SUSTAINABLE FINANCE PROGRAMME

SMITH SCHOOL OF ENTERPRISE AND THE ENVIRONMENT

UNIVERSITY OF OXFORD

The state of climate change knowledge among UK and Australian institutional investors

Working Paper

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About the Sustainable Finance Programme

The Sustainable Finance Programme at the University of Oxford Smith School of Enterprise and the Environment aims to be the world's leading centre for research and teaching on sustainable finance and investment. The Programme was established in 2012 (originally as the Stranded Assets Programme) to understand the requirements, challenges, and opportunities associated with a reallocation of capital towards investments aligned with global environmental sustainability.

We seek to understand environment-related risk and opportunity across different sectors, asset classes, and geographies; how such factors are emerging and how they positively or negatively affect asset values; how such factors 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.

We recognise that the production of high-quality research on 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 into decision-making. We also research the barriers that might prevent integration, whether in financial institutions, companies, governments, or regulators, and develop responses to address them. Since 2012 we have also conducted pioneering research on stranded assets and remain the only academic institution conducting work in a significant and coordinated way on the topic.

The 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, anthropology, climate science, law, area studies, psychology) within the University of Oxford and beyond.

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Working Paper Series

This Working Paper is intended to stimulate discussion within the research community and 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.

University of Oxford Disclaimer

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List of Abbreviations

A4S: The Prince of Wales's Accounting for Sustainability Project

AM: Asset Manager

AO: Asset Owner

AUM: Assets Under Management

CDP: Carbon Disclosure Project

CIO: Chief Investment Officer

ESG: Environmental, Social and Governance

EUROSIF: European Sustainable Investment Forum

IEA: International Energy Agency

IGCC: Investor Group on Climate Change

IIGCC: Institutional Investor Group on Climate Change

IPCC: International Panel on Climate Change

NGO: Non-Governmental Organization

OECD: Organization for Economic Co-operation and Development

OXWFD: Oxford World Finance Digest

PF: Pension Fund

PRI: Principles of Responsible Investing

RI: Responsible Investment

RIAA: Responsible Investment Association Australasia

SF: Superannuation Fund

SRI: Socially Responsible Investment

TCFD: Task Force on Climate-related Financial Disclosures

UNEP: United Nations Environment Programme

UNEP FI: United Nations Environment Programme Finance Initiative

Executive Summary

Institutional investors are key actors in combating climate change. They are exposed to the risks and opportunities of climate change, and represent a large pool of capital that could help finance the trillions of dollars required to transition to a low carbon economy. Recognition of these issues within investment institutions appears to be increasing, but understanding climate change, and its associated investment implications, remains far from universal among investment professionals.

This discussion paper outlines the current understanding of climate change in the investment markets in the UK and Australia, providing novel insights from 58 semi-structured interviews with a range of investment professions and a survey of 154 investors. The UK and Australia both have substantial and growing institutional investment systems, as well as increasing activism surrounding Responsible Investment (EY, 2015). Given this, more responsible management of these assets could, potentially, provide significant impetus in shifting capital towards lower carbon economies.

The level of understanding of climate change, and how it relates to the investment system, was shown to vary hugely among participants in this research. The majority of participants focus more on climate risks than on the investment opportunities likely to arise from environmental change, although this divide was more noticeable in Australia than in the UK, partly due to the greater focus on regulatory risk in Australia. Another reason for this focus was the greater availability of investment products catering to climate risks, such as fossil-free indices and negative screening, compared to products that might be able to capture investment opportunities.

This research highlights a concerning level of illiteracy around five key climate concepts, with only one third of survey participants comfortable with the idea of a '2 degree target' and only 30% aware of 'stranded asset risk'. Although there is some understanding that climate change requires a holistic approach, it is still considered a 'long-term' issue without proper attention of the more immediate short- and medium-term trends, impacts and implications that investors should be considering in their current portfolio decisions.

