

ICPM Climate Change Working Group

Climate change for asset owners

The ICPM guide to integrating
climate change considerations
in investment processes

June 2018

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Foreword

This guide was written by asset owners for asset owners. We think that this sets it apart from other guides for asset owners on climate change, which tend to be written by consultants or with significant fund manager input.

As a truly international group with member asset owners around the globe, we discovered that we're all wrestling with the same questions. These include:

- How do we get the board, trustees and senior leadership driving the change?
- How can we translate climate change language into investment language?
- How can we start managing something that isn't yet measurable?

The aim of this guide is to share our experiences, not only for large asset owners with internal resources and internal management, but also for smaller funds with predominantly external asset management and consultants. We hope it will either act as an impetus for you to address climate change or to support your thinking and integration processes.

We do not see this as a definitive piece of work. This area is evolving rapidly, and practices by asset owners to address climate change are improving all the time.

ICPM Climate Change Working Group
Jaap van Dam, Chair
Toronto | June 2018

Introduction

Climate change is one of the most significant risks facing humanity. It does, and will continue to, affect the investments of pension funds and other asset owners.

Many funds have been addressing climate change for several years as Socially Responsible Investment (SRI), Responsible Investment (RI), or Environmental, Social, and Governance (ESG) issues. Over the past few years, however, climate change has moved from being considered a niche issue to one of potentially major financial consequence for all investors. Mark Carney, chair of the Financial Stability Board, called climate change “a tragedy of the horizon...once climate change becomes a defining issue for financial stability, it may already be too late.”

The conversation has shifted from a company’s impact on climate change to include the impact of climate change on companies, investment portfolios, and capital markets. As investors, we need to understand the potential financial impacts this complex issue brings. Climate change goes beyond the environmental dimension and has influence on social, economic, and policy factors.

Both the transition risks (policy, technology, and behavioral changes) and physical impacts of climate change pose risks and opportunities to the investments that may impact our ability to earn the returns we require to provide our beneficiaries - whether in DB or in DC - with the retirement income they depend on.



Asset owners are facing significant pressure to address these issues:

- The changing climate is driving physical and policy changes that are already impacting our investments;
- Members and other stakeholders are expecting us to address climate change, stepping in where policymakers and regulators have been slow to act; and
- The Task Force on Climate-related Financial Disclosures (TCFD) has raised expectations on how we disclose climate-related exposures and actions, which will drive changes in behavior over time.

There is an urgency in addressing climate change. The longer society takes to act, the more disruptive and costlier it will be to address, and the greater the potential impact on our ability to meet our pension promises. For asset owners who have not already done so, it is time to start thinking about policies on climate change, how to integrate the associated risks and opportunities into the investment process, and what initial actions to take.

The guide

The aim of this guide is to highlight practical steps to help pension funds frame their activities on climate change and offer insight from peers. It does not aim to provide all the answers (as the authors don’t believe they have all the answers). It is not intended to be prescriptive, but rather offer suggestions and options for asset owners to develop their own tailored approaches.

In this guide, we share ideas, case studies and experiences to:

- Learn how to better manage the risks and opportunities that climate change present;
- Learn from the experience of funds that have been addressing this issue for a longer period; and
- Speed up the adoption of practices that will help address climate change as a systemic risk to our ability to provide a secure pension for our members and beneficiaries.

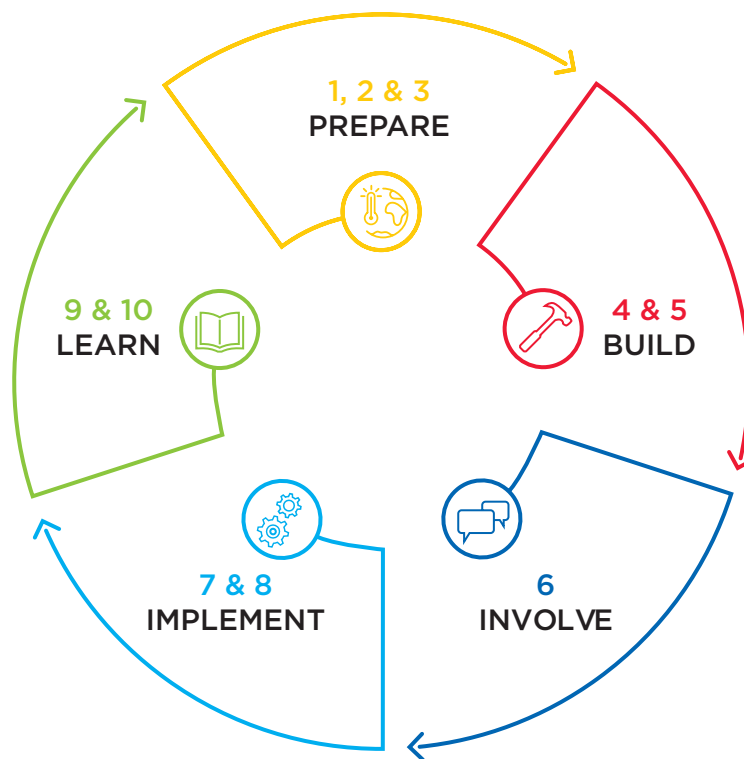
Within the document, we outline 10 actions that asset owners may wish to consider in addressing climate change. To be clear, they are not a checklist, and they are not necessarily in an order of implementation, although there is logic in the suggested order of the 10 actions.

We also provide appendices of investor-relevant climate change resources to support additional research in the implementation of these actions.

Executive Summary

The ICPM Climate Change Working Group has identified 10 potential actions to help asset owners integrate climate change into their investment process. Although there is a logical order in the actions, there is no need to implement all 10, nor to start with Action 1 and end with Action 10. We suggest to asset owners that you design your own approach based on your organization's starting point, resources, and desired results. This is a function of where you are, who you are, and your goals.

The 10 actions can be roughly categorized in five activities: prepare, build, involve, implement, and learn, as shown in the figure below. Actions should be viewed as an opportunity for continuous improvement.



PREPARE	Lay the groundwork in terms of creating a shared understanding of climate change and the necessary governance to start acting on it.
BUILD	Determine where you are in terms of climate change (risks, opportunities), define where you want to go (objectives), and how you will get there (strategy).
INVOLVE	Communicate with beneficiaries and the broader set of external stakeholders, as well as internally within the organization, what you are doing and why.
IMPLEMENT	Implement the strategy.
LEARN	Learn from your experience and that of others to improve or adapt your strategy.

The 10 actions



- 1 Become climate-competent:** Raise awareness about climate change and educate on the potential impact through all levels of the organization, including the board. Learn what peers, companies, and other stakeholders are doing to address climate change.
- 2 Establish appropriate governance structures and processes:** The board should be actively involved in the climate change discussion and have oversight on its management. Management should be responsible for developing and implementing the approach for managing climate-related risks and opportunities, with involvement from their investment teams. We recommend managing climate risk as any other financial risk, as opposed to specifically an ESG risk.
- 3 Create a common understanding across the fund:** Ensure the organization agrees on how and where climate change can affect fund assets, as well as how it fits in the strategy of the fund.



- 4 Understand where you are:** Make sure you know how the fund is currently dealing with climate change, how much the fund is exposed to this risk, and how the fund is taking advantage of the opportunities and managing the risks.
- 5 Set objectives and strategy:** Boards should set clear objectives for the management of climate-related risks and opportunities. It is then up to management and staff to come up with a plan to meet these objectives. Both a “top-down and bottom-up” approach to objective-setting is recommended: the board sets the goal based on input from management and staff.



- 6 Communicate:** Clearly communicate your position on climate change both internally and externally.



- 7 **Manage the risk:** Integrate climate change in the existing risk management processes to ensure it is considered in investment decisions.
- 8 **Implement first steps:** Start with small steps to gain experience and build knowledge.



