate performance data, and even external expert advice, where needed. We want them to start thinking about the risks at an early stage and be careful that it does not become a tick-the-box exercise. Our Risk Group also independently assesses climate change risk in the portfolio.

- CPPIB

METRICS

We recognize the importance of using metrics to monitor, measure, and manage our climate performance. Across our network, we are experimenting with a variety of metrics to better understand exposure to physical and transition risks as well as progress on climate change opportunities.

Most of the metrics you will read about are non-financial in nature. However, we do measure our climate finance investments in financial terms and a few of us are looking into climate valuation techniques.

Where possible, some of us are using industry benchmarks as reference points, including both historical data and external indices. However, many benchmarks do not meet our risk return requirements, and the lack of standardization makes comparability limited.

Defining the right climate-related metrics will be integral if we are to steer our portfolios in the right direction. Most of us are still in the early stages of compiling data to inform our strategies. We are mainly using the data to help us prioritize our active management and engagement strategies with the companies in our portfolio. A few of us are using the data to drive carbon reduction and climate finance strategies forward.

As we evolve on our journey, we have an important opportunity to merge these climate change metrics with investment performance data to inform our risk and return expectations and strengthen our investment strategies.

2°C PORTFOLIO ALIGNMENT

A few of us are measuring the alignment of our investment portfolios with a 2°C warming scenario. More precisely, the metric reflects the exposure gap of an investment portfolio to a desired 2°C warming scenario. The calculation takes into consideration warming projections, alongside carbon budget

allocations, and decarbonization pathways necessary to achieve a low carbon transition. Data sources for these types of projections are informed by organizations such as the IEA, IRENA, IPCC, as well as industry-specific databases.

The majority of us have only just started exploring how to apply the 2°C alignment metric to our investment portfolios. For example, AIMCo has found the PACTA tool useful as a starting point. However, given their highly diversified investment strategy and increasing exposure to renewables beyond public equities, they believe it was important to focus on total fund positioning rather than on relative fund exposure to carbon-intensive sectors in public equities alone. Allianz and Natixis' affiliate, Mirova, are independently developing their own proprietary temperature alignment metric indicators to inform their respective decarbonization strategies, based on both external and internal warming scenario projections.

MEASURING CLIMATE RISKS AND OPPORTUNITIES OF INVESTMENT PORTFOLIOS

2 DEGREE PORTFOLIO ALIGNMENT	CLIMATE VALUATION	CLIMATE FINANCE AND IMPACT	PORTFOLIO CARBON FOOTPRINT	CARBON PERFORMANCE SCORES
Measures investment portfolios' alignment to 2°C decarbonization pathway	Measures financial impacts on portfolio earnings, value, and funded status	Measures financing for a resilient low-carbon economy and carbon impacts	Measures GHG emissions and relative efficiency of an investment portfolio	Measures company preparedness for a low-carbon economy
METRICS °C alignment of the investment portfolio % misalignment from a 2°C decarbonization pathway	METRICS % carbon value at risk % change in EBITDA	METRICS \$ invested in low-carbon sectors \$ invested in climate resilience \$ invested in brown to green finance CO ₂ e avoided	METRICS CO ₂ e per unit revenue CO ₂ e per enterprise value CO ₂ e per ft ² CO ₂ e portfolio exposure	METRICS % readiness score



MEASURING OUR 2°C ALIGNMENT INDICATOR

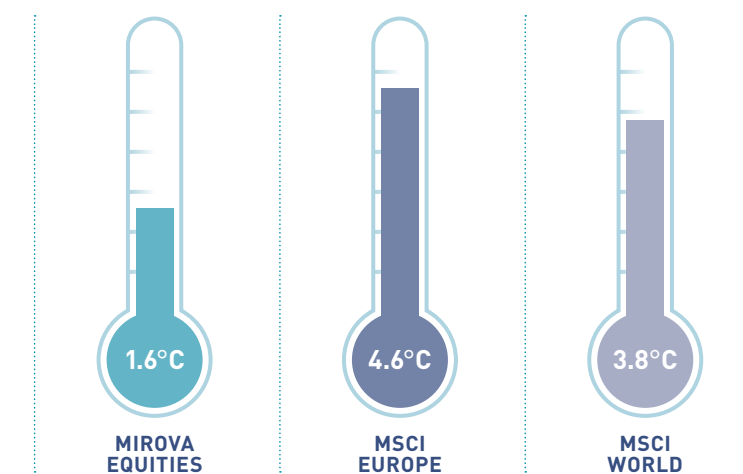
To demonstrate the impact of our investment strategies, at Mirova, our affiliate dedicated to responsible investment, we decided to develop a 2°C alignment indicator that integrates both risks and opportunities related to the energy transition.

We use a life cycle approach, taking into account a company's direct and indirect (scope 1, 2 and 3) emissions, as well as the emissions that will be avoided. The emissions are then aggregated at the portfolio level, alongside the avoided emissions, to assign a level of alignment with published climate scenario projections in a 2°C, 4°C, and 6°C world. We use both internal and external data, such as relevant IPCC and IEA data. By using these scenarios, we are assessing how our investment portfolios align against a benchmark reference point.

We conducted the assessment for our listed equities and found them to be compatible with a 2.9°C scenario. While we are not yet at a 2°C alignment, our equity funds are better aligned than those of the major market indices, which are more in line with a 4°C or 5°C scenario.

The improved 2°C alignment provided is due to our exposure in companies that emit relatively less CO₂ and the significant investments we are making in companies committed to a low-carbon economy, which we believe will bring us closer to a 2°C alignment in the future.

2°C ALIGNMENT METRIC FOR LISTED EQUITIES





For green-brown metrics to be useful, there will need to be near universal agreement as to what constitutes “green” and “brown” finance making the need for a standardized taxonomy of climate finance even more urgent.