Although the rise in funds being managed in a sustainable way has been widely documented, this research sought to examine the experiences of different individuals and institutions. This research highlights the diverse integration strategies available: with 14 different methods identified. The traditional method of screening (both positive and negative) remains the most common strategy among survey respondents and interviewees, in line with industry reports, but there was also a surprisingly occurrence of inactivity and disengagement, given that participants had all agreed to take part in a study on climate change and investment. Low levels of corporate engagement was particularly surprising given the recent high profile campaigns to encourage such action, although many interviews, particularly in the UK, suggested that this practice had increased.

Disinformation remains a key concern: many participants were unaware of whom, if anyone, in their firm was ultimately responsible for incorporating climate change into decision-making, and very few firms regularly discussed climate change at the Investment Committee level or with clients. Given the importance of belief systems in driving education and investment decision-making, this research thus calls for greater analysis of how climate change can be integrated into existing investment belief systems to encourage greater top-down and bottom-up ESG integration and knowledge sharing.

Finally this research adopts a systems approach to highlight actors and interventions needed to catalyse system-wide change towards climate-aware investing. Participants believe such change should be driven by initiatives and incentives from government and the finance community, including a greater role for regulation. Carbon pricing was highlighted as a potential driver of change, although many were still skeptical as to the likelihood of this occurring. There was also a strong sense that, by establishing their own networks, initiatives, and investment strategies, investors can alter the system through collaboration and peer pressure driving greater uptake of innovation and information, and reducing fears of losing a competitive advantage. However, such a role for the finance community was seen as much higher among UK participants than those in Australia, who were more likely to comment on the momentum from a combination of factors, including societal demand, technological change, and awareness from environmental catastrophes.

In conclusion, this research has highlighted the opportunities for greater communication and integration of climate change knowledge into investment decisions, demonstrating that some investors are considering these risks in their portfolios, but many others lag behind on both action and knowledge. Widespread change towards a more climate-aware investment system is deemed possible, but will have to be driven by a combination of actors working together to provide greater education and accelerated action in the coming decades.

Based on the research there are four recommendations that if adopted could help to improve the integration of climate change knowledge into investment decision-making:

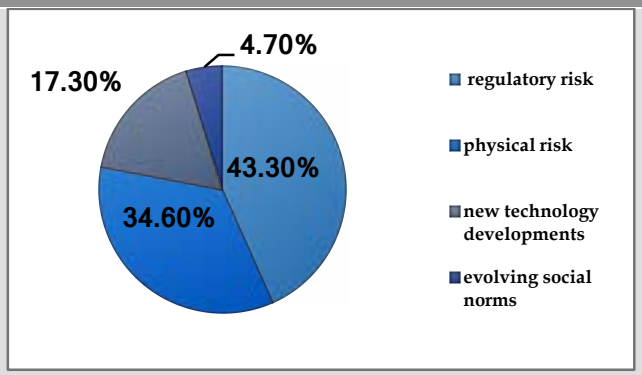
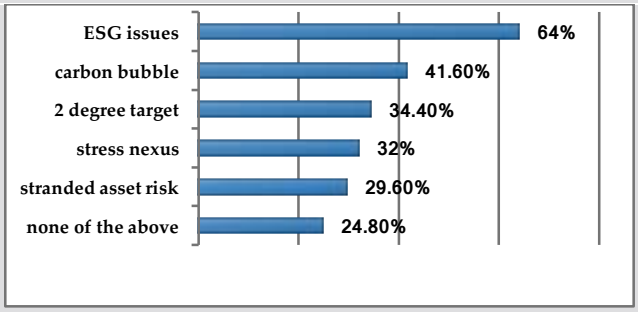
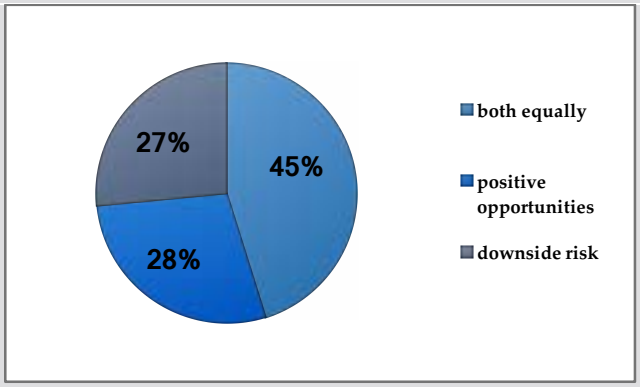
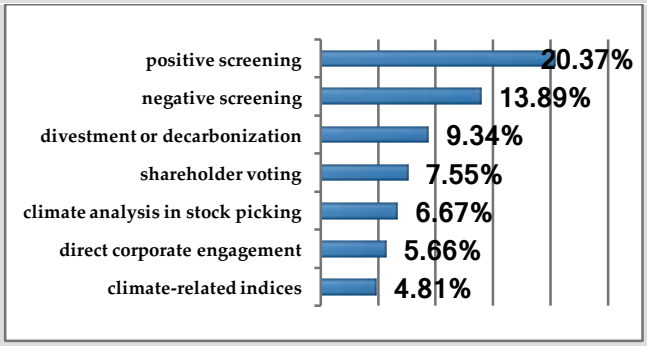
- We found that the majority of investors are not familiar with climate-related terms and concepts, suggesting that more targeted education is needed. Regulators and financial institutions should proactively support enhanced professional training for investors about the material risks and opportunities relating to climate change.