- 9 **Define and measure progress:** Measure the progress made in integrating climate change in the investment process and achieving your overall climate change goals. One way to do this is by setting key performance indicators (KPIs) for the actions described in this guide.
- 10 **Reassess strategy:** Climate change policy and regulations, technology, and best practices for companies and investors are continually evolving. Monitor these movements and ensure your strategy moves along with them.

Raise awareness about climate change and educate on the potential impact through all levels of the organization, including the board. Learn what peers, companies, and other stakeholders are doing to address climate change.

Boards and trustees need to enhance their knowledge of the potential impacts of climate change to oversee the organization.

Physical and transitional risks stemming from climate change will potentially impact asset values. Investors should have a good understanding of these risks and how the assets in which they invest are both impacted by and are responding to them.

Globally, actions on climate change are being taken by policymakers and regulators; non-governmental organizations; industry and investor groups; asset owners and managers; and companies and other stakeholders. These activities can heighten or accelerate transitional and reputational opportunities and risks for both the investor and its investments.

How can asset owners and investment teams keep up?

1. Assess the landscape

Steps could include:

- **Policy:** Undertake a review of current and proposed policy and regulations on climate change (the TCFD recommendations provide a good overview of the policies in place around the world).
- **Industry:** Review industry actions such as disclosure standards being developed, exchange listing requirements, and industry groups and initiatives (e.g., TCFD, Montreal Protocol, INCR, IIGCC, Transition Pathway Initiative). See Appendix B for additional resources.
- **Peers and Partners:** Survey peers and partners to ascertain the different approaches that are being taken to manage climate change risks and help identify an approach that suits the organization at its current level of maturity.
- **Asset managers, consultants:** Leverage relationships with investment consultants, investment managers, and other external partners. Ask external managers across asset classes about their strategies to identify, measure, and mitigate climate change, and the potential effects based on your holdings. Consultants should be asked for their advice on addressing climate change risk.
- **Beneficiaries:** Engage with beneficiaries to gain understanding of the level of awareness among beneficiaries, and whether there is a collective aspiration or view with respect to actions on climate change.
- **Non-governmental organizations:** Be aware of the more influential NGOs and other activist groups, as well as their positions and actions around climate change (e.g., 350.org, AODP, Carbon Tracker). See Appendix B.
- **Companies:** Be aware of corporate actions and strategies for managing climate change risks (e.g., Exxon, Shell, Nike, etc.). When more and more companies become TCFD-compliant over the next few years, transparency will increase.

2. Attend climate change and related conferences

Climate change is a fast-moving area. Boards and trustees could consider attending climate change and ESG-related conferences to augment their awareness and knowledge. Conferences also provide an opportunity to network and speak to other pension funds and asset managers regarding their approaches.

3. Bring in external speakers

External speakers bring expertise and an outside perspective that investment staff may be more open to exploring.

- Many speakers are willing to participate at little or no cost.
- Look for speakers who can: i) inspire or incite action; ii) credibly articulate the financial imperative of managing climate risks or proactively mitigating climate change itself; and iii) are likely to be respected by the organization.

4. Communicate information

Consider raising internal awareness by sharing and publishing thought pieces and papers on climate change risks. Internal research pieces allow organizations to debate and articulate a collective position on climate change and the rationale for taking that position.

5. Self-assess

Assess the organization's level of maturity in understanding and managing climate change risks. In many cases, internal and external asset managers already have ESG and climate-focused practices in place. Boards should assess the level of knowledge across the organization; identify areas where knowledge could be improved; and consider how plans can educate and inform employees on the investment risks posed by climate change, the tools and resources that are available to them, and approaches that can be taken.

Example

The “aha” moment for Ontario Teachers' came when it was invited to an investor conference on climate change held in the lead-up to COP15 in Copenhagen. As one of the few North American pension plans at the conference, seeing the amount of global investor activity was an eye-opener that started Ontario Teachers' on a path towards building an approach to climate change. The fund then took a staged approach of assessing the landscape, driving awareness, enhancing internal education and taking action by integrating climate change considerations in investments practices, as well as engaging with companies and policymakers.

Action 2: Establish appropriate governance structures and processes

PREPARE

The board should be actively involved and have oversight of climate change issues. Management should be responsible for managing the risk, with involvement from their investment teams. We recommend managing climate risk as any other financial risk.

In order for asset owners to best address the challenges and opportunities associated with climate change, board and management roles must be clearly articulated. It is recommended that the governance of climate change risk and opportunity be managed using the traditional risk lens. Climate change is a complex topic that could impact strategy, compliance with regulatory frameworks, and the sustainability of the organization and therefore must be treated no different than any other material risk – it deserves appropriate board attention, not only as an investment risk, but as a fund-wide risk. It should therefore be on the fund-wide risk register or equivalent.

Role of the board

Active engagement of the board in the oversight of climate change risk to the fund is part of their fiduciary duty and the exercise of prudence and loyalty – as per any material risk. Climate change could pose systemic, economic, and investment risks that undermine the sustainability of pension plans. Trustees, acting in the best interest of the beneficiaries, have a duty to act.

Boards should determine the most effective structure for overseeing the management of climate change-related risk. For example, boards should consider which committee or committees should have accountability for climate change. The TCFD notes that it is important for a board to include climate change considerations “when reviewing and guiding strategy, major plans of action, risk management policies, annual budgets, and business plans as well as setting the organization’s performance objectives, monitoring implementation and performance, and overseeing major capital expenditures, acquisitions, and divestitures.”¹

This is true for both companies and for pension plans and other asset owners. This should be reflected in the board’s terms of reference or other applicable governance documents outlining board responsibilities. Policies that the board approves should appropriately integrate climate change. These may include investment policies, risk appetite statements, or other organizational policies.

Regular and formal updates on climate change-related activities should be included in board agendas. This could be covered initially as a stand-alone topic and evolve over time to an integrated approach in which climate change is included in regular reporting by investment, risk, and other teams as applicable.

Finally, a key role of the board is to ensure that the organization has management structure or support in place that ensures climate change receives appropriate attention and is considered in investment strategy.

Role of management

The board must assign clear accountability and authority to the fund executive or management team to translate strategy into action. This is fundamental, as successful implementation of a climate change strategy depends on the commitment of senior management and the “tone from the top.”

Senior management teams should assign roles and define responsibilities to evaluate and manage climate-related factors throughout the organization and ensure appropriate resources are in place to do so. This may be done through specific individuals or working groups, depending on the size and structure of the institution. This may include leaders in investment, risk, legal, strategy, and finance. Fund executives should align climate change management with how the organization manages traditional risks, so that it receives appropriate attention.

Senior managers should oversee the operationalization of the strategy, once defined. To monitor implementation, it is key to define who is accountable, as well as for what and how their progress will be measured and reported.

¹ Implementing the Recommendations of the Task Force on Climate-related Financial Disclosures

Management should discuss with its teams how to consider climate change strategically in investment processes, including in the due diligence stage prior to investment and in regular portfolio monitoring after investment. Active monitoring is needed to ensure appropriate strategic and tactical decisions are being taken by teams acting in line with the organization's defined goals and objectives on climate change. As with any management cycle, appropriate material should be reported to the board so it can oversee execution of the strategy.

Board and management responsibilities should be revisited on a regular basis and revised as experience with climate change builds.

Example of governance around climate change

“Climate change poses potentially significant risks to financial returns and the long-term sustainability of a pension plan, meaning that the board needs to treat it like any other material risk. At Ontario Teachers’, the Investment Committee of the board oversees responsible investing, which encompasses climate change risks. Ultimately, accountability for climate changes lies with the board who sets the tone for risk awareness.”

