



One Planet Sovereign Wealth Funds: Turning Ambition into Action

Briefing Paper
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About the Oxford Sustainable Finance Programme

The Oxford Sustainable Finance Programme at the University of Oxford Smith School of Enterprise and the Environment is a multidisciplinary research centre working to be the world's best place for research and teaching on sustainable finance and investment. We were established in 2012 to align the theory and practice of finance and investment with global environmental sustainability.

We research environment-related risks, impacts, and opportunities across different sectors, geographies, and asset classes; how such factors are emerging and how they positively or negatively affect asset values; how they might be interrelated or correlated; their materiality (in terms of scale, impact, timing, and likelihood); who will be affected; and what affected groups can do to pre-emptively manage risk. Since our inception we have conducted pioneering research on stranded assets and continue to undertake significant research on the topic.

The production of high-quality research on the materiality of environment-related factors is a necessary, though insufficient, condition for these factors to be successfully integrated into decision-making. Consequently, we develop the data, analytics, frameworks, and models required to enable the integration of this information.

We are pioneers and advocates of 'spatial finance', a term we have coined that refers to efforts to bring geo-spatial capabilities into financial analysis. As such we are developing new asset-level datasets through data science and combining these with new approaches to spatial analysis, scenarios, and stress tests.

We also research barriers to the adoption of practices related to sustainable finance and investment. This includes the role of governance, norms, behaviour, and cognition, as well as policy and financial regulation in shaping investment decisions and capital allocation.

The Oxford Sustainable Finance Programme is based in a world leading university with a global reach and reputation. We work with leading practitioners from across the investment chain (including actuaries, asset owners, asset managers, accountants, banks, data providers, investment consultants, lawyers, ratings agencies, stock exchanges), with firms and their management, and with experts from a wide range of related subject areas (including finance, economics, management, geography, data science, anthropology, climate science, law, area studies, psychology) within the University of Oxford and beyond.

The [Global Sustainable Finance Advisory Council](#) that guides our work contains many of the key individuals and organisations working on sustainable finance. The Council also has a role in helping to informally co-ordinate and share information on sustainable finance and stranded assets work internationally. The Oxford Sustainable Finance Programme's founding Director is [Dr Ben Caldecott](#).

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Briefing Paper Series

This Briefing Paper is intended to frame an issue and stimulate discussion among users of research. The views expressed in this paper represent those of the author(s) and do not necessarily represent those of the host institutions or funders.

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Executive Summary

Given their size, influence, and long-term investment horizons, Sovereign Wealth Funds (SWFs) are uniquely placed among asset owners to promote and implement the alignment of finance with the Paris Agreement on Climate Change and the Sustainable Development Goals (SDGs). Yet, to date, sustainable investment has remained on the periphery of SWF investment decision-making.

The One Planet Sovereign Wealth Fund Group was established at the One Planet Summit hosted by President Macron in December 2017 in Paris. The One Planet Group represents diverse funds from around the world. Its founding members are the Abu Dhabi Investment Authority, Kuwait Investment Authority, the New Zealand Superannuation Fund (NZ Super), Norges Bank Investment Management (NBIM), the Public Investment Fund of the Kingdom of Saudi Arabia (PIF), and the Qatar Investment Authority. These six funds together hold approximately USD 3.07 trillion in assets under management (AUM) as of June 2018, representing around 40% of the sector globally.

On the 6th July 2018, the One Planet Group published a voluntary framework ('the Framework') outlining principles for integrating climate change into SWF governance and investment processes. These principles are structured around three key themes: alignment, ownership, and integration. In this briefing paper we make recommendations to help guide SWFs in their implementation of the Framework and its principles.

Principle 1: Alignment

Alignment should mean that the activities and portfolios of SWFs are compatible with and supportive of the objectives of the Paris Agreement. This means systematically reviewing different functions to identify how they can better support alignment and then developing plans to embed alignment through changes in governance, strategy, processes, training, and culture, as well as updating the tools used by staff to fulfil their functions. The following recommendations will ensure SWFs deliver alignment on climate change, and overtime, other environment and sustainability topics:

- Portfolio compatibility with Paris will take time to achieve. It starts with SWFs creating a board-approved strategy to achieve alignment. This should set out the ultimate destination and the steps funds will take to get there, as well as metrics for assessing progress and who is responsible for implementing the strategy.
- Climate change and other environment-related risks and impacts should be integrated clearly into investment beliefs and investment frameworks and a clear view of the SWFs environment-related risk appetite should be developed.
- The Board, Senior Management, portfolio managers and other relevant functions should undertake courses and training, as well as continued professional development, to ensure they have access to the latest skills and knowledge to support alignment.
- There should be complete internal and external clarity about the key individuals at a board-level and in senior executive management who are responsible and accountable for implementing, monitoring, and improving alignment over time.

- SWFs should align their strategy with external communications and government affairs work that they do. As key players in the market, they should participate in and shape local and international initiatives, including by publicly signing statements and targets to ratchet progress and increase ambition.
- SWFs should disclose their climate strategy and climate-related exposures publicly, with this extending to broader environment-related risk exposures over time. The quality of disclosure should improve annually and in the first instance SWFs should align reporting with the Taskforce on Climate-Related Financial Disclosure (TCFD).
- SWFs should also adopt robust frameworks for measuring and reporting on both positive and negative impacts related to climate change, and over time extend this to broader environmental impacts and the wider SDGs.
- SWFs should use metrics based on ‘cumulative committed emissions’ and ‘carbon lock-in’ as these are a much more effective and accurate ways of assessing whether portfolios are compatible with different carbon budgets (See, Millar, Hepburn, Beddington, & Allen, 2018; Caldecott, McCarten, & Charalampos, 2018). SWFs should calculate and disclose aggregate financed committed emissions.
- SWFs should adopt the Oxford Martin Principles¹, which create a robust science-based framing for pursuing portfolio alignment with Paris carbon budgets or other warming thresholds.
- SWFs should consider publishing climate adaptation plans that set out how they intend to manage physical climate-related risks in their portfolios over time.

Principle 2: Ownership

As large, long-term investors, SWFs should practice responsible ownership of all the assets they hold, whether debt or equity. As universal owners SWFs have a range of rights and responsibilities that they can exercise, and through this ownership they can have a significant impact on the decision-making processes of companies and other stakeholders.