CLIMATE FINANCE

As part of our low-carbon transition strategies, many of us are measuring various metrics relating to climate finance, including dollars invested in low-carbon investments, green-brown ratios, and carbon impact ratios.

Low-Carbon Investments

Low-carbon investments are typically measured using exposure-based metrics represented in financial terms as the dollar amount invested in low-carbon investments, such as clean energy, energy efficiency, or climate change adaptation projects.

Unfortunately, there is no standardized taxonomy for what constitutes climate finance. Some of us are using internal corporate rules focusing mainly on certified green bonds and renewable energy, while others are applying broader taxonomies described by the Climate Bonds Standard and other organizations, which include those in the energy, building, transport, and water sectors. Currently, an EU classification system for sustainable activities is under public review, which includes screening criteria for activities across eight sectors that can make a substantial contribution to climate change mitigation and adaptation. Developing a standardized taxonomy for climate finance and clear methods of accounting for such investments on the balance sheet will be important.

As a result, many of us have developed our own internal approaches to measure low-carbon investments. For example, PGGM’s mandate to invest at least €20 billion in solutions for societal problems by 2020, is focused on measuring the euros invested in climate change solutions, as well as their impact. They use an internal decision-tree framework to determine whether an investee or investment fund meets their solutions category.

$$\text{Low Carbon Finance (\$)} = \sum \text{Climate Solutions}$$

Green-Brown Ratio

A few of us are starting to explore exposure-based green and brown investment metrics. These metrics measure the relative share of “green” – low carbon climate resilient solutions or “brown” – high carbon, climate-risk inducing activities within a portfolio.

These types of metrics are being used to understand the extent to which the portfolio is shifting away from brown finance to green finance.

If these types of metrics are to be useful, there will need to be near universal agreement as to what constitutes “green” and “brown” finance making the need for a standardized taxonomy of climate finance even more urgent. Furthermore, figuring out how to handle companies that have multiple revenue streams will also need to be better understood.

$$\text{Green-Brown Ratio} = \frac{\text{Proportion of Green Exposure}}{\text{Proportion of Brown Exposure}}$$

Carbon Impact Ratio

To measure the carbon impact resulting from climate financing, some of us are calculating the avoided emissions as a ratio to the produced emissions. For example, Natixis’ affiliate, Mirova, calculated a carbon impact ratio to provide them with an easy comparison between peers within the same sector. If the ratio is zero, it means the company has no avoided emissions. A ratio of 10 signifies the company’s products made it possible to avoid emissions in the following amount: 10 times the quantity of GHG emissions needed to manufacture, distribute, and use the product as compared to the subsector reference product.

$$\text{A Company's Carbon Impact Ratio} = \frac{\text{Avoided Emissions (tCO}_2\text{e)}}{\text{Produced Emissions (tCO}_2\text{e)}}$$

CLIMATE PERFORMANCE SCORES

As part of broader ESG investment monitoring, some of us are using qualitative carbon performance scores. These scores measure a company's climate change risk exposure, management practices, and preparedness for transitioning to a low-carbon economy. We typically purchase third-party research data to get an indication of performance on climate-related issues.

While mainly qualitative in nature, these scores can be indicative of the relative climate change performance of companies. Performance typically includes climate change policies, low-carbon transition strategies, target-setting, and GHG emissions efficiency improvements over time.

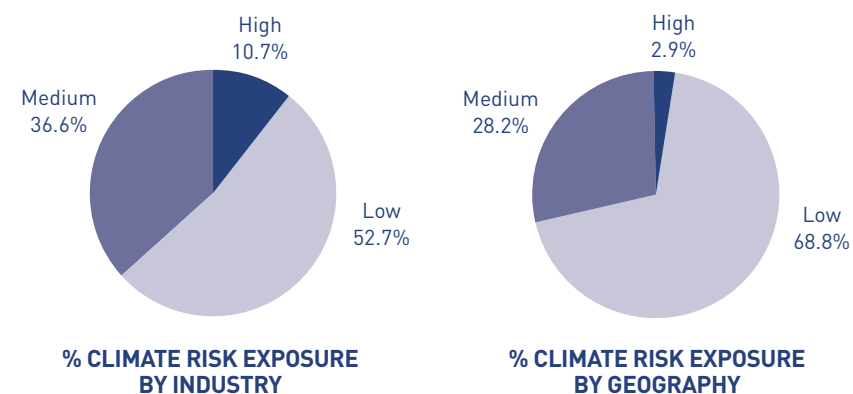


USING ESG SCORES FOR CLIMATE CHANGE ASSESSMENTS

At OPTrust, we have been using ESG industry scores to measure our exposure to physical climate risks such as weather patterns as well as transition risks. From a transition perspective, we look at the impacts of carbon pricing, carbon regulations, "stranded assets" or reserves, and volatile energy costs. We also use the scores to understand our indirect exposure to these risks through financing or supply chains.

In addition, we use a "Climate Vulnerability by Country" methodology to help us understand our vulnerability to climate change as it relates to developed, emerging, and frontier market countries. The key factors of the analysis are physical impacts, sensitivity to extreme weather events, energy transition risks, and a country's potential to respond to climate change, covering financial resources and national governance indicators. We used this ranking to classify countries as high, medium, and low to assess our exposure to climate risk.

The results of this assessment proved valuable in providing us with a clear baseline for our total fund exposure. For instance, we found most of our assets to be in industries and countries with low climate-risk exposure. We also uncovered the limitations of using backward-looking data and determined some counterintuitive facts. For example, an asset stranded by climate change and a renewable asset are not necessarily mutually exclusive. It is possible to have a stranded wind farm asset if the assessment indicates that climate change will significantly affect wind patterns.