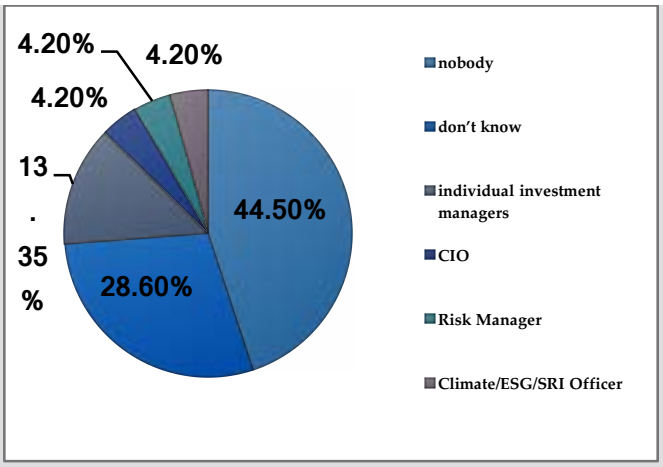
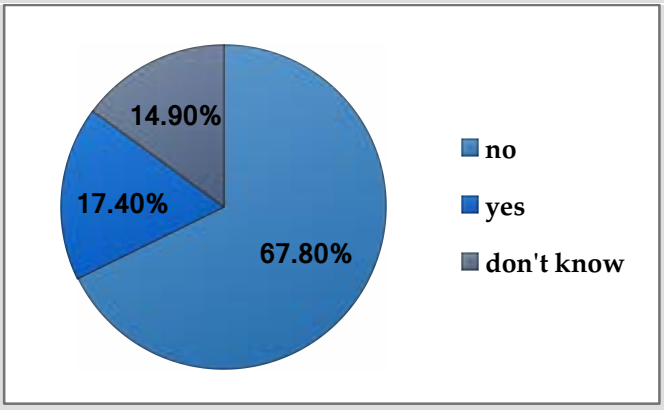
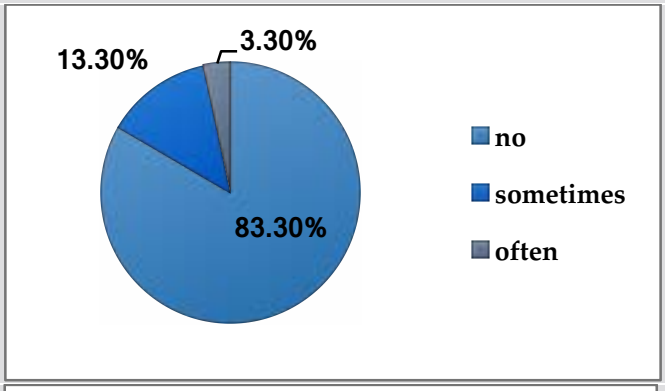
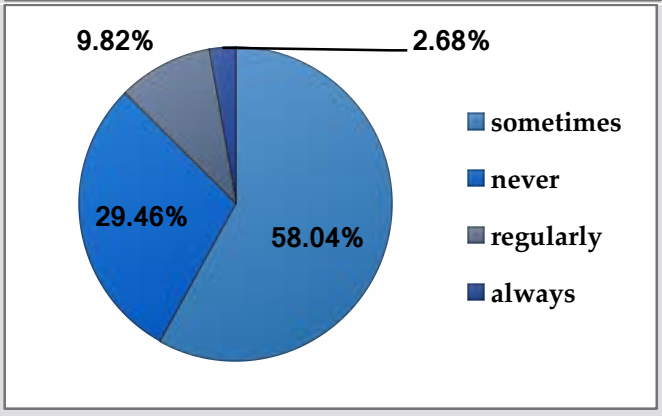
- We found that there was significant uncertainty as to who is ultimately responsible for considering climate change within firms. This suggests that greater clarity of expectations regarding the integration of climate change should be included in investor mandates and performance benchmarks. Financial institutions should outline explicitly the expectations of their employees as to the integration of climate change in investment decision-making.