- SWFs should clearly outline their expectations of investee companies regarding climate-related risks and impacts. This should include the expectation that company boards are aware of the physical and transition risks facing their company, their contribution to carbon emissions, and have prudent strategies in place to manage risks and reduce impacts over time. SWFs should also communicate the expectation that companies undertake strategic climate assessments to understand how different climate scenarios might affect future activity, and require that material climate risks be incorporated into strategic planning, risk management and reporting. SWFs should promote, and over time require, investee company alignment with the Paris Agreement and SDGs.
- Where appropriate, SWFs should undertake engagement to ensure that material climate risks are incorporated into corporate strategic planning, risk management, and reporting by investee companies. They should either do this directly or through mandated proxies. SWFs should ask companies to disclose their climate risk exposure, impacts and management strategies through

¹https://www.oxfordmartin.ox.ac.uk/downloads/briefings/Principles_For_Climate_Conscious_Investment_Feb2018.pdf

standardised frameworks, such as the TCFD. Active climate-related ownership could begin by focusing on high emitting companies, but over time this should be extended across sectors, geographies, and asset classes.

- SWFs should outline expectations clearly and incorporate consideration of climate-related risks and reporting within proxy mandates. SWFs should expect intermediaries with delegated ownership responsibility to be integrating climate consideration into their engagements, and actively voting their shares in line with the overarching goals of the Framework and climate-aligned long-term value creation. SWFs should engage with portfolio managers and proxy voting agents to understand how this is being done in practice, and mandate that climate-related risks are incorporated into engagement and voting practices.
- SWFs should develop methodologies to measure and monitor how managers are conducting engagement on their behalf, and include responsible stewardship in manager selection, monitoring, and reviews.
- SWFs should collaborate with other stakeholders to develop robust methodologies for measuring and monitoring the engagements undertaken on their behalf (internally or externally), to ensure that their interests are being represented and that these engagements are aligned with the One Planet Framework.
- Engagements are currently hindered by a lack of timely climate-related information and data. SWFs should work with other industry actors to secure greater data on climate-related risks and opportunities across different sectors and asset classes. They should develop methods and tools to integrate this climate data into effective, targeted engagement strategies.
- SWFs should consider joining relevant collaborative engagement efforts. This can further lend support and clout to investor-led initiatives and can be an effective tool for those SWFs just starting out on this pathway, perhaps with limited internal capacity and expertise on climate topics. By collaborating with other investors, SWFs can ensure that they are contributing to a united investor voice with increasingly coherent and consistent asks. Several such opportunities exist, including through membership to investor groups on climate change and specific engagement initiatives
- SWFs should also, where appropriate, support relevant shareholder resolutions that will improve disclosure and climate alignment.
- Engagement with companies lagging behind should make clear the improvements expected and the consequences of non-compliance, including (if appropriate) the option of divestment.
- SWFs should ensure that responsible ownership strategies and practices are built into their passive holdings. This is particularly important as passive funds, unlike active funds, by definition follow the index and have to buy the holdings contained in the index. Active ownership is, therefore, the most powerful tool passive funds have to effect change in investee companies.

Principle 3: Integration

Integration of climate and other environment-related risks into SWF functions, particularly strategic asset allocation, risk management, and portfolio management, will require phased plans to build capabilities and associated investment in human resources, analytical capabilities, and datasets, as well as investing time in understanding and implementing key use cases. SWFs will need to work actively with their investment managers, consultants, data providers, and employees to ensure that integration improves and expands over time.

- SWFs should integrate climate risk management into company and asset valuations. This will require working with internal/external investment managers, data providers, and consultants to identify different integration strategies and understand which align best with the goals and governance of the fund. Funds should recognise that different integration strategies are not mutually exclusive, with best practice often employing a combination of approaches, and that this should be an on-going consideration as suitable strategies will evolve over time.
- Funds should then put in place the necessary processes and incentives to implement these strategies. This includes integrating climate consideration into investment manager mandates, and outlining the expectation that portfolio managers (whether internal or external) should measure and manage their climate risks and impacts. Over time, SWFs should set targets for reducing portfolio climate risk and impact, and ultimately should expect managers to align portfolios with the Paris Agreement and SDGs.
- SWFs should integrate climate considerations into external manager selection processes, agreements and post investment reviews. For those funds who rely on external managers, this will be vital in the management of climate-related risks and securing productive investments in climate-related opportunities.
- SWFs should integrate climate-related risks and opportunities into strategic asset allocation. Climate exposure and opportunities vary across different asset classes, sectors and geographies, and this can be integrated into strategic asset allocation.
- SWFs should draw on, and help to develop, analytical tools to inform portfolio allocation and investment decisions. This could include commissioning research and working with asset management firms to design new methodologies for understanding and accounting for climate-related factors. This should involve the utilisation of novel methodologies, such as asset-level data secured from developments in earth observation and artificial intelligence², fintech, artificial intelligence, and machine learning.
- SWFs should link internal and external manager incentives, including remuneration and renewal of mandates, to progress against climate-related risk management and Paris alignment.
- SWFs should also develop education and training programmes and tools to ensure that employees are aware of relevant research and best practice as it evolves in the coming years.

² See the Spatial Finance Initiative for more information: www.spatialfinanceinitiative.com

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1. Introduction

Sovereign Wealth Funds (SWFs) are government-owned investment entities, designed to acquire and manage assets for a variety of macroeconomic purposes. The first recognised SWF was established by Kuwait in 1953 (Buteica & Huiduman Petrescu, 2017), though public sector financial institutions in general have a much longer history. The past few decades have seen a substantial rise in the number of SWFs globally due to a range of socio-economic and political factors, particularly the rise in the value of national commodity exports (e.g. fossil fuels) and increased recognition of long-term public funding responsibilities. As such, SWFs are now recognised as a distinct category of asset owner, with estimated assets under management (AUM) of \$7.87tr (SWFI, 2019).

Given their size, influence, and long-term investment horizons, SWFs are uniquely placed among asset owners to promote and implement the alignment of finance with the Paris Agreement on Climate Change and the Sustainable Development Goals (SDGs). To support this endeavor the 'One Planet Sovereign Wealth Fund Group' ('the One Planet Group') was established at the One Planet Summit hosted by President Macron in Paris in December 2017.

The One Planet Group represents diverse funds from around the world. Its founding members are the Abu Dhabi Investment Authority, Kuwait Investment Authority, the New Zealand Superannuation Fund (NZ Super), Norges Bank Investment Management (NBIM), the Public Investment Fund of the Kingdom of Saudi Arabia (PIF), and the Qatar Investment Authority. These six funds together hold approximately USD 3.07 trillion in assets under management (AUM) as of June 2018, representing around 40% of the sector globally.

On the 6th July 2018, the One Planet Group published a new voluntary framework ('the Framework') outlining principles for SWFs to systematically integrate climate change into their decision-making and how they can collectively support ambitious global climate action (OPSWF, 2018). This Framework includes 12 recommendations based around three guiding principles:

Principle 1: Alignment - Build climate change considerations, which are aligned with the SWFs' investment horizons, into decision-making.