CARBON VALUATION

Climate-related risks and opportunities are closely linked to the value of the underlying assets within investment portfolios. For us, as long-term institutional investors, it is critical that we better understand the potential effects of climate change on our portfolio's valuation. The development of climate valuation metrics is still in its infancy and many of us believe the risks are not yet fully priced into capital markets.

The TCFD recommendations provide an overview of the types of potential financial implications on a company's value from physical and transition risks and opportunities. Today, many of us are only just beginning to understand how these financial implications could affect portfolio- and asset-level valuations. A few of us are working on

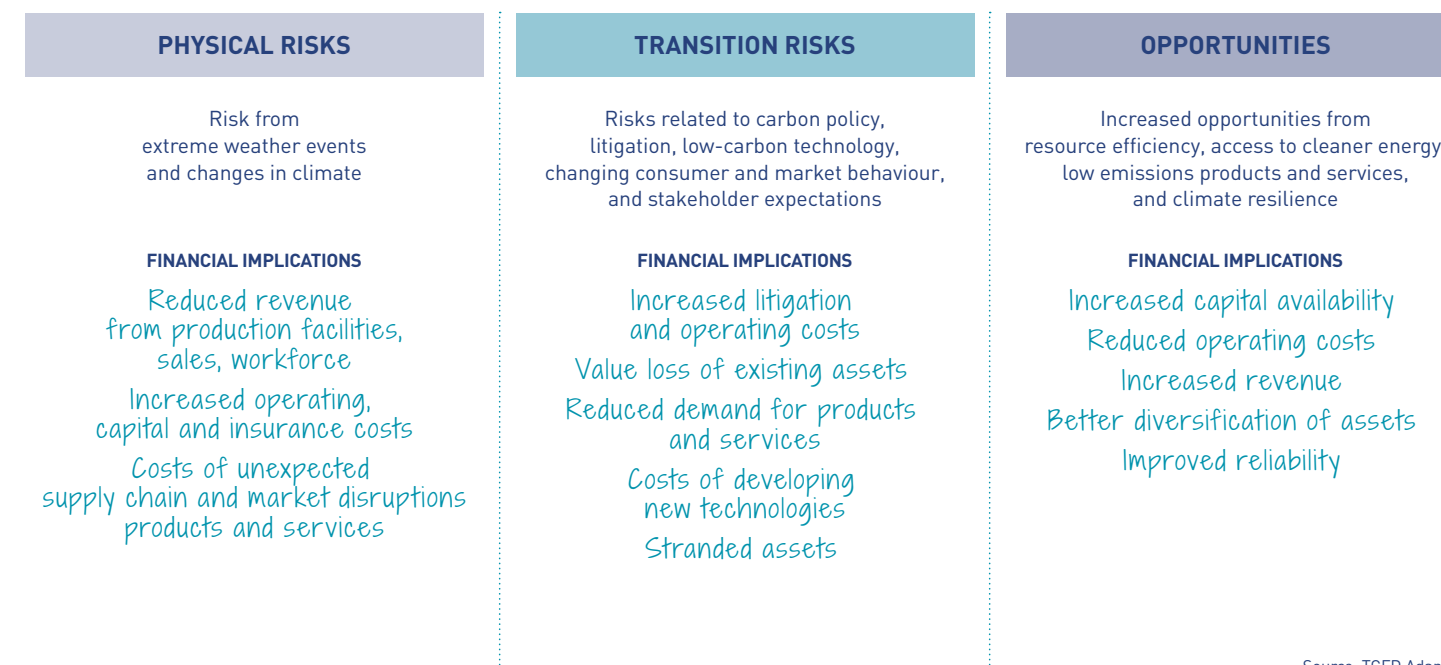
developing carbon valuation metrics that can express the effect of these climate-related risks and opportunities on the asset value or funded status of a portfolio in a single figure.

For example, OPTrust explored the use of a third-party carbon Value-at-Risk model to analyze how carbon costs will affect the company's value, specifically on earnings before interest, taxes, depreciation, and amortization (EBITDA). The analysis combined the effects on direct emissions, supply chain indirect emissions, industry pricing, and demand for the industry's product.

Through the value assessment, OPTrust modelled the pro-forma change in EBITDA from current levels to those generated if carbon prices were to rise to \$100/tonne of carbon. The exposure was calculated for

approximately 10,000 global companies, which was then aggregated to portfolio conclusions by combining them with stock weights. OPTrust's decision to use a financial carbon value at risk metric, such as impact on EBITDA, made sense because it aligned with their investment team's current valuation methodology and provided them with a common comparable financial metric.

MEASURING THE FINANCIAL IMPLICATIONS OF CLIMATE RISKS AND OPPORTUNITIES



Source: TCFD Adapted



By repeating the carbon footprinting exercise year-over-year, we discovered a consistent pattern where over 25% of the total public equities portfolio emissions' intensity is driven by the top ten emitting companies, comprising just 3% of the portfolio's assets under management. This further suggests that portfolio emissions have the potential to be reduced through a strategy of targeted engagement.

- AIMCo

PORTFOLIO CARBON FOOTPRINT

Carbon footprint accounting can be used to measure the GHG emissions associated with an investment portfolio's underlying entities.

In our experience, measuring the carbon footprint of an investment portfolio can be a useful exercise. It enables comparisons to global benchmarks, helps identify areas and actions for reducing emissions, prioritizes engagement efforts, and can be used to track progress in making those reductions.

At the same time, however, many of us recognize the limitations in terms of carbon footprints and the relationship to risk.

Carbon footprints rely on historical and backward-looking data, limiting their applicability for forward looking scenario analysis. Despite significant improvements in carbon data disclosure, there continues to be gaps and uncertainty in the data, particularly as it relates to Scope 3 emissions.

In addition, aggregating portfolio level carbon footprints may not always be possible from across asset classes, and making comparisons between portfolios and among peers is challenging given the unique mandates, geographies, and sectors of our investment strategies.