Patti Croft, Board member, Ontario Teachers’

Action 3: Create a common understanding across the fund

PREPARE

Ensure the organization agrees on how and where climate change can affect fund assets, and how it fits in the strategy of the fund.

Within a fund, there may be very different views on climate change at the board, management, and individual investor level. Without a common understanding of the challenge of climate change and a decision about how it fits in the strategy of the fund, it will be impossible to act consistently and move the meter on this topic.

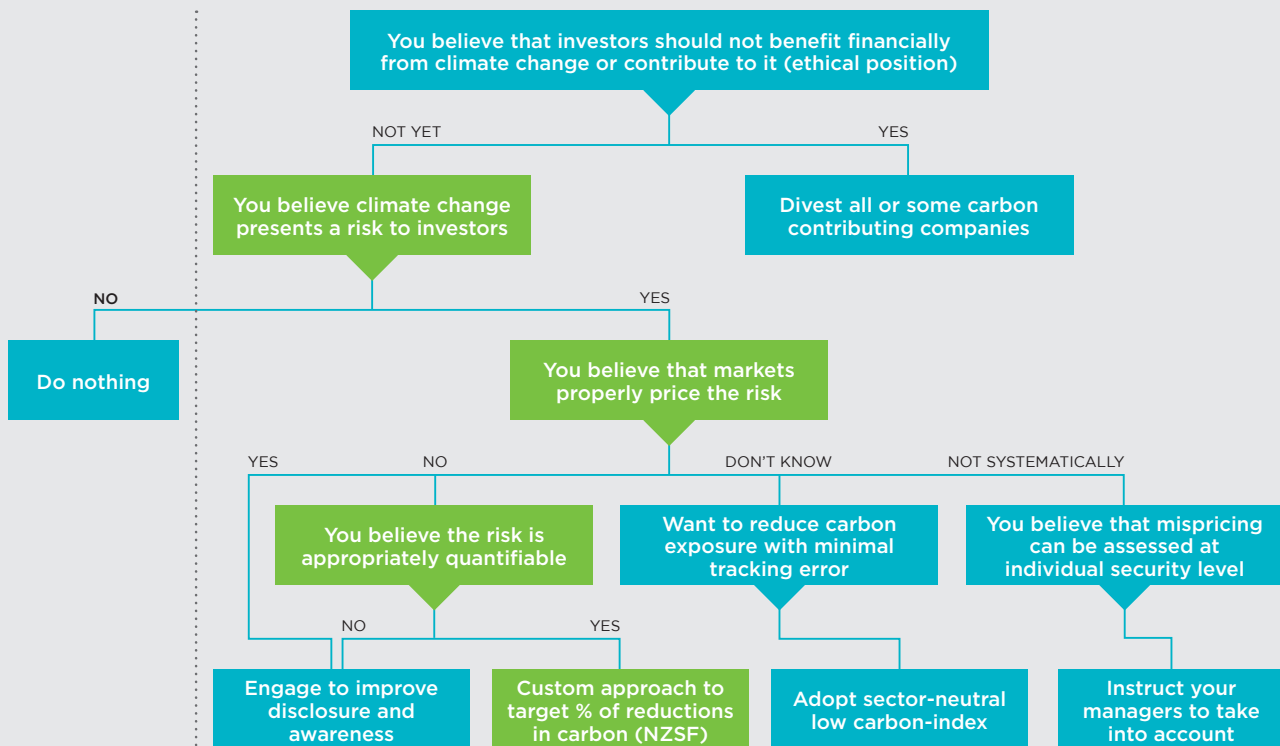
Asset owners who have gone through the exercise of creating a common understanding caution that it does not happen overnight. In some cases, it can take years to have a thorough internal discussion about the risks posed by climate change, and what, if any, actions need to be taken and how these fit into the organization’s mandate and investment beliefs. Then, the discussion can proceed with determining strategy and where specifically to incorporate and implement the strategy.

CASE STUDY: New Zealand Super Fund

Our climate change investment strategy was a long time in the making.

In creating a common understanding, we went through many steps and asked fundamental questions about our investment mandate. We’ve outlined a decision tree (below) that shows where we landed in the end, based on our beliefs about climate risks and how to deal with them. This approach helped guide the conversation internally and with the Board and might be useful for other asset owners.

Climate Change Action - Our Decision Tree



ON THIS SIDE OF THE DOTTED LINE, YOU WILL:

01 Analyze impact at market and security level (and have manager do this)

02 Engage on climate change expectations of companies

03 Vote according to climate change policy

04 Search for opportunities

Deciding whether climate change risks should be in the benchmark

Our board delegates responsibility for all investment decision-making to the investments team, apart from the choice of the Reference Portfolio, which acts as a benchmark and default allocation for the fund. Decisions about the composition of the Reference Portfolio are made by the Board. It was apparent that we would be making active investment decisions (changing the actual portfolio). The investment team felt that climate change was such a significant, long-term risk, it also had to be recognized in the Reference Portfolio. As our passive equities portfolio contained by far the largest concentration of risk, it was a natural place to start— and an area where it was possible to make large changes at low cost.

Board alignment necessary

To change the Reference Portfolio, we needed alignment at the board level, which also made the board directly responsible for the return impact. It took time for the board to become comfortable with making a material and very long-term decision. Part of the difficulty was the long-term uncertainty. We spent time getting the board up to speed and comfortable with the decision to act, without having all the answers. In total the investment team presented to the board five times, from concept to final implementation.

Explicit goals needed

Eventually, we arrived at a goal: to make our portfolio more resilient to climate-related risks. We agreed on a set of targets: to reduce our carbon emissions intensity, which is tonnes of carbon emissions per dollars of sale, by 20%, and to reduce our carbon reserves by 40%, both by 2020. Importantly, we agreed to think about this at a whole of portfolio level. We do not have carbon budgets at an individual asset class level.

Implementation and evolution

Our strategy has four workstreams. The first is to reduce exposure to reserves and emissions. We started implementing this workstream straight away. At the end of June 2017, we shifted to a lower-carbon passive equities portfolio, reallocating approximately US\$670 million away from companies with high exposure to carbon emissions and reserves into lower-risk companies.

We continued to research the remaining three components of our strategy (analyze, engage, and search for opportunities). Our climate strategy will evolve over time as we uncover more information about global warming, policy changes, and market pricing reactions, and as the data and tools available to measure and manage risk improve.

Make sure you know how the fund is dealing with climate change at this moment, how much the fund is exposed to this risk, and how the fund is taking advantage of the opportunities.

When an organization has reached a common understanding of climate risk, the next step is to take inventory of what is currently being done, and how the plan's investment strategy is exposed to the risks and opportunities associated with climate change and a low-carbon-economy transition.

Climate change presents a particularly complex set of issues that need to be understood to determine a fund's exposure. If long-term investors do not fully understand the potential magnitude of impact and timeframes associated with the range of climate change issues, it is difficult to incorporate considerations for the resiliency of portfolios over the long run.

A useful first step is sitting down with the various investment teams and managers to survey current practices to help tailor how climate change risks are integrated into the investment process.

There are several methods and tools available to build internal knowledge and understanding of the potential impacts that climate change poses to an investment strategy. It is important to put the firm's strategy in context to determine an appropriate exposure evaluation.

Recommended actions to help determine exposure are:

- Characterize the fund composition in terms of asset classes and investment beliefs; and
- Conduct sector and geographic mapping in each portfolio and for the total fund.

Many funds will already have this information readily available. It is a useful first step to understanding potential approaches and what they will require. For example, funds with predominantly internally-managed assets across all asset classes and geographies will need to build a comprehensive understanding of how climate change will impact all aspects of the global economy and markets. Funds that are primarily externally-managed will need to focus on how best to evaluate their fund managers' abilities to include climate change considerations in their investment functions.