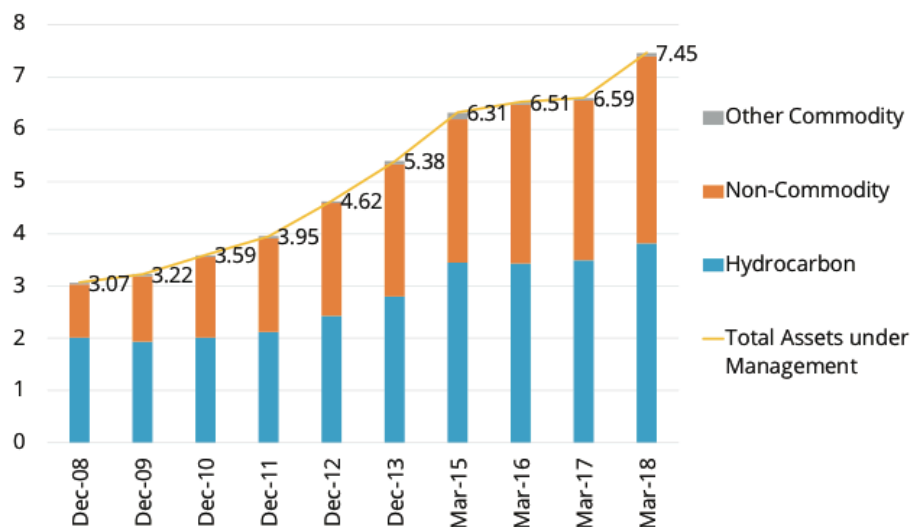
Principle 2: Ownership - Encourage companies to address material climate change issues in their governance, business strategy and planning, risk management and public reporting to promote value creation.

Principle 3: Integration - Integrate the consideration of climate change-related risks and opportunities into investment management to improve the resilience of long-term investment portfolios.

The establishment of the One Planet Group, and the publication and implementation of the Framework are important for two main reasons. First, the successful implementation of the Paris Climate Change Agreement and the SDGs will in part hinge on how large asset owners, including SWFs, invest their capital over the coming years. As the size of SWFs has increased dramatically in the past decade (Figure 1), it is increasingly recognised that the allocation of this capital by this distinct group of asset owner will play a key role in shaping financial markets and real economy decision-making internationally. While other asset owners in aggregate hold more assets (for example, the world's pension funds hold \$45tr

AUM (WillisTowersWatson, 2019)) this is dispersed among hundreds, if not thousands, of individual funds. In contrast, AUM among SWFs are concentrated in a small number of funds (the largest 10 SWFs currently manage more than \$5.78tr (SWFI, 2019)), which means that decisions by such institutions are more likely to move markets.

Figure 1: Aggregate Sovereign Wealth Fund AUM in USDtr 2008-2018 (Prequin, 2018)



Secondly, unlike many other actors in the global financial services industry, SWFs have long-term investment horizons. They have obligations to their citizens many decades into the future. Given this extended horizon and their scale, SWFs are well positioned to play an important role in aligning capital markets with inter-generational sustainability, and its associated investment risks and opportunities (Richardson, 2012; Yin, 2017). It is our firm view that it is also in their interests to do so, protecting their long-term revenue creation and value protection for their beneficiaries. Implementing the Framework could protect the long-term economic, environmental, and social stability of their nation states and their citizens.

Sustainable investment has been a growing feature of financial markets. Over the last decade, institutional investors have organised themselves in coalitions to foster sustainable investment via active ownership and stewardship. For example, the UN-backed Principles for Responsible Investment (PRI) – an investor initiative laying out general principles for ESG integration – has increased from under 100 signatories representing around USD 6tn in AUM in 2006 to over 1400 signatories holding over USD 80tn in AUM (PRI, 2019). The Global Sustainable Investment Alliance estimates that sustainable investment strategies grew to \$30.7tr at the start of 2018, a 34 percent increase in two years (GSIA, 2019).

There have also been significant regulatory changes to support and promote sustainable finance. The Bank of England initiated world-leading reviews of climate-related financial risk (Bank of England, 2015, 2018) and the Financial Stability Board created Task Force on Climate-Related Financial Disclosures (TCFD). Since 2017 the Central Banks and Supervisors Network for Greening the Financial System (NGFS) has been established and this now includes 40 central banks and supervisors - representing five continents, half of global GHG emissions, and the supervision of two thirds of the global systemically important banks and insurers. The Network's purpose is "to help strengthening the global response

required to meet the goals of the Paris agreement and to enhance the role of the financial system to manage risks and to mobilize capital for green and low carbon investments in the broader context of environmentally sustainable development” (NGFS, 2019).

Some SWFs have already begun to take steps towards climate-aligned investment policies and strategies. For example, recent legislation from the Irish Parliament and the Government of Norway represent significant moves to divest their respective SWFs from oil & gas exploration and production companies (E&Ps) over time (Carrington, 2018; Davies, 2019). Beyond divestment, SWFs have been active in exploring net zero-carbon opportunities, including renewable energy, and increased engagement with high-emitting companies (UNEP, 2017).

Yet, to date, sustainable investments³ have remained on the periphery of SWF investment decision-making: recent estimates suggest that they account for only 1% of SWF’s total AUM (Capapé & Santiso, 2017; OECD, 2016). There is little evidence that the majority of SWFs systematically integrate environment-related risks, such as climate change, into their decision-making (UNEP, 2017). This follows a broader trend where there remains a considerable gap between investor rhetoric and public statements on the one hand and meaningful, strategic integration of sustainable investing principles on the other. NBIM and NZ Super are, at the time of writing, the only Funds to have published substantive responsible investment frameworks that require the broad integration of climate risks and opportunities into decision-making.

While acknowledging SWFs’ different objectives and differentiated national responsibilities, as well as their varying starting points, here we set out in more detail how SWFs can implement the 12 principles of the Framework. This is the first publication that specifically addresses how the One Planet Sovereign Wealth Funds Framework could be implemented in practice.

The report is structured as follows. First, we outline why climate change matters for SWFs, including highlighting key material risks and opportunities (Section 2). In Section 3, we examine the 12 principles and set how they can best be implemented to translate their ambition into impactful and efficient outcomes. In Section 4, we set out a transition pathway for SWFs to follow in order to implement the OPSWF Framework over time, allowing them to measure and scale up their ambition and action. Section 5 concludes.

³ Throughout this paper we use the terms *sustainable investment* and *sustainable finance*. This is meant to be broadly defined, and includes other commonly used terms such as “socially responsible investment (SRI)”, “green investment”, or investment practices which incorporate environment, social and governance (ESG) factors.