Further, some of us have found that high carbon intensity may not always mean a high-risk investment. Take the cement and steel sector – despite their high intensity the fact that there are limited substitutes for these materials means that they carry a lower risk, which could make them more attractive than a low-carbon emissions intensity company that has no transition plan.

So, while carbon footprint data has been a starting point for many of us, it certainly is not the end point. For those of us who are measuring the portfolio carbon footprint, we have been working with a number of carbon intensity metrics.

Aggregated GHG Emission Intensity

A GHG emissions intensity metric is used to measure the aggregated emissions rate of an investment portfolio relative to an indicator that represents business growth over time. Most of us are calculating the market or enterprise value of the portfolio as the GHG emissions intensity denominator. When developing this metric, it is important to ensure data measurements are consistent across the asset classes to facilitate aggregation.


Weighted Average Carbon Intensity (WACI)

The WACI measures the portfolio's exposure to carbon-intensive companies with attribution of emissions based on portfolio weights. This approach is recommended by the TCFD based on its simplicity and scope across asset classes. However, a few of us have observed that the WACI is sensitive to outliers and favours companies with high pricing power relative to peers.

Sector-Specific Carbon Efficiency

Depending on sectors, many of us are customizing our carbon efficiency metrics. For example, those of us measuring carbon efficiency metrics in our real estate portfolio are expressing carbon intensity units using square footage values. Some of us are also using the Global Real Estate Sustainability Benchmark (GRESB) scores to track performance relative to our peers in the real estate portfolio.

$$\begin{aligned}
 &\text{Total Financed Intensity} = \frac{\text{Total Carbon Emissions}}{\text{Millions \$ Invested}} \\
 &\text{WACI} = \sum_i^n \left[\frac{\text{Holding Market Value}_i}{\text{Portfolio Market Value}} \times \frac{\text{Issuer's GHG Emissions}_i}{\text{Issuer's Revenue}_i} \right] \\
 &\text{Real Estate Efficiency} = \sum_{\text{Real Estate}} \left[\frac{\text{Building Energy Usage} \times \text{Emissions Factor}}{\text{Square Feet}} \right]
 \end{aligned}$$



MEASURING THE CARBON EFFICIENCY OF OUR REAL ESTATE PORTFOLIO

At AIMCo, we measure carbon efficiency metrics in our \$17.82 billion real estate portfolio. The real estate portfolio includes long-term, direct investments in quality office, retail, industrial, and residential properties in Canada, and opportunistic investments internationally. We began annual ESG reporting to the GRESB in 2015 and assembled key metrics into an in-house sustainability dashboard to track assets' environmental performance, including climate change, across the portfolio.

Our sustainability dashboard allows us to identify climate change risks and opportunities across the portfolio. For example, we can track emissions attributable to heating (Scope 1) and energy consumption (Scope 2) and view property-specific emissions including variations by location, demonstrating properties' dependency on the regional electricity grid, and variations by property type. The results inform our active ownership strategies, risk management framework, and target-setting process. The dashboard further informed our 2021 sustainability targets for energy consumption, water usage, and waste diversion, and now helps us target opportunities for eco-efficiency upgrades and retrofits and capital provisions to third-party property managers.

ENERGY CONSUMPTION (kWh/sq. ft)	GHG EMISSIONS (tCO ₂ /sq. ft)	WATER WITHDRAWAL (L/sq. ft)	WASTE DIVERSION (t)
↓ 22%	↓ 31%	↓ 22%	↑ 24%

IN FOCUS

MEASURING SCOPE 1, 2 AND 3 GHG EMISSIONS OF INVESTMENT PORTFOLIOS

Q. What should be the scope of emissions covered?

A. We are measuring Scope 1 and 2 emissions. Scope 3 emissions are not always included because of data accuracy and concerns about double counting. Some of us strongly believe that Scope 3 emissions should be included in the measurement to cover every step of a company's value chain, from raw material extraction to manufacturing, product use, and recycling.

Q. What is the difference between owned and financed emissions?

A. Owned emissions attribute the share of emissions proportionate to the investor's ownership stake in the company's equity. The limitation is that emissions are attributed only to the equity portion of holdings, ignoring debt. This method is sensitive to market pricing. As market valuations increase, intensity falls, and as market valuations decrease, intensity rises.

However, given that equity carbon footprint data is readily available from third party providers, it has become the most common disclosure approach. Where investors mostly use equity carbon footprint data, it may be advisable to follow the owned emissions method.

Financed emissions measure the company's emissions relative to the investor's stake in the company's equity and debt. The limitation of the financed emissions method is that it is somewhat dilutive if the fund is invested either in the company's equity or in its debt capital, but not both. The net result is to reduce the emissions intensity of the portfolio relative to the owned emissions method. The advantage is that long-term debt acts as a stability parameter, reducing sensitivity to market capitalization fluctuations.

Q. How are public vs. private assets dealt with?

A. Most of us are measuring the carbon footprint for our entire portfolio. We started with our public assets mainly because the data was more readily available. Data for our private assets is based on a combination of third-party sources, and supplemented by data we obtain directly from our private assets.

Q. Is data quality an issue?

A. Some of us have reservations regarding overall data quality, including the accuracy of proxy emissions for non-disclosing issuers, and data that is not verified. For instance, proxy data based on global revenues may be over- or under-stated as this data doesn't consider variations, such as exchange rates. While some of us are more comfortable with our chosen methodology, we all recognize more needs to be done towards better data integrity. This is why we are engaging companies to disclose complete and verifiable emissions data.