Assessing climate change impact requires breaking down the suite of risks and opportunities and understanding the range of uncertainties. Each fund is unique in composition and strategy and, as such, will have a unique exposure to climate change-related risks and opportunities. Portfolio management teams need to understand how their respective portfolios and the total fund interact with climate change issues, and how this may influence their strategic priorities to build resilience into the portfolio.

Measuring exposure to climate change can be imprecise but directionally informative and provides guidance for risk mitigation as well as opportunity exploitation.

Some tools and analysis that can build knowledge and understanding of a fund’s exposure to climate change risks and opportunities include the following:

Tools	Description
Climate change scenario analysis	Forecast a variety of climate impacts on financial markets and corresponding fund performance.
Carbon footprint	Measure greenhouse gas emissions generated by companies that are attributable to the fund’s investment in those companies.
Fossil fuel reserves assessment	Evaluate the amount of fossil fuel reserves that are owned or accounted for by investments
Climate Value at Risk (VaR)	Climate VaR quantifies climate change risks and associated future costs.
Climate ESG scores	Review climate change scores from data providers to understand how a company is positioned or exposed to climate change risks.
Physical climate change risk assessment	Conduct analysis of geographic locations of fund’s assets relative to physical risks (e.g., water stress areas, sea level exposure, etc.).
External manager evaluation	Evaluate the extent to which external managers are considering climate change risks and opportunities in their investment decision making.
Thematic research	Conduct research on key themes, sectors, or segments of the portfolio to understand trends and risk exposure to climate change.
Education and training	Provide education and training to staff to ensure they understand potential impacts of climate change.
Stranded asset risk assessment	Assess the potential for company or sector’s business model to be disrupted by climate change actions. Determine if climate change may lower an asset’s rate of return sooner than expected.

Appendices A, B, and C provides many valuable sources with more detailed information regarding the topics in the table.

Dissect your portfolios

As you explore the current portfolio’s exposure to climate risk, a few key metrics can offer a view as to the exposure of the portfolio to climate-related impacts and set a baseline for future improvements.

A few options to consider for a top-down assessment of the total fund are:

- How much of the portfolio is invested in high-carbon intensity sectors (e.g., the magnitude of operational emissions). High-impact sectors include fossil fuel extraction, cement production, and some sources of power generation;
- High, medium, and low-risk geographies; and
- How much of the portfolio is invested in climate-related solutions?

Explore bottom-up assessment by asset class or industry. You could also tailor the evaluation to the most critical risk factors for each sector - for example, physical risks for real estate or transition risks for companies in the energy industry.

A climate change objective set by the board will help management and staff develop a strategy to deal with this long-term risk. Both a “top-down and bottom-up” approach is recommended: the board sets the goal, based on input from management and staff.

In developing a comprehensive approach to climate risk and opportunities, an organization should consider the role it could play in addressing this global challenge. This starts with setting an organizational objective for climate change in the context of overall organizational objectives.

As asset owners, do we want to minimize or mitigate climate change risk in our portfolio? Do we want to profit from the investment opportunities which arise from climate change? Do we want to take more proactive and constructive actions to reduce the impact of our portfolio companies in contributing to climate change? All of the above?

It should be clear to staff how a climate change objective aligns with the organization’s overall mission.

Then, management and staff can develop a strategy to meet the objective. Considering climate change as part of corporate strategy gives it the profile that can unlock intellectual, time, and financial resources. We suggest that organizations take a “top-down and bottom-up” approach when developing a strategy. While senior management commitment is imperative, we recommend that everyone in the organization has an opportunity to be heard and to contribute.

Organizations can begin by asking: what climate-related risks are we concerned about? Possibilities include:

- Physical risks to investments, such as real estate, infrastructure, and other assets with large geographic footprints (e.g., increased maintenance capex, reduced access or availability of inputs);
- Disruption to business operations (e.g., weather events impacting supply chains);
- Asset stranding (e.g., technological disruptions, changes in consumer behavior); and
- Climate-related regulation leading to changes in product demand (increased cost of operations, reduced access or availability of resources).

Goals in the first year can be simple, such as making a commitment to improve organizational awareness and knowledge of climate change impacts and actions.

As an organization’s desired role and the scope of its climate-related risks becomes better defined, strategy can become more detailed. There are many options for managing risk. For example:

Addressing primary causes

- Engage with companies to encourage emissions reductions (engagement can have dual benefits: reducing portfolio risk, as well as the impact on global warming). This can be as simple as joining a collaborative initiative such as Climate 100+.
- Advocate for climate policies that send the appropriate signals to the market and decrease uncertainty when making investment decisions; for example, one could support the annual letter to the G7.
- Increase investments in clean technologies and renewables to benefit the fund and support a just and orderly transition, possibly using passive green or clean technology indices.

Reducing or hedging exposure to higher-risk investments

- Use portfolio tilts to shift away from companies more likely to be impacted by climate change, possibly using indices composed of lower carbon-emitting companies;
- Set portfolio emissions reduction targets (note that this can be used as a measure of progress for both addressing and avoiding the risk); and
- Divest of high carbon-emitting companies.

Regardless of the approach an organization decides to take, it is important to send a clear and consistent message on the organization’s position internally and externally.

CASE STUDY: Caisse de dépôt et placement du Québec (CDPQ)

Climate change has been part of countless conversations at CDPQ in recent years. These discussions had various origins: concern over the impact of climate change on our investments by our clients and our board of directors, public scrutiny of our actions by various stakeholders, and most frequently, internal debates about investment decisions.

We needed a comprehensive approach to climate risk and opportunities and wanted to play a role in addressing this global challenge.

Our strategy on climate change

In October 2017, after more than two years of work, CDPQ announced its climate change strategy. Going forward, climate change would be factored into every investment decision, and we would rigorously assess risks, opportunities and the carbon footprint of our existing and future assets.

To guide our investments within that context, we set two targets. In the short term, we would increase our investments in low carbon assets by 50% over the next three years, such as investments in public transit infrastructures, renewable energies, clean tech companies, and high-performance real estate. In the medium term, we would reduce our GHG emissions per dollar invested by 25% by 2025. This target applies to our entire portfolio and was translated into “carbon budgets” for each of our portfolios.

We also wanted to be active leaders, especially on engagement with companies. We place a greater focus on structuring discussions on climate change that will inform our decisions as an investor. This may include supporting shareholder resolutions aimed at enhancing transparency on climate risks and carbon emissions, and accelerating investments in more efficient industrial processes. Supporting the TCFD’s recommendations was just a first step for CDPQ.

How did CDPQ rally around this strategy?

Within CDPQ, the most pointed debates focused on what role institutional investors should play in addressing climate change, with opinions rooted both in facts and beliefs.

To succeed, we knew we needed a pragmatic approach that reconciled our multiple obligations. Specifically, we needed to address climate change in a way that was good for our clients and good for the planet. Senior sponsorship was assumed by both our Head of Equity and Head of Responsible Investing, sending a clear message that this was neither a marketing effort, nor a risk-only topic. We reached out to international and local peers, specialized firms and technical experts to help us shape our thinking.

Early in the process, the idea of implementing carbon budgets that would decrease over a long period of time gained traction because it allows investment teams to retain flexibility in managing their portfolio. It also provided a useful metric to track progress and was aligned with decarbonization efforts undertaken by states and companies around the world. Perhaps more importantly, it charted a concrete course for our investment teams.

We invested a lot of time in meeting with managers and analysts to hear their concerns, but also to raise awareness about climate change and its potential impact on our portfolios. To do so, we reinforced our risk teams and set up a new Stewardship Investing group to raise the profile and expertise of our ESG analysis and engagement activities.