2. Why Does Climate Change Matter For SWFs?

As large, long-term investors, SWFs are exposed to a wide range of climate-related physical, transition, and liability risks. It is important to note that climate change is a risk to individual portfolio performance, but also has potential systemic risks beyond asset-level or fund-level risks. However, there are also significant investment opportunities contained in the net zero-carbon transition.

Box 1: Stranded Assets, Climate-related Risk, Carbon Bubble, and Unburnable Carbon

Stranded assets are assets that have suffered unanticipated or premature write downs, devaluations, or conversion to liabilities (B. Caldecott, Howarth, & McSharry, 2013).

We are already seeing stranded assets caused by climate-related risks in different sectors, geographies, and asset classes and this trend is accelerating. The fact that climate-related risks can result in stranded assets is directly relevant to a wide range of important topics that are relevant to financial institutions, including SWFs, directly or indirectly. For example:

- Measuring and managing the exposure of investments to climate-related risks across sectors, geographies, and asset classes so that financial institutions can avoid stranded assets (for example, see Financial Stability Board 2015; Caldecott et al. 2013; Generation Foundation 2013; Carbon Tracker Initiative 2011; Caldecott 2011).
- Financial stability implications of stranded assets caused by climate-related factors and what this means for macroprudential regulation, microprudential regulation, financial conduct, and monetary policy (for example, see Cœuré 2018; Kruitwagen et al. 2016; Bank of England 2015b; Carbon Tracker Initiative 2011; Caldecott 2011).
- Reducing the potentially negative consequences of asset stranding and ensuring a 'Just Transition' by finding ways to address unemployment, lost profits, and reduced tax income (for example, see Caldecott 2015).
- Internalising the risk of stranded assets in corporate strategy and decision-making, particularly in carbon intensive sectors susceptible to the effects of societal action on climate change (for example, see Rook & Caldecott 2015; Carbon Tracker Initiative 2013; Ansar et al. 2013).

From the late 1980s some individuals and organisations working on climate change began to acknowledge the possibility that climate policy and regulation could negatively influence the value or profitability of fossil fuel companies to the point that they could become impaired (Krause *et al.* 1989; IPCC 1999; IPCC 2001; IEA 2008).

With the concept of a global 'carbon budget' – the amount of cumulative atmospheric CO₂ emissions allowable for certain amounts of anthropogenic climate change – there was a way to determine when impairments ought to begin given a certain climate change target (Allen, Barros, Broome, Cramer, & Christ, 2014). When the amount of fossil fuels combusted, plus the amount of carbon accounted for in reserves yet to be burned exceeded the carbon budget, either the climate or the value of fossil fuel reserves would have to give.

This concept was dubbed 'unburnable carbon' in the early 2010s (see Caldecott, 2018). Unburnable carbon quantifies the disconnect between the current value of the listed equity of global fossil fuel producers and their potential commercialisation under a strict carbon budget constraint (Carbon Tracker Initiative 2011; Caldecott 2011).

Conjoined with and in parallel, the idea of a 'carbon bubble' has also gained traction. This is the hypothesis that unburnable carbon would mean that upstream fossil fuel assets were significantly overvalued, potentially creating a financial bubble with systemic implications for the global financial system (Carbon Tracker Initiative 2011; Caldecott 2011).

In parallel to concerns about how carbon budget constraints could strand fossil fuel assets, attention has also turned to a broader range of climate-related risks and how these could strand assets in sectors beyond fossil fuel exploration and production.

In a major and widely covered speech at Lloyd's of London in September 2015, Mark Carney, Governor of the Bank of England and then Chair of the G20 Financial Stability Board (FSB) outlined three ways in which climate change could present a major risk to financial stability and present material risks to financial institutions. These are:

- **Physical risks** caused by the direct impact of changing weather patterns and natural catastrophes.
- **Transition risks** caused by the revaluation of assets as a result of the transition to a low or net zero carbon economy.
- **Liability risks** that could arise from those suffering climate change damages seeking compensation from parties that have contributed to the problem, as well as the risks of litigation from failing to manage climate-related risks appropriately and/or improperly disclosing them.

2.1 Physical Climate Risk

Physical climate risk are current and future impacts due to a changing climate, such as rising temperatures, changing precipitation patterns or increased frequency and intensity of extreme weather events such as heat waves, floods and storms. Due to changing and more extreme weather patterns, an asset such as a building or a power station may face physical risks from storms, droughts, flooding, water stress and/or sea-level rise, which may force the operating company to reduce, change, or cease operations. Physical risk is already stranding assets and affecting asset pricing and volatility, and is likely to become more prevalent in coming years as climate impacts intensify (IPCC, 2014b). No sector or geography can be considered immune from the plethora of climate changes predicted by science - but vulnerability and resilience to change do vary considerably (Batten, Sowerbutts, & Tanaka, 2016; B. Caldecott & McDaniels, 2014; IPCC, 2014b).

The magnitude of physical climate impacts on global and regional economic growth depends on the level of global warming. Particularly in high temperature scenarios (i.e. $>+4^{\circ}\text{C}$), physical climate change impacts could have catastrophic impacts on the global economy through widespread damage to property and infrastructure, loss in productivity, disturbance of international trade, food and water shortages, mass migration, as well as through insecurity and conflicts (World Bank, 2012). The damage caused by climate change to global annual economic output and systems is non-linear, with damages expected to increase slowly at low temperatures but then disproportionately proliferate with increasing temperatures (Dietz & Stern, 2015; IPCC, 2014a; Weitzman, 2012). This could be accentuated if we pass 'tipping points' (Lemoine & Traeger, 2012), whereby sudden climatic systems shifts causes potentially irreversible climate breakdown, disrupting the stability of the global financial system.

Investors such as SWFs are exposed to such risks due to their ownership of individual assets and companies, as well as through their role as large investors in particular regions and as Universal Owners in the global economy. Many SWFs have large diversified portfolios, so their performance is partly reliant on the performance of the economy as a whole, and this will likely be negatively affected by climate change, especially if business as usual continues and physical risk causes damage and disruption across multiple sectors and regions (Hawley & Williams, 2007; World Bank, 2012).

2.2 Transition Risks

To achieve the goals outlined in the Paris Agreement, the global economy must be decarbonized across all sectors and reach net zero emissions in the second half of this century (Committee on Climate Change, 2019).