Q. Are benchmarks used?

A. There are a number of benchmark options to consider for a portfolio carbon footprint. The benchmark can be based on the carbon footprint of the portfolio's financial benchmark; or the fund's prior carbon intensity; or relative to a select sustainability or custom composite benchmark. At AIMCo, in order to ensure accuracy, relevance, and comparability of their carbon footprinting process they calculate the carbon footprint of the relevant financial benchmark to identify the relative emissions performance of the portfolio. For example, for public equities, they follow their chosen methodological approach for every holding and aggregate their share of the emissions to determine the absolute emissions and emissions intensity of each investment pool. Each pool is then proportionally weighted to determine the total absolute emissions and emissions intensity of their public equity holdings. They approach the market indices in a similar fashion.

KEY LESSONS LEARNED

- Don't let the fact that the processes are not clear or that the data is not perfect stop you from doing the work - we know that over time our measurements will improve. But it is important to start now.
- Use carbon intensity values and a baseline year to allow for year-over-year comparisons.
- Start by measuring the carbon footprint of public equity portfolios and then expand coverage to other asset classes.
- Engage teams on the metrics and methodologies to build consensus and buy-in. This is an iterative process that will evolve and improve over time.
- Using Scope 3 emissions provides a more accurate picture of the carbon impact and risks of an asset.

In the process, we learned the data is not perfect, but we do not want this to hold us back. We went out there - took what existed and worked as hard as possible to improve it and make prudent estimates and choices. It has helped us make the data more robust overall.

TARGETS

Setting clear and long-term ambitions towards a low-carbon economy continues to be an ongoing and evolving process. Climate targets are used to manage risks and opportunities, while demonstrating performance over time.

Some of us are still at an early stage, compiling data, measuring baselines, and working through strategies to improve performance. In this context, there are concerns that targets may be too prescriptive, limiting investment teams' ability to deliver on their mandates.

We want our teams to have the flexibility and delegated authority to meet their investment objectives while integrating climate considerations into the process.

For those of us who have embarked on setting carbon-related targets or ambitions, we have taken a bold and transformative stand on climate change.

2°C ALIGNMENT SCIENCE-BASED TARGETS

Setting targets towards a 2°C alignment based on climate science is still evolving. For example, Natixis' affiliate, Mirova, has set a goal to align its investment portfolio to a 2°C warming world. This target is a key goal of their Chief Investment Officer who made a public declaration as part of the Montreal Carbon Pledge and the Portfolio

Decarbonization Coalition initiative. In 2015, they started with a 3.5°C alignment of their consolidated equities portfolio.

Over the past three years, they gradually reduced the carbon footprint to a 1.6°C alignment, mainly due to focusing their investments in companies that provide climate solutions with strong financial performance.

Allianz is working to develop methodologies to allow financial institutions to set long-term science-based targets by working directly with peers, civil society representatives, and academics within the SBTi. Science-based targets are goals developed in line with scientific evidence on the scale of reduction required to keep global warming in the range of the targets of the Paris Agreement.

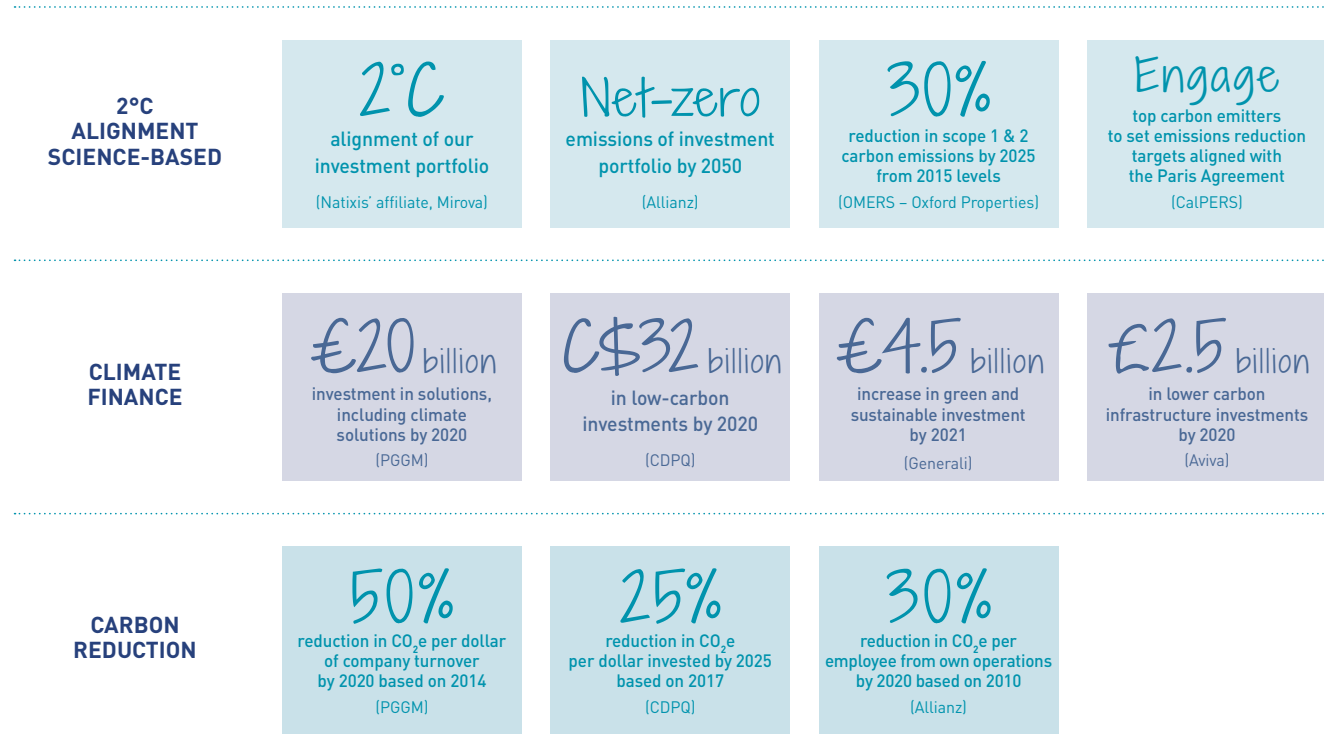
The difficulty in setting targets for the investment portfolio lies in the fact that the methodology is currently being developed and data availability and quality issues remain. Until we get there, companies like Allianz are taking bold action. They have committed to having net-zero emissions by 2050 for their entire proprietary investment portfolio. While the pathways to achieve this target are still being defined, Allianz' main lever will be through engagement with investees, either individually or with other investors, such as through the Climate Action 100+ initiative.