- We found that a significant number of investment professionals view climate change only as a long-term risk, rather than an ongoing phenomena that is a material risk today. This could hinder awareness of current climatic change and transition trends that are already affecting portfolios. Greater emphasis should be placed on understanding and communicating the short- to medium-term impacts of climate change, as investors are more likely to alter their decisions based on these time horizons.

- We found that a majority of investment firms participating in this research do not include climate change in their investment beliefs. This suggests that many investment firms are not actively encouraging climate awareness and integration. Financial institutions should introduce climate-related investment beliefs; without these many firms will lack impetus to consider how climate change will affect their decisions.

Summary of Survey Results

Research Question	Research Results
Which aspect of climate change is the most important in your investment decisions?	
Which climate concepts are you familiar with?	
Do you read more about climate downside risk or positive market opportunities	
Which integration strategies does your firm regularly apply?	

Who is responsible for climate consideration in your firm?	
Is climate change included in the firm's investment beliefs?	
Is climate change a regular consideration in your Investment Committee Meeting?	
How often do you discuss climate change with clients?	

1. Introduction

Institutional investors are key actors in combating climate change. They are exposed to the risks and opportunities of climate change, and represent a large pool of capital that could help finance the trillions of dollars required to transition to a low carbon economy (IEA, 2014). A growing literature highlights how environmental change makes investments across a range of sectors and asset classes at risk from being stranded[1] (Caldecott, Howarth, & McSharry, 2013; I. Harnett, Edstrom, & Harnett, 2014). Research suggests that 60-80% of publicly listed fossil fuel reserves are 'unburnable' if the world is to avoid disastrous climate changes (Carbon Tracker, 2013; Kepler Cheuvreux, 2014). This would likely be reflected in stranded assets and lower share prices, creating large economic losses among investors, corporations, and governments. However, the financial impact may be even higher if excess reserves are burnt: subsequent climate changes could irrevocably alter the environment, affecting economic production and investment risk and returns (IPCC, 2014).

Recognition of these issues within investment institutions appears to be increasing: with membership to groups such as the Principles of Responsible Investment and the Montreal Carbon Pledge expanding quickly (IIGCC, 2015; UNEP FI, 2014). Civil society and NGO campaigns for decarbonization and divestment from dirty fossil fuels have also gained momentum (Flood, 2015), with more than $5 trillion AUM pledged to move capital out of fossil fuels (Arabella Advisors, 2016). However, an understanding that environmental changes will have a financial impact on investment portfolios is far from universal (Eurosif, 2014; Sievänen, 2014).

The UK and Australia both have substantial and growing institutional investment systems, as well as increasing activism surrounding Responsible Investment (EY, 2015). Given the size of institutional investment assets in these two countries, (pension assets in both are equivalent to the entire annual economic output (OECD, 2014), more responsible management of these assets could, potentially, provide significant impetus in shifting capital towards lower carbon economies. Such efforts will be vital if the world is to limit future climate changes and adapt current economies to the locked-in impacts from historic emissions, thereby reducing the socio-economic disruption and investment risk associated with climate change (Covington & Thamotheram, 2014).