The journey is far from over. We are in the process of improving our assessment metrics and tools. An encouraging sign is the extent to which the climate change conversation has changed within CDPQ. Our teams now dedicate more of their time to green and innovative investments, and climate discussions have significantly increased (in frequency and intensity) during investment committee meetings – signs that confirm we are on the right path.

Clearly communicate your position on climate change both internally and externally.

Organizations should communicate a clear and consistent message on their position and approach to climate change and how it is incorporated into the long-term investment strategy. To do this, an internal and external communication plan should be developed to ensure all stakeholders are aligned and informed about your position, rationale, and strategy for managing climate change risks and opportunity.

Internally, transparent communication and dialogue on climate change will foster a corporate culture where sustainability factors are top of mind and inextricable from investment processes. Externally, it ensures your stakeholders have a common understanding of what you're doing and why. Clear communication can not only deepen trust and engagement, it can make your organization more attractive both as an employer and an investment partner.

Internal and external messaging needs to be consistent. Note that this does not mean messaging will be “constant” over time – just as climate change is a complex and rapidly changing area, organizational goals and strategies to manage climate risk will evolve, and communication plans and messaging will need to evolve alongside them.

Internal communications

Building a climate-conscious culture requires consistent tone from the top and ongoing reinforcement. When the organization has determined its climate goals and strategy, with contributions from all levels internally, it may also be useful to develop a clear position statement on climate change (the 10-second elevator pitch) with input from others in the fund. When staff contribute to the development of the message, it fosters shared understanding and buy-in. In a small organization, this can readily be achieved through facilitated brainstorming sessions. For larger organizations, it may be more effective to convene a smaller group with representatives from across the fund.

Once the strategy for climate change and position statement have been developed, organizations need to communicate these at various levels (from the board and executives to people managers, teams, and individuals) using existing communication channels. The most effective way to communicate the strategy in an organization is to apply the strategy in practice in existing processes and to communicate by doing. This isn't a case of “one and done” – if the goal is to achieve lasting cultural or behavioral change and to regularly share knowledge about fast-changing climate developments, then internal communication about climate change will be ongoing.

Regular touchpoints across the organization can be established through a corporate intranet, e-mail messages, town halls, team or committee meetings, discussion forums, workshops, and other gatherings to reinforce any targeted changes in behavior. Communication materials can be specific to, and developed by the organization, or they can be third-party materials or speakers aimed at educating staff about climate change in general.

Some suggestions include:

- Organization's vision and strategy on climate change
- Shared practices across the plan
- Thought pieces on specific implications or developments
- Dashboards and tear-sheets with data tailored to asset classes
- Relevant and influential papers from third parties, NGOs, etc.
- Internal or external speakers

External communications

Pension plans have multiple stakeholders with different communications wants and needs. Plans should identify their various stakeholder groups and their communications needs. This could include determining what aspects of climate change are most meaningful and assessing stakeholders' levels of understanding. Senior management and corporate communications staff should be involved as climate change-related information should not be siloed, and in fact needs to be embedded in overall corporate communications.

External communications provide several functions to support a climate-conscious organization.

- **Leading by example.** Investors and other corporate stakeholder require companies to provide transparency on exposure to climate change and explain the company approaches to managing them. Investors should aim to set an example by providing a similar level of transparency to their members and other stakeholders.
- **Enhance trust and license to operate.** Communicating the organization's commitment to managing climate change risk fosters members' trust that their pension savings are being managed responsibly and prudently, as well as aligns with members' values. External communications should aim to be as detailed and specific as possible to credibly convey the fund's approach.
- **Elevate the industry.** There are many benefits that a company accrues by supporting a more climate-aware investment industry. Communicating the fund's climate change approach enables sharing of best practices, and some friendly competition that pushes the industry further.

Organizations may want to take different communication channels depending on the audience, content, and objective.

- For smaller organizations or those with small communication budgets, it is fairly easy to post a summary of the organization's strategy on its website and devote some attention to climate change when executives have speaking engagements, present at conferences or annual public meetings, etc.
 - Some potential avenues for external communications about the organization's climate change approach:
 - Organizational website
 - Participation in speaking engagements, webinars
 - Participation in union / member meetings
 - Regular investment reporting, e.g., annual reports, sustainability reports
 - Inclusion in regular member communications, e.g., newsletters, pamphlets
 - Video and other multimedia applications, e.g., webinars

Example

In 2016, Ontario Teachers' assembled a climate change working group, made up of individuals from various departments in the Investment Division. While the end result was a set of climate change scenarios and signposts, the process was equally about creating a shared understanding and common lexicon across the plan for assessing climate change risk. Over the course of 2017, the climate change working group used multiple touchpoints and interactions across the plan, including email and intranet communications, department meetings, and smaller discussion groups to educate and socialize concepts. An intranet site dedicated to climate change was created to share resources and stories, including examples of how climate change risk or opportunity was integrated into an investment decision.

Integrate climate change in the existing risk management processes to ensure climate change is considered in investment decisions.

Climate change is a systemic risk that should be evaluated at various levels across a fund. The long-term nature of the risks and opportunities coincide with the long-term time horizons that are important to institutional asset owners. Climate change has the potential to impact broader economic outcomes, which could impact overall fund performance and should be considered in established risk management processes. While risks may be long-term in nature, the pricing-in of those risks may happen much sooner (e.g. coal).

It is important to have a clear understanding of potential climate change impacts on fund performance and to ensure the risk exposure aligns with the fund's risk tolerances. Embedding climate change into existing risk management processes ensures investment decisions as well as asset allocation decisions systematically consider material risks and opportunities related to climate change alongside other investment information. Asset owners who embed climate change risks and opportunities into their risk management processes tend to gather quantitative information that leads to material, investible information. In some cases, qualitative assessments of climate change risk will lead to valuable investible information.

Individual investment decisions will require a more nuanced approach to understand climate risk assessment, and different tools will be required for this evaluation. All aspects of the risk management process must have accountability assigned at the corresponding level of the organization.

Selecting relevant metrics

Measuring climate change risk is not a standardized process for investors, and no single metric measures climate change risk for an investment. A combination of metrics will need to be analyzed in order to make a determination of risk. Many different approaches can be used to gather a holistic assessment of the climate-related risks in a portfolio.

Based on earlier actions, you should have insight into your organization's exposure to a range of transition and physical risks and opportunities that need to be assessed and managed. This information should indicate where to focus your initial measurement efforts. Determine appropriate climate change risk metrics that are relevant to your strategy and your assets.

Some suggested measurements are provided in Appendix C. A climate change materiality assessment may also help inform the risk measurements that are relevant - tools such as the SASB Materiality Map can help.

Building the appropriate metrics and tools will be an iterative process and requires input from across the organization.

Management considerations

Once metrics have been set and analyzed, you can establish your unique approach to manage the climate risks and opportunities identified.

The following are some key recommendations for embedding climate change into risk management processes:

- Understand the potential risks that climate change poses to pension liabilities. For example, what is expected to change as the economy transitions (or not) to a low-carbon economy, and how does this impact the value of your investments?
- Develop an approach for managing climate-related risks and opportunities that is applicable and implementable across asset classes.
- Potential impacts and expected outcomes should inform all stages of the investment lifecycle, from origination to due diligence to asset management.
- Stress testing changes to investment valuations should be evaluated as possible risk management mechanisms.
- Engagement and advocacy are tools to manage climate risk by encouraging actions within investments and should be consistently applied across all asset classes.
- Consider supporting proactive actions to mitigate climate risks more broadly (beyond direct impacts on portfolio companies).
- Collaborate with peer organizations to collectively manage climate-related risks in financial markets.

Once management processes have been decided, ensure that all new metrics, steps and accountabilities are clearly defined and described in the appropriate governance structure.