Meanwhile, CalPERS has set an ambition to manage climate risk and opportunity by engaging the top carbon emitters in its publicly traded portfolio. Their goal is to engage companies on setting emissions reduction targets aligned with the Paris Agreement and disclose their progress to manage climate risk in line with the TCFD recommendations. They are also tracking the financial performance of their portfolio companies.

From a real estate investment portfolio perspective, OMERS' real estate investment arm, Oxford Properties, established a science-based target for its scope 1 and 2 carbon emissions, on a square foot basis, of 30% reduction by 2025 relative to a 2015 base year. To arrive at the target, they looked at various science-based accepted methodologies, all of which arrived at roughly the same reduction percentage – 3% / year for 10 years.

The target was considered aggressive and something they deeply investigated before committing. Questions they asked: "What would the target mean financially at the asset level? How would the financials roll up at a corporate level?" It was important to consider both a top-down and bottom-up approach. The target is now integrated into their entire business. It is considered when asset budgets are set and there is a rigorous reporting and monitoring system in place. It is also supported by employee compensation and recognition programs.

DEFINING OUR AMBITIONS FOR THE LOW-CARBON TRANSITION



“

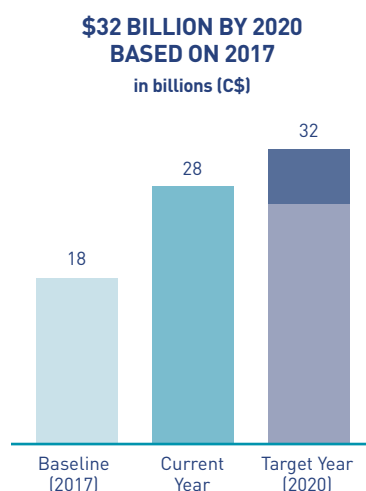
We set ourselves the target to reach a net-zero proprietary investment portfolio by 2050, while aiming for real economy impact compared to mere portfolio-polishing. This will require our investee companies to decarbonize. And precisely because not all sectors can decarbonize fully as of now, we consider it absolutely necessary to set such a goal and define this long-term ambition.

– Allianz

CLIMATE FINANCE

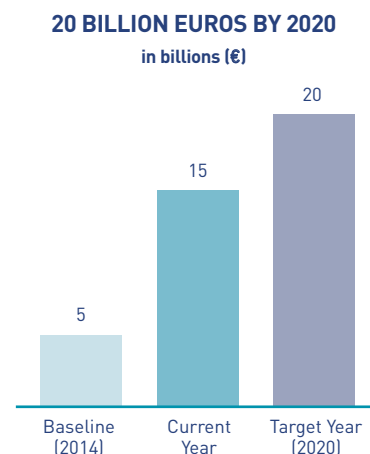
While most of us measure our climate finance investments, only a few of us have set climate finance targets or ambitions. A climate finance target specifies a total value or percentage increase in climate solutions finance to be achieved within a specific time period. In developing the target, it is important to consider the baseline year reference point, the climate finance investment pipeline forecast, and a clear taxonomy to measure eligible investments that fit the climate category.

For example, CDPQ set a conservative climate finance target of an 80% increase by 2020 based on their investment projections. They used the Climate Bonds Standard for the taxonomy and defined the baseline to a year when they had just started to deliberately invest in climate finance.



"In the first year, at CDPQ, we exceeded our target mainly due to a brown-to-green investment strategy. As a result, in 2018, we refreshed our target from a 50% to 80% increase in climate finance."
- CDPQ

PGGM also set an ambition to achieve €20 billion in solutions by 2020, which includes climate change solutions. This ambition was not derived from science-based targets, but was considered a prudent, yet ambitious step to take.



"Our investments in climate solutions have been challenged by a more than expected increase in the price of green assets. As a result, we will likely miss our ambition of achieving €20 billion investments in solutions by 2020."
- PGGM

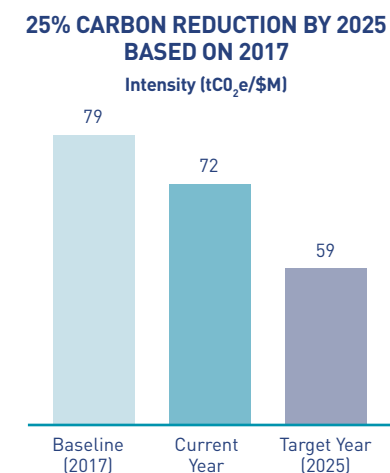
As part of its support for the transition to a greener and more sustainable economy, Generali set a target to increase its green and sustainable investments by €3.5 billion by 2020. At the end of the same year, they increased their target to €4.5 billion by 2021. They are focusing mainly on fixed income (bonds, both corporate and sovereign, as well as infrastructure debt).

To determine the eligibility criteria for their green and sustainable investments, Generali did not focus exclusively on investment opportunities supporting the climate change agenda, but also took into consideration investments that support sustainable and social objectives aligned with the UN Sustainable Development Goals. That being said, today, the bulk of their investments are still in green bonds and green infrastructure financing.

CARBON REDUCTION

Most of us are measuring the carbon footprint of our investment portfolios. However, only a few of us have set carbon reduction targets.