This will have a significant impact on the way in which our societies and economies operate, and will likely lead to a (potentially abrupt) reassessment of values of a range of financial assets. This will have wide ranging implications for SWF portfolios in terms of both risks and opportunities. It is estimated that \$90 trillion investment is required by 2030 in new sustainable infrastructure, and transition opportunities exist in a range of transition and climate solution-oriented technologies (WRI, 2018). The competitive advantage of entire regions and sectors is expected to shift as a result of the net zero-carbon transition with potential impacts on portfolios and broader financial stability (Carney, 2015, 2018).

Scenario analysis can be used to analyse potential winners and losers from the net zero-carbon transition. Those organisations and governments able to diversify away from high-emitting industries and innovate in clean strategies are likely to benefit, whilst others locked-in to carbon systems likely to lose out. Clear policy signals from government and business will be important in facilitating investors' capacity to plan

for and integrate transition risks in their decision-making. The UK became the first major economy to commit to such policy in June 2019 through the passing of legislation mandating the transition to a net zero-carbon economy by 2050 (UK Government, 2019), a move that was quickly followed by France (Business Green, 2019).

2.3 Liability Risks

A third strand of climate-related risk is liability (Bank of England, 2015). These are financial risks linked to climate-related legal liabilities. The legal basis and form in which SWFs are established and operate varies from country to country – some are separate legal entities, many are state operated enterprises (SOEs), and others are constituted as pools of assets owned by the state or the central bank and operated without a separate legal entity. These differences will affect the legal liabilities of funds in the face of climate change, but each could – in their own way – be held accountable for climate-related decision-making (Van Der Zee, 2012; Yin, 2017).

For example, some SWFs will have fiduciary duties towards shareholders and governments to ensure investments are made in their best interest (Richardson, 2012). Ongoing debates exist as to the extent that climate risk should be considered within fiduciary decision-making (Freshfields, 2005; Sandberg, 2010, 2013). Academic and legal discussion of climate risk in this context is being boosted by growing evidence that climate change represents a material financial risk, and that a consideration of ESG factors does not lead to financial underperformance (Clark et al. 2014; Carney, 2015).

2.4 Opportunities

The transition to a net-zero carbon economy will generate significant investment opportunities across geographies, sectors, and asset classes. This will increase global demand for capital: potentially increasing long-run interest rates and improving SWFs' ability to meet liabilities (Carney, 2016).

The IEA estimate that USD 123tr cumulative infrastructure investments are needed between 2016 and 2050 to meet the Paris Agreement (IEA & IRENA, 2017). There a wide variety of climate-aligned investment strategies across different asset classes, many of which present new opportunities for SWFs. As large, long-run investors, SWFs could work with asset managers and service providers to develop new tools and investment strategies across primary and secondary markets, playing a signalling and scaling role for the broader investment market. In primary markets, traditional or blended finance tools could boost financing in national and international public-private partnerships (Cochran, Hubert, Marchal, & Youngman, 2014; UNEP, 2017). In secondary markets there are a range of options to suit different time horizons and climate preferences, focusing on the re-allocation of funds and/or the re-weighting of existing capital allocations. Passive index investment opportunities have also emerged aimed at supporting investors integrate climate considerations into their investment decisions. These include a wide range of low carbon weighted indices as well as fossil-free indices and both listed and unlisted sustainability-focused equity funds (and some funds of funds) (PRI, 2018).

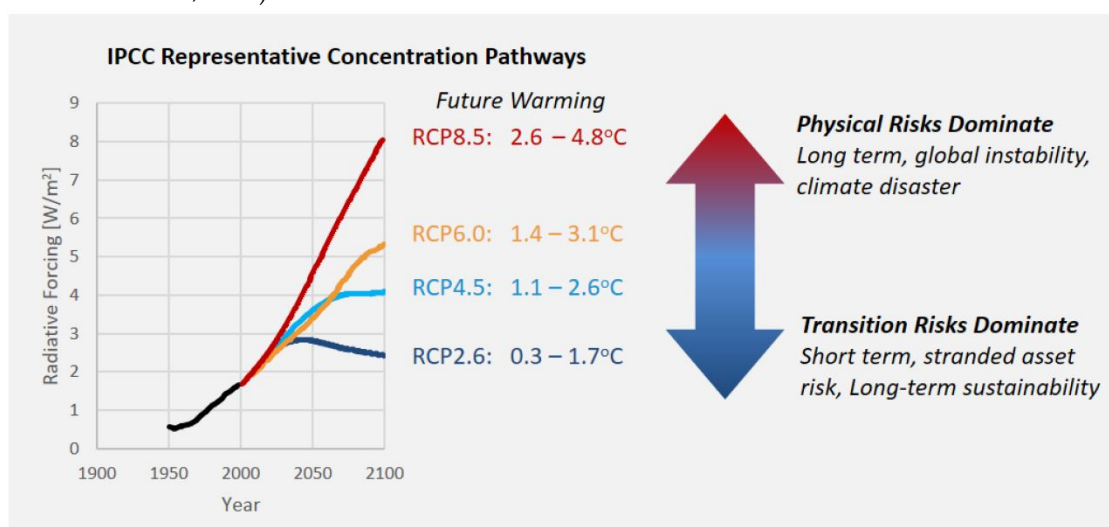
In terms of sector diversification, this could include a) shifting towards new and emerging sectors; b) diversification away from at-risk sectors, notably those with high emission footprints; c) allocating more capital towards sectors such as agriculture and forest sectors, sustainable farming and forest management practices (incl. reforestation) which will have to be deployed at scale to reduce CO2 emissions from land-use change; and, d) investing in sectors in new geographies, where previous penetration was unfeasible due to changing socio-economic and environmental contexts. Within all of these sector decisions, efforts

should be made to consider the long-term suitability of the physical and political climate in each geography – as some sectors will remain profitable in certain regions longer than others (IPCC, 2014b; Samson, Berteaux, McGill, & Humphries, 2011; Smith, 2012).

2.5 Discussion

The magnitude and distribution (across sectors, geographies and asset classes) of climate risks and opportunities vary substantially depending on plausible scenarios consisting of different combinations of physical, transition, and liability risks. (see Figure 2).

Figure 2: Physical versus transition risks depending on concentration pathways. Source: Caldecott et al. (B. L. Caldecott et al., 2018)



This will have a significant impact on both portfolio specific and systemic financial risks. Consider the following two examples:

1) *Current policies – catastrophic physical impacts globally*

If countries continue with current climate policies, projected global average warming could reach approximately 4°C by 2100 compared to the pre-industrial average (IPCC, 2014). While transition risks would be less, this would most likely result in a wide range of potentially catastrophic physical impacts on a global scale. This would have a significant negative impact on economic productivity and global supply chains.