CASE STUDY: BCI

Investment risk management is integral to BCI's fiduciary role in managing our clients' funds. Along with our clients, we believe that investors who take environmental, social, and governance (ESG) matters into account can better understand, manage, and mitigate risks associated with long-term investments.

In 2015, we embarked on a multi-year initiative to strengthen our investment risk management and bolster how we analyze, report, and capitalize on investment risk. We reviewed how risk types and categories were considered across the corporation and collaborated with clients to determine risk management priorities. ESG factors, specifically climate risk, were a focal point for clients.

Stemming from that, we incorporated a guiding principle into our risk policies stating that ESG factors are integrated into investment risk management. We determined a need for additional capacity and expertise to support ESG and climate change risk management functions, as these risks present unique modelling, measurement and evaluation challenges. With these functions now in place, we are developing a consistent climate change risk management approach across all of our asset classes, while accommodating their specific needs. Our inaugural Climate Action Plan - which presents new tools and metrics, and an updated strategy - will ensure that our clients' assets are positioned to capitalize on the investment opportunities from the transition to a low-carbon economy, while also managing physical and transition risks.

Additional resources

SASB's Technical Bulletin on Climate Risk is designed to help investors better understand, measure and manage their exposure to climate-related risk.

Appendix B and C also contain links to a variety of useful reports and websites.

Start with small steps that will have limited impact on the portfolio to gain experience and build knowledge.

Uncertainty around the impacts and timing of climate change is usually seen as an impediment to start the work. We believe that getting started is more important than being right. Climate change is happening faster than expected and perfect solutions are not available today. A “wait and see approach” could mean actions will be too late, impacts to investments could be greater, and solutions could be expensive to implement.

Benefits of starting small

Your organization will gain experience, build knowledge, and raise awareness by starting with small steps. This will provide basic tools for assessments and will give your teams experience with managing climate change in the portfolio, while minimizing adjustments to the current portfolio. These steps can be scalable to the size of any organization. A continuous improvement mindset is valuable: tools and processes should evolve as more information becomes available, and the teams and investment partners gain knowledge and confidence about potential impacts of climate change and alternatives.

Additionally, steps like engagement and advocacy can have a positive financial effect through reducing uncertainty in the market.

Put some money to work

We strongly advise putting some money to work where it is relevant. By doing so, you will start looking at investments through both the investment and climate change lenses. Allocating funds forces you to think about objectives, measures, mandates, benchmarks, reporting, and perhaps even incentives for individuals and teams. Often, the first investment steps will be one or more of these:

- Investing in green bonds;
- Investing in one or more clean energy funds or projects; and
- Reducing the carbon footprint in the equity benchmark or portfolio.

One or more of these steps can be taken with a very limited impact on risk budgets and liquidity. They should fit within your regular investment process. To create a useful learning experience, involve the board and the whole investment chain. All investment organizations have previous learning experiences they can draw on, such as entering new markets or asset classes - this should be seen as no different.

Cast your votes

Your votes count! Consider and define how you want to vote on climate-related proposals in the future. Review your existing approach to climate change in proxy voting guidelines, whether they are your own or your external manager's. Include external managers in this discussion if they vote on your behalf, so voting decisions are consistent.

Engagement and advocacy

Review your current affiliations with external organizations and examine their efforts on climate change. Pension industry groups, peers, and responsible investing associations are a good starting point for participating in collaborative initiatives. Learn more about the objectives and types of involvement in industry associations and endeavors such as Climate Action 100+ (see Appendix B). Consider joining one or two of them to learn more about the challenges they identify and advocacy strategies they have in place.

Take advantage of free tools and resources developed by organizations such as the Principles for Responsible Investment (PRI) or the Task Force on Climate-related Financial Disclosures (TCFD). These entities publish reports and guidelines for institutional investors interested in advancing the consideration of ESG factors in the investment process, as well as for improving disclosure.

Recognize the influence you can have on companies, standard-setters, and regulators to enhance climate change-related disclosure and policies. Offer feedback on policy proposals and participate in local conversations with peers or working groups.

Reach out to companies and policy makers, either individually or through industry associations, to advocate for better climate risk management and enhanced disclosure.

Ask your external managers how they approach companies to discuss climate change, and whether they require investee companies to report on key climate indicators. Ask external managers to demonstrate how the portfolio looks from a climate change perspective relative to a market benchmark. Ask investment consultants to include climate change in external manager search and monitoring processes.

Portfolio Construction

You may wish to compare total-fund holdings against a benchmark to assess how the portfolio is positioned to cope with the potential impacts of climate change, and if there is a competitive advantage to be explored. (Benchmarks might have to be proxies or peer-related.)

If your assessment reveals gaps between your objectives and your portfolio, explore options to close this gap, such as allocating away from higher climate risk investments towards lower or risk-reducing investments.

Measure the progress made in integrating climate change in the investment process and achieving your overall climate change goals. One way to do this is by setting key performance indicators (KPIs) for each action described in this guide.

Establish a framework to measure performance and track progress towards successful implementation of your unique climate change strategy.

KPIs can take many forms but should be determined based on your objectives and risk management process. They could also be linked to overall fund performance measures. By identifying and tracking KPIs, asset owners can better understand what has been achieved and what still needs to be actioned. This is important to ensure all stakeholders have a shared understanding of objectives and whether the strategy is on track, as well as to ensure adequate resources are devoted to these efforts.

Examples of possible KPIs

Tracking progress of integrating climate change into processes:

- Governance structure ensures climate change is consistently considered across all asset classes
- Percentage of board members/senior leadership/investment professionals who have received training on the implications of climate change
- Proportion of external managers who consider climate change into investment process
- Climate-specific risk management metrics have been established
- Progress towards meeting TCFD disclosure recommendations

Achieving desired investment outcomes:

- Proportion of deals that consider climate-related impacts
- Climate change engagement KPIs, such as number or outcome of discussions
- Change in, or targets for carbon reduction and/or climate-friendly investments (see the targets of La Caisse de Dépôt et Placement du Québec and NZ Super)

Climate change policy and regulations, technology, and best practices for companies and investors are moving fast. Monitor these changes and ensure your strategy moves along with them.

A full climate change strategy takes time to develop and has a top down, integral perspective.

We believe that a sound, robust strategy must address four key areas: governance, strategy, risk management, and metrics to be successful. This framework is aligned with the TCFD recommendations outlined below.



Governance

The organization's governance around climate-related risks and opportunities

Strategy

The actual and potential impacts of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning

Risk Management

The process used by the organization to identify, assess, and manage climate-related risks

Metrics and Targets

The metrics and targets used to assess and manage relevant climate-related risks and opportunities

Revisit the strategy every two to three years – the world is changing fast

All the parts of climate change are moving quite quickly – policy, technology, measures, and best practice. It makes sense to check progress and results, then revisit and update the organization's strategy every two to three years. In these uncertain circumstances, it is difficult to see far ahead, so the strategy should be adaptive – which is not the same as “wait and see.”

••• Tactics to cope with uncertainty

Three key elements for coping with uncertainty should be a part of any strategy.

1. Monitor climate change developments

Stay on top of the developments where climate change is concerned. This is a many-faceted challenge, and a good analytical framework is STEEP: Societal (stakeholders), Technological (solutions like wind and solar and their cost), Economic (risk and return), Environmental (how fast is climate change happening), and Political (extremely important and moving fast). Results of this monitoring should be part of the board and C-suite agenda at least once a year. Appendix B contains additional resources.

2. Direct attention to the largest risks and opportunities

Given the uncertainty around climate change, it makes no sense to try to address the whole problem at once. Even in the largest organizations, resources are limited; therefore, prioritize actions, for example, based on the outcome of scenario analysis. See the case study below for more examples.