For example, CDPQ, announced its target to reduce Scope 1 & 2 carbon emissions by 25% by 2025 across the entire portfolio. They performed a detailed analysis and considered all angles. For instance, they questioned whether the target should be absolute or intensity-based; cover the entire portfolio;

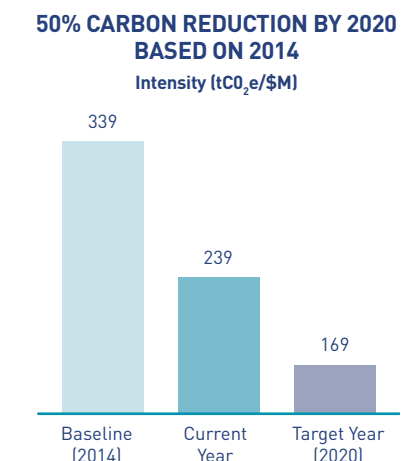


"So far we are on track to meet our carbon reduction targets, but we recognize that most of our progress had to do with a few low-hanging fruit. Setting a carbon reduction target provided an opportunity to clean-up our portfolio - now the hard work begins"
- CDPQ

be short or long-term; and how it could be achieved. It was not surprising that it took several months to define and approve their target. They created a taskforce made up of heads of business lines, as well as internal and external carbon experts. They settled on a target that felt realistic yet ambitious taking into consideration benchmark data of other institutional investors, as well as country and provincial commitments.

They assigned carbon budgets for the 13 asset classes in their portfolio based on feasibility, recognizing that some asset classes were inherently limited on what they could do while others were much more flexible. On an annual basis, they revise these budgets to readjust based on the business context. Access to real-time data was an integral part of their approach. This is why they linked the third-party carbon data of their portfolio to an internal IT system, giving their portfolio managers access to the carbon intensity of the portfolio in real time.

PGGM set its carbon reduction ambition of 50% by 2020 based on 2014. They started with the equity portfolio due to the availability of emissions data, the portfolio's high liquidity, and its high overall weight. They intend to include other asset classes once they have better data.



"During the past year, we have found our carbon reduction targets to be challenging. In some sectors, contrary to expectations, companies appear to have become less carbon efficient, causing us to probably miss our 50% reduction ambition by 2020"
- PGGM

We worked with our investment teams to set our climate targets. We clarified the impacts on our investment decisions and equipped our managers to make informed decisions in line with our expectations.

IN FOCUS

DEFINING OUR AMBITIONS FOR THE LOW-CARBON TRANSITION

1. Establish Complete Data for Baseline

An important first step is to understand the current emissions profile. Ensure that it is as complete as possible and reflects a conservative estimation upon which to set the baseline year. Some of us will engage with carbon-intensive companies ourselves to complete the data set.

2. Understand Future Portfolio Growth Projections and Carbon Concentrations

Figure out where the portfolio could be in the future – 10 to 15 years down the road. Look at how it may change from an acquisition and divestment perspective. Understand the current concentration of high-carbon assets and the types of carbon-intensive deals on the horizon in the next two years to get a sense of how a possible target might affect the portfolio. During CDPQ's analysis, for example, they noted that the energy grid was naturally going to become greener, which helped make the case for target-setting.

3. Set Realistic Ambition Levels

Base targets on what is realistic yet ambitious. It helps to start with a benchmark of what others are doing globally as well as country-level commitments. Reduction targets between us vary significantly ranging from 25% to net-zero with short, medium, and long-term time horizons of 2020, 2025, and 2050.

4. Define Short-term Intensity Targets with Long-term Absolute Reductions

We debated between intensity versus absolute targets. On the one hand, carbon intensity improvements can be misleading. For example, intensity targets could decrease based solely on market dynamics such as interest rates and market upswings, while absolute emissions continue to increase. Despite this, we tend to pick intensity-based targets to reflect the relative growth of our business.

KEY LESSONS LEARNED

- The tone from the top is a powerful driver when setting ambitious targets that are credible. Leaders need to "walk the talk" and be prepared to reduce their personal carbon footprint if they expect this from investee companies.
- To incentivize performance, align targets with financial incentives.
- Start down the path, even if not all the data is there yet. This is how we learn.
- Carbon reduction requires major investments from companies, which may only be reflected after several years.
- Set out specific decarbonization pathways to reach long-term targets.
- Evaluate the future availability of eligible investment opportunities to determine what is feasible.
- Set ambitious but realistic targets that fit your investment strategy and constraints – you can still increase them further down the line.