Responsible Investment (RI) refers to the consideration of environmental, social and governance (ESG) factors in investment decision-making (Eurosif, 2012). To integrate RI, asset owners and asset managers must first learn about their exposure to ESG risks and the investment opportunities available to manage and mitigate these risks. Information asymmetries, a lack of standardized corporate ESG disclosures, and inherent uncertainty and complexity in climate change scenarios all contribute to a lack of information and learning opportunities surrounding RI, hindering its integration into investment decisions (Eccles & Serafeim, 2013; Sievänen, 2014). As such, there is still a significant need for improving the capacity for RI in different investment markets, and further understanding of how financial markets and portfolios will be affected by climate risks and opportunities could provide one avenue for catalyzing change.

This discussion paper thus seeks to outline the current understanding of climate change in the investment markets in the UK and Australia. This will provide a benchmark from which to track progress and provide an up-to-date picture of the knowledge and practice of integrating climate change into decision-making in UK and Australian institutional investment systems. Finally, it explores systems theory to identify key interventions within the investment system that could catalyze a shift towards greater climate awareness and responsible

[1] Stranded assets are defined as when 'environmentally unsustainable assets suffer from unanticipated or premature write-offs, downward revaluations or are converted to liabilities' (Caldecott et al. 2013).

investment practices.

This paper thus seeks to explore the following key questions:

1. How do investors perceive climate change issues?
2. Does the integration of climate change into investment beliefs and practices vary between the UK and Australia?
3. What are the interventions available to aid the integration of climate change in the investment systems?

This paper uses data from 58 semi-structured interviews conducted with investment industry professionals. The UK and Australia were chosen because of the high level of potential stranded asset exposure in their asset markets, their differing institutional investment structures, and their climate policies. The assets under management (AUM) of organisations interviewed in Australia were A$778bn, almost 30% of total A$2.6tr AUM in the country (Reserve Bank of Australia, 2015). Interviewed organizations in the UK represented £6.5tr, 24% of the combined Western Europe and the Middle East[2] market (BCG, 2015). A global survey of 154 investors was conducted to provide additional insight and in addition to UK and Australian respondents, had respondents from the USA.

Section 2 sets out the methodologies used to obtain insights into investor attitudes and awareness regarding climate change. Sections 3 to 5 provide insights into the three key questions outlined above, before Section 6 offers a discussion and recommendations as to how to increase climate awareness in the UK and Australia, drawing conclusions from the empirical research outlined in the paper.

[2] Western Europe and Middle East used in calculation due to the geographic scope of interviewed organizations' AUM despite their investment office location in the UK.

2. Methods

The primary research for this article took place between November 2014 and August 2015, and further exploration of the methods and results can be found in Harnett (2016; 2017). The results are based on a comparative study of 58 in-depth interviews undertaken in the UK and Australia, and a broader global survey of 154 investors and financial actors. A full list of interview and survey questions can be found in Harnett (2016).

2.1 Interviews

58 interviews were conducted, 29 each in the UK and Australia. Table 1 provides a tabulated breakdown of the 60 interview participants (one interview in each country was attended by two individuals). As is common in more qualitative business studies, this research utilized convenience sampling instead of more systematic techniques (Eriksson & Kovalainen, 2008). These respondents are thus not presumed to be representative of the wider market, but as gaining access to business-people, or 'elites', especially in the financial world, is often particularly difficult (Harvey, 2010; McDowell, 1998; Thomas, 1993), it was decided that the methods and sampling adopted would yield the most interesting and insightful results. Furthermore, snowballing techniques reduced subjectivity, as participants were often willing to suggest additional individuals to interview (Atkinson & Flint, 2001).

Table 1. Breakdown of Interview Participants by Role and Organization Type. Source: Harnett, 2016.