3. Become more mature over time

Many investment professionals will not be familiar with the details of climate change, let alone how to cope with this challenge in their part of the value chain or portfolio. Increase the maturity of the investment organization over time. The first step is to understand climate change and figure out how it might affect a specific part of the portfolio or value chain. Intermediate steps are integrating climate change in the investment process and operating this changed process. Then, you can be prepared to explain how climate change affects a part of the portfolio, how the decision-making process has changed, and what the effect was on the portfolio.

CASE STUDY: PGGM

As a result of Pensioenfond's Zorg en Welzijn's (PFZW) Investment Strategy 2020, PFZW and PGGM have taken important bottom-up steps in climate change by halving the footprint of the public market equity portfolios and investing in new energy sources (wind, solar). In addition, energy efficiency is deeply integrated into PGGM's approach to real estate investing.

This provided valuable experience and the confidence that, if done well, investment returns do not suffer from integrating climate change decisions in the investment portfolio. A number of investment teams and risk management specialists were eager to take the next step, so we undertook a scenario analysis and measured the climate change risks in the PFZW portfolio. After this assessment, PGGM will move up the maturity ladder on climate change by:

- Monitoring risks and developments;
- Developing a deeper insight in the risks and opportunities in the portfolio from a risk management perspective;
- Building an approach to integrate climate change into the due diligence of potential infrastructure deals; and
- Developing TCFD-compliant reporting.

Lessons learned and advice

PGGM organized the strategy formulation process from the top down, as we found creating ownership from the bottom up is not that easy.

An organization can fall into the trap of making the strategy too big - with the result that nothing happens. In our view, small steps are better than large steps.

When implementing strategy, the teams who are responsible should be in the lead. At the same time, you need gentle coordination to move collectively in the same direction, at the desired speed, and using the same language.

While not an easy process, it is surely worth the time and effort invested.

Appendix A: Scenario Analysis

Asset owners and asset managers use scenario analysis in a range of areas to assess risks where there are uncertain outcomes. Scenario analysis is a tool used to understand how various possible future events may affect outcomes and expectations related to a strategy - in this case, the fund's investment strategy. Very simply, you map out different ways the world could unfold with scenario analysis. For example, on one path, climate policy is implemented early on and the world transitions in an orderly fashion to a low-carbon economy. On another path, existing policies start getting retracted, physical risks of climate change worsen, and the world transitions in a very volatile, disorderly way. Then, you assess how your investment strategy interacts with those scenarios to help inform any changes you may want to make.

- Scenario analysis is used for climate change as there is no historic data that can be used to understand this issue, and climate change impacts need to be understood over long timeframes.

While scenario analysis is just one of many possible ways to build knowledge of climate change risks and opportunities in investments, it has an advantage of providing a high-level overview of the broad range of complex issues that need to be understood and evaluated.

- Scenario analysis can be used to focus efforts where there are material risks and opportunities to a portfolio. It can be modified to suit the needs of the fund and the management team at that time and should not be an isolated exercise as information continues to evolve on this topic.

There are many ways to get started with scenario analysis and recommended first steps are to review the TCFD scenario analysis guidance along with disclosures or examples published by other investors and service providers. Also watch for upcoming guidance from the UNEP FI Pilot project on implementing the TCFD Recommendations for Investors.

Key questions to consider include:

- Do you want to develop your own scenarios, or use some of the publicly available scenarios?
 - Some of the commonly referenced, publicly available, scenarios include: **Shell Scenarios** (<https://www.shell.com/energy-and-innovation/the-energy-future/scenarios/what-are-scenarios.html>), **IEA World Energy Outlook** (<https://webstore.iea.org/world-energy-outlook>), and **Greenpeace Energy [R]evolution** (<https://www.greenpeace.org/archive-international/en/campaigns/climate-change/energyrevolution/>)
- What is your progress towards meeting TCFD disclosure recommendations?
- Do you want a scenario tool that provides investible/decision-ready information, or something more narrative-based to help stretch thinking and identify trends and themes?
 - Scenario tools that can be directly applied to investment decision-making need to be more quantitative, e.g., **Mercer scenarios** (<https://www.mercer.com/our-thinking/wealth/investing-in-a-time-of-climate-change.html>), while **narrative-based scenarios can be higher level, e.g., Shell scenarios** (<https://www.shell.com/energy-and-innovation/the-energy-future/scenarios/what-are-scenarios.html>).
- How much expertise do you want to develop in-house vs. hiring consultants?
- Portfolio scenario analysis is offered by a number of vendors, which can provide a quick first pass. This approach requires less direct involvement across a fund, lowering barriers to engagement and adoption.

Once an organization determines the approach that is best suited to its situation, it should plan out the implementation to ensure representation and input is included from all parts of the organization. This will maximize buy-in, as well as subsequent application and use from staff.

Scenario development

- Scenario work should be led or sponsored by the CEO and prioritized appropriately throughout the organization.
- Involvement from all asset classes through a task force or working group should be sought to avail the fund of existing talent and ensure breadth of internal stakeholder involvement.

Scenario implications

- This is generally a work-in-progress area for most funds.
- Mercer has done preliminary research to try and quantify the financial impact of various scenarios on asset classes; however, it is challenging to apply to complex portfolios with large heterogeneous assets.

Using the scenarios for climate change insights

- While a robust quantification of the financial outcomes across different asset classes in different scenarios is still nascent, that should not deter a fund from taking the insights from the scenarios to develop tailored use cases, or applications and thought exercises.
- Consider the various use cases and audiences for the results of the scenario analysis and integrate this information into the appropriate investment processes. **Some examples of applications include:**
 - Thematic research
 - Identification of new opportunities and trends
 - Asset allocation decisions
 - Asset valuation and stress testing
 - Asset management and value creation
 - Liability and funding ratio impacts
- When rolling out the results of scenario analysis, prepare material that is suitable to each audience and ensure the results are tangible to the specific audience.
- Expect adoption to progress at a variable rate across different asset classes and fund managers, so plan for ongoing change management efforts.
- Consistent emphasis from leadership to support adoption and use of the scenarios' results will improve the value generated from the exercise and improve the change management process.

Scenario Monitoring

- Scenario analysis is not a point-in-time effort. To be useful, developments must be continually monitored.
- Inclusion of climate change signposts that are tracked on an ongoing basis can help anchor the process of revisiting and revising the scenarios. Signposts are used to monitor trends and trajectories related to the assumptions that are used to build the scenarios. The signposts can be used to better understand the probability of each scenario occurring and monitor specific changes to the assumptions that feed into the scenarios.

Examples: (order from least complex to more complex)

- **OPTrust** (https://www.optrust.com/documents/OPTrust_PortofolioClimateRiskAssessment_Mercer.pdf)
- **NYSCRS** (https://www.osc.state.ny.us/pension/NYSCRF_climate_change_report.pdf)
- **Environment Agency Pension Fund** (<https://www.eapf.org.uk/news/public/2017/10/our-policy-to-address-the-impacts-of-climate-change-2017-is-now-available>)
- **CalSTRS;**
- **Transitions Pathway Initiative** (<http://www.lse.ac.uk/GranthamInstitute/tpi/>)

Non-Asset Owner Examples:

- **Shared Socioeconomic Pathways** (<https://www.sciencedirect.com/science/article/pii/S0959378016300681>)
- **Blackrock** (<https://www.blackrock.com/corporate/literature/whitepaper/bii-climate-change-2016-us.pdf>)
- **Mercer** (<https://www.mercer.com/our-thinking/investing-in-a-time-of-climate-change.html>)
- **Shell Scenarios** (<https://www.shell.com/energy-and-innovation/the-energy-future/scenarios.html>)