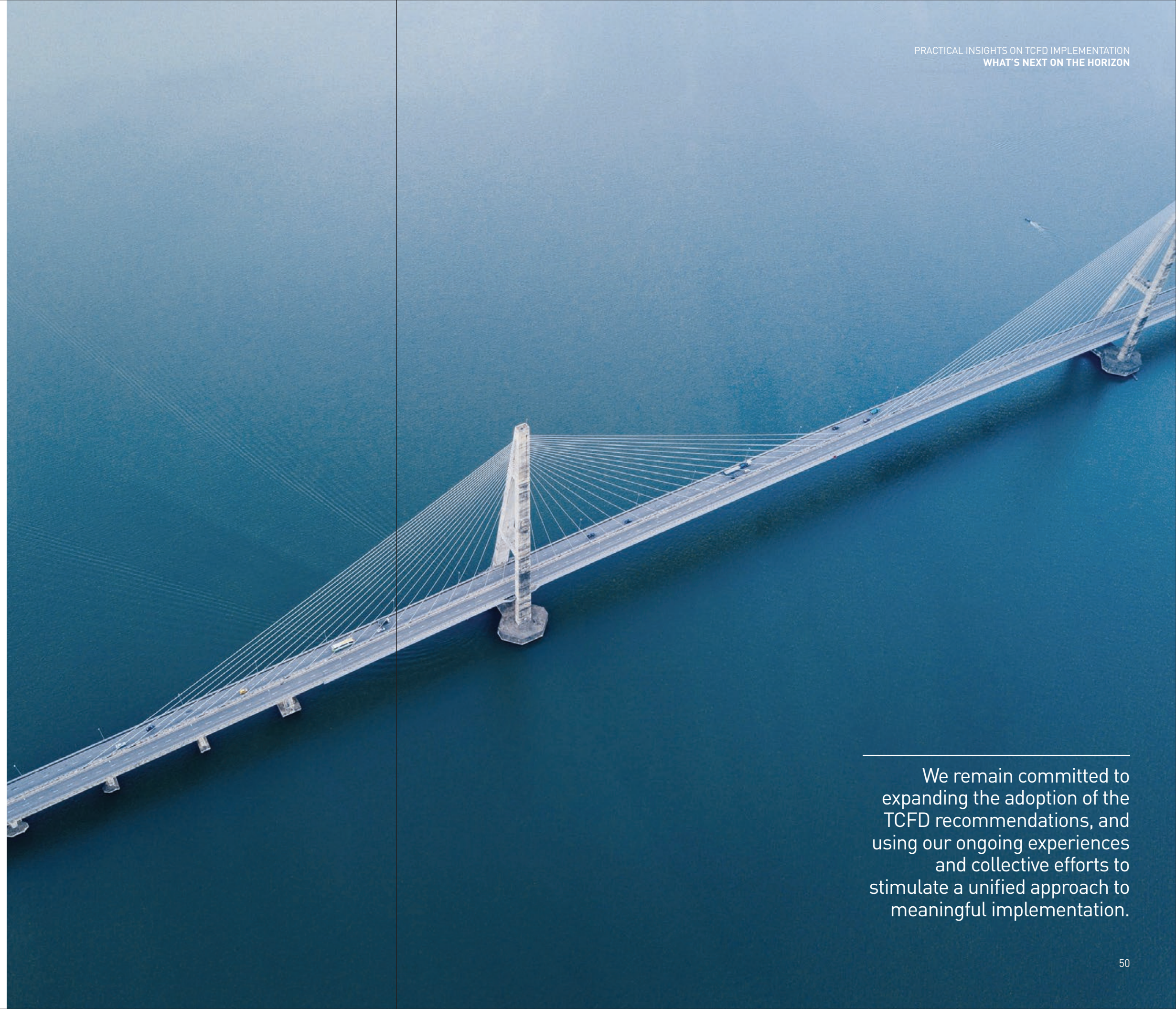
Do not over promise. Be honest in your communications on what is possible for emissions reductions.

WHAT'S NEXT ON THE HORIZON?

As a partner network, we will continue to work together to speed up the implementation of uniform and comparable climate-related disclosures under the TCFD Framework. As we share our “behind-the-scenes” experiences and insights, we realize this is a journey we are all just beginning.

When you consider where we are today, and even though many of us are making important strides, we still have a long way ahead of us. Certainly none of us are winding things down. Improving data quality and working towards uniform measurement methodologies, especially relating to climate change risks and opportunities will continue to be an important focus.

As we move forward, we plan on continuing to share our journey and to collaborate on our respective approaches to measure, track, and disclose climate risk. Our aim is to have a lasting effect in advancing our role as stewards to encourage climate disclosure through engagement, concrete actions, and global partnerships.



We remain committed to expanding the adoption of the TCFD recommendations, and using our ongoing experiences and collective efforts to stimulate a unified approach to meaningful implementation.

CONTRIBUTORS

The ILN would like to acknowledge the valuable contributions of our partners in the development of this document:

AIMCO

Alison Schneider
Director Responsible Investment

ALLIANZ

Urs Bitterling
Head of Corporate Responsibility

Till Schultis
Project Manager, Climate Integration

AVIVA

Zelda Bentham
Group Head of Sustainability

CALPERS

Divya Mankikar
Investment Manager
Sustainable Investment

CDPQ

Michel Léveillé
Advisor Sustainable Investment

Jérôme Lussier
Director of Responsible Investment (former)

Karine Poirier
ILN Project Manager

CPPIB

Jeffrey Hodgson
Director, Industry and Stakeholder Affairs

GENERALI

Jacopo Cardinali
Group Investment Governance

Lucia Silva
Group Head of Sustainability and
Social Responsibility

Francesco Sola
Head of Group Investment
Governance & Stewardship

NATIXIS INVESTMENT MANAGERS - MIROVA

Ladislav Smia
Co-head Responsible Investment Research

OMERS

Anca Drexler
Managing Director, Risk Management

ONTARIO TEACHERS'

Eli Angen
Principal, Responsible Investing

Sarah Takaki
Senior Principal, Responsible Investing (former)

Jackie Clark
ILN Project Manager

OPTRUST

André Choquet
Responsible Investing Consultant

Katharine Preston
Director, Responsible Investing (former)

Laura Song
Analyst, Responsible Investing

PGGM

Han van der Hoorn
Senior Advisor Responsible Investment



We would also like to thank PwC for their support in compiling the data and writing this report, including:

Janice Noronha

PwC Partner
Sustainability and Climate Change Practice

Rick Alsop

PwC Senior Associate
Sustainability and Climate Change Practice



**INVESTOR
LEADERSHIP
NETWORK**

As we move forward, we plan on continuing to share our journeys and to collaborate on our respective approaches to measure, track and disclose climate risk. Our aim is to have a lasting effect in advancing our role as stewards to encourage climate disclosure through engagement, concrete actions and global partnerships.

CONTACT

For questions about the
ILN Climate Change Initiative
please contact:

climate@investorleadershipnetwork.org

www.investorleadershipnetwork.org