2) *Ambitious climate policies – smoother transition to a net zero-carbon economy*

Policy and technology-related transition risks will likely be greater if countries take ambitious action by collectively implementing restrictive climate policies in line with the Paris Agreement to limit average global warming to well below 2°C by 2100. In particular, under such scenarios, high-emitting and energy intensive sectors would face considerable risk of becoming stranded assets. However, expected physical impacts would likely be much less significant.

In other words, in every possible future there is climate-risk, just different combinations of it. Overall, climate-related risks are likely to be much lower if there is an early and orderly transition towards a net zero-carbon economy (ESRB, 2016).

3. Recommendations to Implement the Framework

On the 6th July 2018, the One Planet Group published a new voluntary framework ('the Framework') setting out principles for how SWFs can systematically integrate climate change into decision-making and how they can collectively support ambitious global climate action (OPSWF, 2018). This section makes specific recommendations to help guide SWFs in their implementation of the Framework and its principles.

Principle 1: Alignment

Principle 1.1: SWFs recognise that climate change will have an impact on financial markets.

Principle 1.2: Due to their long-term investment horizon and diverse investment portfolios, SWFs recognise that climate change presents financial risks and opportunities which should be incorporated into the investment framework.

Principle 1.3: In accordance with their respective mandates, SWFs should report on their approach to climate change.

Alignment should mean that the activities and portfolios of SWFs are compatible with and supportive of the objectives of the Paris Agreement. This means systematically reviewing different functions to identify how they can better support alignment and then developing plans to embed alignment through changes in governance, strategy, processes, training, and culture, as well as updating the tools used by staff to fulfil their functions.

The following recommendations will ensure SWFs deliver alignment on climate change, and overtime, other environment and sustainability topics:

- Portfolio compatibility with Paris will take time to achieve. It starts with SWFs creating a board-approved strategy to achieve alignment. This should set out the ultimate destination and the steps funds will take to get there, as well as metrics for assessing progress and who is responsible for implementing the strategy.
- Climate change and other environment-related risks and impacts should be integrated clearly into investment beliefs and investment frameworks and a clear view of the SWFs environment-related risk appetite should be developed.
- The Board, Senior Management, portfolio managers and other relevant functions should undertake courses and training, as well as continued professional development, to ensure they have access to the latest skills and knowledge to support alignment.
- There should be complete internal and external clarity about the key individuals at a board-level and in senior executive management who are responsible and accountable for implementing, monitoring, and improving alignment over time.

- SWFs should align their strategy with external communications and government affairs work that they do. As key players in the market, they should participate in and shape local and international initiatives, including by publicly signing statements and targets to ratchet progress and increase ambition.
- SWFs should disclose their climate strategy and climate-related exposures publicly, with this extending to broader environment-related risk exposures over time. The quality of disclosure should improve annually and in the first instance SWFs should align reporting with the Taskforce on Climate-Related Financial Disclosure (TCFD).
- SWFs should also adopt robust frameworks for measuring and reporting on both positive and negative impacts related to climate change, and over time extend this to broader environmental impacts and the wider SDGs.
- SWFs should use metrics based on ‘cumulative committed emissions’ and ‘carbon lock-in’ as these are a much more effective and accurate ways of assessing whether portfolios are compatible with different carbon budgets (See, Millar, Hepburn, Beddington, & Allen, 2018; Caldecott, McCarten, & Charalampos, 2018). SWFs should calculate and disclose aggregate financed committed emissions.
- SWFs should adopt the Oxford Martin Principles⁴, which create a robust science-based framing for pursuing portfolio alignment with Paris carbon budgets or other warming thresholds.
- SWFs should consider publishing climate adaptation plans that set out how they intend to manage physical climate-related risks in their portfolios over time.

Principle 2: Ownership

Principle 2.1: SWFs expect company boards to understand the consequences of their business practices for climate emissions and to set clear priorities for the company to address relevant climate change issues.

Principle 2.2: SWFs expect companies to plan for relevant climate scenarios and incorporate material climate risks in their strategic planning, risk management and reporting.

Principle 2.3: SWFs encourage public disclosure by companies to understand how climate change may affect their future performance, and what actions they are taking.

Principle 2.4: SWFs should encourage the development and adoption of agreed standards and methods that promote the disclosure of material climate-related data.

As large, long-term investors, SWFs should practice responsible ownership of all the assets they hold, whether debt or equity. As universal owners SWFs have a range of rights and responsibilities that they

⁴https://www.oxfordmartin.ox.ac.uk/downloads/briefings/Principles_For_Climate-Conscious_Investment_Feb2018.pdf

can exercise, and through this ownership they can have a significant impact on the decision-making processes of companies and other stakeholders.

They should exercise this power of ownership to improve the sustainability of their investments and drive evolution and adoption of relevant industry standards, practices, and norms. There are a number of ways in which a fund might exercise their ownership rights, including direct engagement with companies or through indirect engagement via investment managers and proxy voting firms. Active ownership will take on different guises across different asset classes, and will also vary across sectors and geographies:

- SWFs should clearly outline their expectations of investee companies regarding climate-related risks and impacts. This should include the expectation that company boards are aware of the physical and transition risks facing their company, their contribution to carbon emissions, and have prudent strategies in place to manage risks and reduce impacts over time. SWFs should also communicate the expectation that companies undertake strategic climate assessments to understand how different climate scenarios might affect future activity, and require that material climate risks be incorporated into strategic planning, risk management and reporting. SWFs should promote, and over time require, investee company alignment with the Paris Agreement and SDGs.
- Where appropriate, SWFs should undertake engagement to ensure that material climate risks are incorporated into corporate strategic planning, risk management, and reporting by investee companies. They should either do this directly or through mandated proxies. SWFs should ask companies to disclose their climate risk exposure, impacts and management strategies through standardised frameworks, such as the TCFD. Active climate-related ownership could begin by focusing on high emitting companies, but over time this should be extended across sectors, geographies, and asset classes. For example, SWFs could identify regions of high physical climate risk and undertake targeted place-based engagement with portfolio holdings operating in these locations to ensure they are managing climate-related risks.
- If directing other actors to undertake ownership activities on their behalf, SWFs should outline expectations clearly and incorporate consideration of climate-related risks and reporting within proxy mandates. SWFs should expect intermediaries with delegated ownership responsibility to be integrating climate consideration into their engagements, and actively voting their shares in line with the overarching goals of the Framework and climate-aligned long-term value creation. SWFs should engage with portfolio managers and proxy voting agents to understand how this is being done in practice, and mandate that climate-related risks are incorporated into engagement and voting practices.
- SWFs should develop methodologies to measure and monitor how managers are conducting engagement on their behalf, and include responsible stewardship in manager selection, monitoring, and reviews.
- SWFs should collaborate with other stakeholders to develop robust methodologies for measuring and monitoring the engagements undertaken on their behalf (internally or externally), to ensure that their interests are being represented and that these engagements are aligned with the One Planet Framework.
- Engagements are currently hindered by a lack of timely climate-related information and data. SWFs should work with other industry actors to secure greater data on climate-related risks and

opportunities across different sectors and asset classes. They should develop methods and tools to integrate this climate data into effective, targeted engagement strategies.