Appendix B: Resources/References

CLIMATE INVESTMENT GROUPS	DESCRIPTION	WEBSITE
<ul style="list-style-type: none"> • Asia Investor Group on Climate Change (AIGCC) • Investor Group on Climate Change (IGCC, Australia/New Zealand) • Institutional Investors Group on Climate Change (IIGCC, Europe) • Ceres Investor Network on Climate Risk and Sustainability (INCR, United States) • Global Investor Coalition (GIC, international) 	<p>There are a number of regional climate change-specific investor groups.</p> <p>These groups act as coordinating bodies for stewardship, policy engagement and information sharing.</p>	<p>www.aigcc.net</p> <p>www.igcc.org.au</p> <p>www.iigcc.org</p> <p>www.ceres.org/investor-network/incr</p> <p>www.globalinvestorcoalition.org</p>
UN Environment Programme Finance Initiative (UNEP FI)	UNEP FI is a global partnership between the United Nations Environment Programme and the financial sector.	www.unepfi.org
Climate leaders group	Climate leaders group	
Portfolio Decarbonization Coalition	Portfolio Decarbonization Coalition is a small group of investors who are seen as climate leaders, with the objective of finding solutions to decarbonizing the economy.	www.unepfi.org/pdc
Renewable Energy 100 - RE100	RE100 is a collaborative, global initiative uniting more than 100 companies committed to 100% renewable electricity, working to massively increase demand for - and delivery of - renewable energy.	www.there100.org
Climate Action 100+ (CA100+)	Climate Action 100+ is an investor led initiative to engage with the largest global corporate greenhouse gas emitters.	www.climateaction100.org
Transition Pathway Initiative (TPI)	The asset owner-led Transition Pathway Initiative assesses how companies are preparing for the transition to a low-carbon economy.	www.lse.ac.uk/GranthamInstitute/tpi
Principles for Responsible Investment (PRI)	The United Nations-supported Principles for Responsible Investment (PRI) is an international network of investors with a goal to help signatories integrate ESG issues (including climate change) into their investment decision-making and ownership practices.	www.unpri.org
Australian Council of Superannuation Investors (ACSI)	ACSI provides collective voice for pension funds on ESG issues, including climate change in the Australian market.	www.acsi.org.au

NGOS AND SERVICE PROVIDERS	DESCRIPTION	WEBSITE
Asset Owners Disclosure Project (AODP)	AODP rates the world's asset owners on climate risk management.	www.aodproject.net
Carbon Tracker Initiative	Carbon Tracker carries out in-depth analysis on the impact of the energy transition on capital markets and the potential investment in high-cost, carbon-intensive fossil fuels. They originated the stranded asset discussion.	www.carbontracker.org
CDP	CDP encourages companies around the world to disclose carbon and other ESG-related data.	www.cdp.net
ShareAction	ShareAction promotes RI (including climate change) and gives savers a voice in the investment system. It also now runs the AODP (see above).	www.shareaction.org
South Pole	South Pole specializes in supporting carbon footprinting and related services.	www.southpole.com
Trucost	Trucost specializes in supporting carbon footprinting and related services.	www.trucost.com
Commonwealth Climate and Law Initiative (CCLI)	CCLI is examining the legal basis for directors and trustees to consider, manage, and report on climate change-related risk.	https://ccli.ouce.ox.ac.uk

INFORMATION SOURCES	DESCRIPTION	WEBSITE
International Energy Agency (IEA)	IEA	www.iea.org
Mercer	Mercer Investment Consulting has undertaken a range of work on the implications of climate change for pension funds.	https://www.mercer.com/our-thinking/wealth/can-you-afford-to-ignore-climate-risk.html
Task Force on Climate-related Financial Disclosures (TCFD)	TCFD was established by the Financial Stability Board to encourage improved disclosure on climate change-related issues by companies and their investors.	www.fsb-tcdfd.org

FUND MANAGERS	DESCRIPTION	WEBSITE
Schroders	Schroders developed a Climate Progress Dashboard that monitors 12 indicators to show progress towards decarbonizing the global economy.	www.schroders.com/en/us/institutional/insights/climate-progress-dashboard/ www.schroders.com/en/insights/economics/climate-progress-dashboard-forecasts-global-warming-of-more-than-4c/
Aviva	Aviva	https://www.aviva.com/social-purpose/climate-risks/ http://icpmnetwork.com/wp-content/uploads/2018/09/Aviva_Tragedy_of_Horizons_Report-1.pdf
HSBC	HSBC	www.gbm.hsbc.com/solutions/sustainable-financing/climate-research
LGIM	LGIM	https://www.lgim.com/files/_document-library/capabilities/lgim-climate-change-policy-april-2016-2.pdf

OTHER RESOURCES	DESCRIPTION	WEBSITE
If carbon footprinting is the answer, then what is the question?	A report by a group of European asset owners reflecting on current practice in carbon reporting.	www.responsible-investor.com/home/article/carbon_footprint_piece/
'Investing in a Time of Climate Change'	A study by Mercer which considers four climate scenarios and four climate risk factors to estimate the climate impact on potential returns for asset owners.	https://www.mercer.com/our-thinking/wealth/investing-in-a-time-of-climate-change.html
Climate change - the investment perspective	EY thought leadership report on the risks and opportunities associated with climate change and stranded assets for the investment industry.	https://www.ey.com/Publication/vwLUAssets/EY-climate-change-and-investment/\$FILE/EY-climate-change-and-investment.pdf

Appendix C: Potential Metrics

SUGGESTED RISK MEASURE	DESCRIPTION	RESOURCES
<ul style="list-style-type: none"> • Manager survey on climate change policy and processes 	<ul style="list-style-type: none"> • Add climate change-related questions to external manager reviews. • Determine how managers are incorporating climate considerations into their investment process and ask for examples. 	<p>CalSTRS Green Initiative Task Force Pg. 11</p> <p>CalSTRS Monitoring Equity Managers</p> <p>Institutional Investors Group on Climate Change – Guide for Private Equity Investors</p>
<ul style="list-style-type: none"> • Carbon footprinting/GHG intensity • Disclosure evaluation: climate strategy, TCFD recommendations • Opportunity identification (renewable and clean energy technology and infrastructure, low carbon funds, green bonds) • Ratio of “green/brown” investments and other metrics • Physical risk assessment • Regulatory risk assessment • Sector transition risk assessment • Reported GHG emissions • Climate change resiliency 	<ul style="list-style-type: none"> • Review carbon disclosures from CDP and other providers for measurements of relative actions taken by companies. • Identify investments that may benefit from climate change. • Conduct stand-alone assessments on physical, regulatory and transition risks in key areas of the portfolio for insight into risks relevant to certain assets. • “Resiliency” is often viewed as a combination of measurements and can qualitatively assess an investment’s ability to perform under various climate change scenarios. 	<p>EAPF Carbon Metrics Report</p> <p>CDPQ Climate Change Strategy</p>
<ul style="list-style-type: none"> • Carbon intensity • Supply chain risk • Carbon shadow pricing • Physical climate change risk 	<ul style="list-style-type: none"> • The same measurements for internally-managed assets apply to direct private market investments. • These assets require risk measurement and management throughout the investment lifecycle (from due diligence through asset management). • Climate risk needs to be evaluated at the portfolio level to understand exposure and influence deal origination. 	<p>AP6 Case study: Carbon Footprint a Private equity Portfolio</p> <p>Primer on responsible investment in infrastructure</p> <p>Institutional Investors Group on Climate Change – Guide for Private Equity Investors</p>
<ul style="list-style-type: none"> • Signpost tracking • Aggregation of other metrics to the total fund level (to understand risk/opportunities across the fund) 	<ul style="list-style-type: none"> • Carbon pricing and regulation. • Global energy supply and demand mix. • Levelized cost of energy across global markets. • Commercialization rates of disruptive technologies. 	<p>Mercer Climate Change Study Pg. 39 - 40</p>

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