	Director or Executive	RI analyst	Investment manager	Head of RI	Researcher	Policy director	Total
Asset Manager	4	4	7	3	3	-	**21**
Asset Owner	5	8	2	2	1	-	**18**
Climate/RI NGO	5	1	-	-	-	3	**9**
Consultant	1	2	-	1	-	-	**4**
Data/ Research Provider	2	-	-	1	-	-	**3**
Pension Fund body	2	-	-	-	-	1	**3**
Other	1	1	-	-	-	-	**2**
Total	**20**	**16**	**9**	**7**	**4**	**4**	**60**

Existing contacts within the Oxford University Smith School and the economic consultancy Absolute Strategy Research[3] acted as 'gatekeepers'[4]. Emails were sent out to contacts of both institutions explaining the research topic and requesting participants; while this provided a range of interviewees, there is some self-selection bias as those most interested in the topic are more likely to respond. Key organizations in RI, including leading NGOs and investment organizations were approached directly following desk-based analysis. These two sampling strategies were used to ensure a diversity of jobs and sectors were represented, and (where possible) the most senior investment or RI individual was contacted. In addition to NGOs, consultants, brokers and data providers, interviewees represented a range of investment sectors, including mainstream asset managers, corporate and public pension funds, ethical funds, infrastructure funds and a sovereign wealth fund.

[3] Absolute Strategy Research is a leading independent macro economic research provider, catering for institutional investment clients around the world. The author's father is one of the co-founders and Chief Investment Strategist.

[4] Rice (2010) suggests adopting a business-like or 'inside' approach, using 'gatekeepers' to gain access to initial interviewees.

Interviews were semi-structured, and varied depending on the individuals' profession (mainstream investor, RI professional or intermediary), their interests and experience. Prompt questions were designed in light of existing literature, historical investor surveys and the key research questions. Due to the sensitivity of the information discussed, particularly regarding investment practices, quotes have been anonymised, with references based on their location and the order in which the interviews were conducted (i.e. UK01 and Aus01 for the first interview in each country).

2.2 Survey

A structured, web-based, invitation-only survey was a secondary research method employed to provide broader insights to a consistent set of questions regarding investment learning. A pilot study of 9 individuals, with varying knowledge of climate change and/or investment experience, contributed to the non-linear process of survey creation following the interview process and literature search. This survey reduced response bias by randomizing the order in which answer options appeared, and emphasised that results would be shared with participants to increase likelihood of 'true' responses. Both positive and negative phrasing of questions was used and answers were triangulated to ensure that respondents were answering consistently.

The survey was disseminated through the Oxford World Financial Digest (OXWFD), an online news outlet aimed at international investment professionals. This survey accumulated a rich data set of 154 responses: 38.7% of survey respondents were Executives and a further 27.8% were Investment Managers. Only 4.7% were ESG/RI specialists, but 88.3% of survey respondents said that they were 'somewhat' or 'very' familiar with sustainability investment topics. 40.6% worked in Asset Management organizations. However, a key limitation of the survey design was that the disclosure of location was not mandated, so almost half of responses are not attributable to a specific country; survey results are thus used to support the interview comparisons of Australia and the UK by providing a broader insight into the global investment market.

2.3 Data Analysis

Survey and interview data were analyzed using a number of different techniques, including statistical analysis on quantitative data, and textual analysis on qualitative data. The interview data, where appropriate, has been quantified through tallying responses to structured questions to facilitate comparison to survey data. Coding software 'NVivo' facilitated collective analysis of the data. This software platform helped to organize and analyze data through coding, search, query and visualization tools. Codes were cross-examined and combined to 'understand the patterns, the recurrences' of responses by framing the ways in which data illuminated, questioned and clarified key themes and answered research questions (Guest, MacQueen, & Namey, 2012; Miles & Huberman, 1994; Saldana, 2009).

The results are specific to the time and place of the research, and my own interpretation and understanding of participants' responses (Schoenberger, 1991). However, every effort has been made to accurately represent the views and data generated, and address biases where possible. The methodologies are clearly outlined, and repeatable in different settings.

3. Awareness and Perception

This section will examine the current understanding and awareness of a range of investment professionals regarding climate change. Climate change has grown in the public conscience over the previous decades, but remains a contentious issue, with a prominent divide between scientific and public understanding of the issue (BBC, 2010; Moser & Dilling, 2011). However, there is a growing recognition of the issue within the investment industry, with participation in investor-led climate groups and initiatives on the rise (Eurosif, 2014; RIAA, 2016), including, among others, the global Principles of Responsible Investment, the Investor Group on Climate Change (IGCC) in Australia, and the Institutional Investor Group on Climate Change (IIGCC) in the UK. However, few reports have sought to examine how investors actually view the topic of climate change, and this section will thus analyse the ways in which investment actors define and view climate issues, with the belief that this can help investors seeking to understand their peers and clarify their own beliefs, as well as offer recommendations for those communicating climate issues to the investment audience.