- SWFs should consider joining relevant collaborative engagement efforts. This can further lend support and clout to investor-led initiatives and can be an effective tool for those SWFs just starting out on this pathway, perhaps with limited internal capacity and expertise on climate topics. By collaborating with other investors, SWFs can ensure that they are contributing to a united investor voice with increasingly coherent and consistent asks. Several such opportunities exist, including through membership to investor groups on climate change and specific engagement initiatives. One such collaborative engagement initiative is the Climate Action 100+, which is mobilising the voice of more than 320 investors with more than USD \$33 trillion in assets under management to engage with the most polluting companies globally. New Zealand Superannuation Fund, one of the founding OPSWF members is part of this group.
- SWFs should also, where appropriate, support relevant shareholder resolutions that will improve disclosure and climate alignment.
- Engagement with companies lagging behind should make clear the improvements expected and the consequences of non-compliance, including (if appropriate) the option of divestment.
- SWFs should ensure that responsible ownership strategies and practices are built into their passive holdings. This is particularly important as passive funds, unlike active funds, by definition follow the index and have to buy the holdings contained in the index. Active ownership is, therefore, the most powerful tool passive funds have to effect change in investee companies.

Principle 3: Integration

Principle 3.1: SWFs should identify, assess and manage portfolio risks generated by the expected transition to a low-emissions economy and from the potential physical impacts of climate change.

Principle 3.2: SWFs can draw on, and develop, analytical tools to inform portfolio allocation and investment decisions.

Principle 3.3: SWFs should consider investment opportunities that arise from the global effort to address climate change.

Principle 3.4: SWFs should consider approaches to reducing portfolio exposure to climate-related risks.

Principle 3.5: SWFs can promote research on issues related to the financial implications of climate change.

Integration of climate and other environment-related risks into SWF functions, particularly strategic asset allocation, risk management, and portfolio management, will require phased plans to build capabilities

and associated investment in human resources, analytical capabilities, and datasets, as well as investing time in understanding and implementing key use cases.

SWFs will need to understand the various options for integrating climate and environment-related risks and opportunities into decision-making, and identify key priorities and the sequence of key steps and strategies to overcome operational challenges they might face. SWFs will also need to work actively with their investment managers, consultants, data providers, and employees to ensure that integration improves and expands over time.

- SWFs should integrate climate risk management into company and asset valuations. This will require working with internal/external investment managers, data providers, and consultants to identify different integration strategies and understand which align best with the goals and governance of the fund. Funds should recognise that different integration strategies are not mutually exclusive, with best practice often employing a combination of approaches, and that this should be an on-going consideration as suitable strategies will evolve over time.
- Funds should then put in place the necessary processes and incentives to implement these strategies. This includes integrating climate consideration into investment manager mandates, and outlining the expectation that portfolio managers (whether internal or external) should measure and manage their climate risks and impacts. Over time, SWFs should set targets for reducing portfolio climate risk and impact, and ultimately should expect managers to align portfolios with the Paris Agreement and SDGs.
- SWFs should integrate climate considerations into external manager selection processes, agreements and post investment reviews. For those funds who rely on external managers, this will be vital in the management of climate-related risks and securing productive investments in climate-related opportunities.
- SWFs should integrate climate-related risks and opportunities into strategic asset allocation. Climate exposure and opportunities vary across different asset classes, sectors and geographies, and this can be integrated into strategic asset allocation.
- SWFs should draw on, and help to develop, analytical tools to inform portfolio allocation and investment decisions. This could include commissioning research and working with asset management firms to design new methodologies for understanding and accounting for climate-related factors. This should involve the utilisation of novel methodologies, such as asset-level data secured from developments in earth observation and artificial intelligence⁵, fintech, artificial intelligence, and machine learning.
- SWFs should link internal and external manager incentives, including remuneration and renewal of mandates, to progress against climate-related risk management and Paris alignment.
- SWFs should also develop education and training programmes and tools to ensure that employees are aware of relevant research and best practice as it evolves in the coming years.

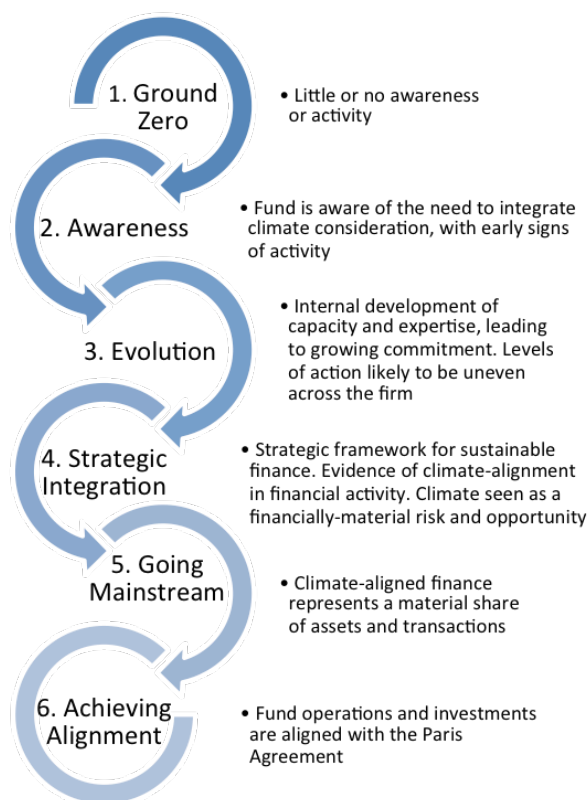
⁵ See the Spatial Finance Initiative for more information: www.spatialfinanceinitiative.com

4. Pathway

It is important to recognize that change does not happen overnight, and that many of the SWFs around the world currently have relatively low levels of awareness on climate issues. The implementation of the Framework will require time, as well as resources, and a willingness to learn by doing.

This journey will require internal and external transparency on progress and for responsible individuals and teams to be rewarded for success and to learn from challenges that they have encountered. According to Kotter's (1995) theory of organizational change management, these factors, among others, can help catalyze further commitment to change. Figure 3 illustrates a potential pathway from inaction 'ground zero' to 'achieving alignment' for SWFs implementing the Framework.

Figure 3: Six Steps to Achieving Alignment. Adapted by authors from FC4S (2019)



We recognize that Funds will start at different places on the pathway, and that it is possible (through changes in personnel and policies) to make advancements but also to lose momentum and slide backwards on the pathway.

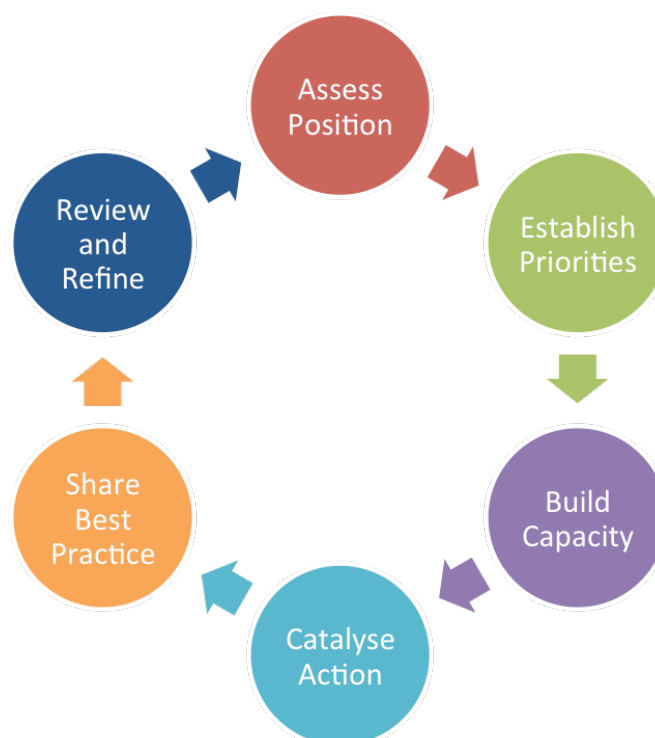
However, through collaboration and growing societal and political pressure, Funds will be encouraged and enabled to increase their capabilities and consistently ratchet progress towards achieving alignment.

The six steps on this pathway are not equal – each will take time and the pace of progress will vary. For example, transitioning from ‘ground zero’ to ‘awareness’ is simple and can be achieved quickly. However, stepping from ‘strategic integration’ to ‘achieving alignment’ is much more challenging. Documenting and communicating progress externally and within the SWF community will be important for ensuring momentum.

Outreach to other SWFs, large asset owners, and other institutional investors should be actively encouraged to ensure that the lessons learnt in the process of alignment, ownership, and integration are shared beyond the founding members of the OPSWF. This is particularly important given the long-term, ambitious nature of the Framework.

To begin (or continue) this journey, we encourage all Funds interested in integrating climate change risks and opportunities into their investment decision-making to carry out an evaluation exercise to determine where on this pathway they are currently, and what new priorities, resources and actions are needed to progress to the next stage. Figure 4 provides a simple processual outline that Funds could follow in order to instigate the progress necessary to scale up their climate-related capacity and enable their own transition towards alignment. These six steps can be applied at every stage of the pathway outlined above in Figure 3 to aid the implementation of the OPSWF Framework.

Figure 4: Process for Scaling Ambition and Action. Adapted from FC4S (2019)



5. Conclusions

During the last decade SWFs have established official collaboration to boost international learning and governance among themselves. Clear examples of this exist in the Santiago Principles published in 2008 to improve transparency, and the formation of the International Forum for Sovereign Wealth Funds (IFSWF) in 2009 as a voluntary membership organisation for SWF dialogue and research. The One Planet SWF initiative marks the first time that SWFs have formally aligned on the issue of climate change. This is important for two key reasons: firstly, due to the fact that it marks a powerful acknowledgement that climate change presents real and material financial risks and opportunities to the SWFs, and secondly, because it has the potential to act as a direct and indirect market signal towards the financing of the transition towards a net zero-carbon economy and the freeing up of capital for climate-aligned investments.

As large, government-owned investment pools, SWFs are designed to manage assets for long-run macroeconomic purposes. As such, they are exposed to the physical, transition, and liability risks from climate change, but also have the patient, scalable capital necessary to invest in climate solutions and therefore create value through financing the transition towards a net zero-carbon economy. Funds face both specific and systemic risks from climate change, and whilst some of these risks are unavoidable and unquantifiable, many climate-related risks can and should be measured and managed. These factors have been recognised by the six founding members of the One Planet Group, brought together by President Emmanuel Macron during the One Planet Summit in 2017 to cooperate towards the integration of climate risks and opportunities into portfolio decision-making. They represent diverse funds from around the world, holding approximately 40% of SWF.

To date, these Funds have worked rapidly to produce and endorse the One Planet SWF Framework, a principles-based outline of how Funds can and should align their investment policies and practices with the Paris Agreement. The implementation of this Framework is a journey for these Funds, and will not happen overnight, but this marks a significant opportunity for the facilitation of climate-aligned investment and the acceleration of the transition towards a net zero-carbon economy. The Framework is voluntary and currently does not include specific monitoring or evaluation mechanisms.

This paper has made recommendations for how SWFs might incorporate the three core principles of alignment, ownership and integration into their policies and practices. In combination, these recommendations outline a clear expectation that climate risks and opportunities are integrated throughout SWFs operations, from executive-level policies and employee education down to individual voting practices and asset allocation. In particular, we highlight the importance of communicating climate consideration to portfolio managers in facilitating the goals of the SWFs, and recommend integrating climate change into manager selection, mandates, and performance reviews. Alignment with the Framework will require significant collaboration with a range of stakeholders, and the One Planet Group should continue to encourage peer learning and coordinated engagement throughout the investment chain to foster education, training and the development of new data sets, tools, and methodologies to analyse and manage climate risks and opportunities.

SWFs will need to scale up ambition and implementation over time, and should reflect growing capacity and innovation in the field of sustainable finance. We have established a transition pathway towards implementation of the Framework. Each Fund, regardless of their baseline capacity, should assess existing capacity and then work to demonstrate progress towards the implementation of the Framework and alignment with the Paris Agreement. Such transparency amongst the Funds on their individual

pathways will facilitate knowledge sharing, provide political and investment salience to the OPSWF initiative, and put pressure on those Funds who are lagging. Through their individual action and collaboration, these Funds have the opportunity to catalyse market-wide innovation through driving demand for sustainable finance products and services, protecting and generating financial value whilst contributing to broader social, environmental, and economic stability.

We applaud the founding Funds for developing the Framework – no small feat of collaboration and ambition – but call on other investment actors to support and follow the Framework, and hope that SWFs, and the investment industry more broadly, will use it as a sounding board from which to integrate a wider set of ESG factors into investment decision-making.

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