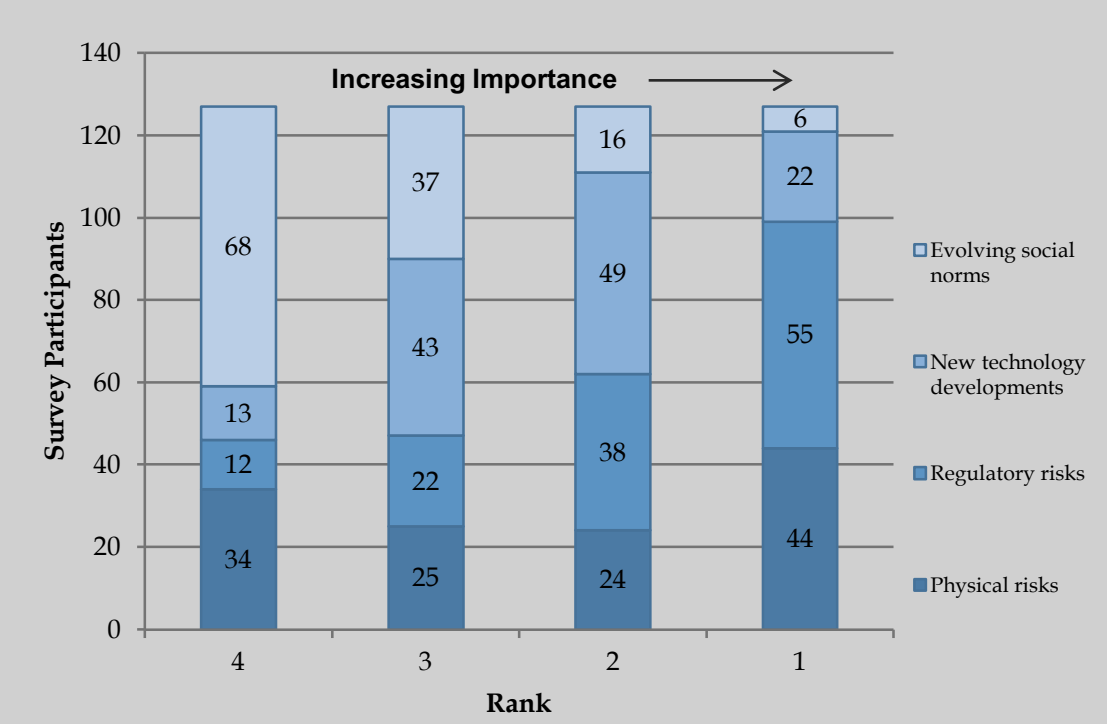
3.1 Defining Climate Change

The understanding of climate change and how it relates to the investment system varied hugely among participants. This research sought to identify which climate risks and opportunities investors identified as most important for their investment decisions. Survey participants were asked to rank four climate-related issues:

- Physical risks (e.g. changing water scarcity, agricultural productivity or extreme weather events)
- Regulatory risks (e.g. carbon prices, air pollution regulation, emissions targets)
- New technology developments (e.g. solar PV, smart grids)
- Evolving social norms (e.g. divestment campaigns and changing consumer preferences)

Figure 1 demonstrates that regulatory risk is seen as the most important issue for survey participants, with 55 of 127 (43.3%) ranking this as most important. Evolving social norms was ranked as least important by 68 participants (53.5%), with only 6 respondents saying that it was their most important consideration. This is interesting, as interviewees were much more likely to mention divestment campaigns as a key reason behind their increased focus on climate change. One explanation for this could be the difference between the participant organizational representation in each method; whereby the higher number of Asset Owners compared to Asset Managers interviewed placed a greater emphasis on beneficiary satisfaction and social pressure from members to divest and invest responsibly compared to that experienced by Asset managers and financial advisors who dominated the survey.

Figure 1. Please rank the following four climate-related issues in terms of importance as they relate to your investment process and consideration of the financial impact of climate change on portfolios. Source: Survey.

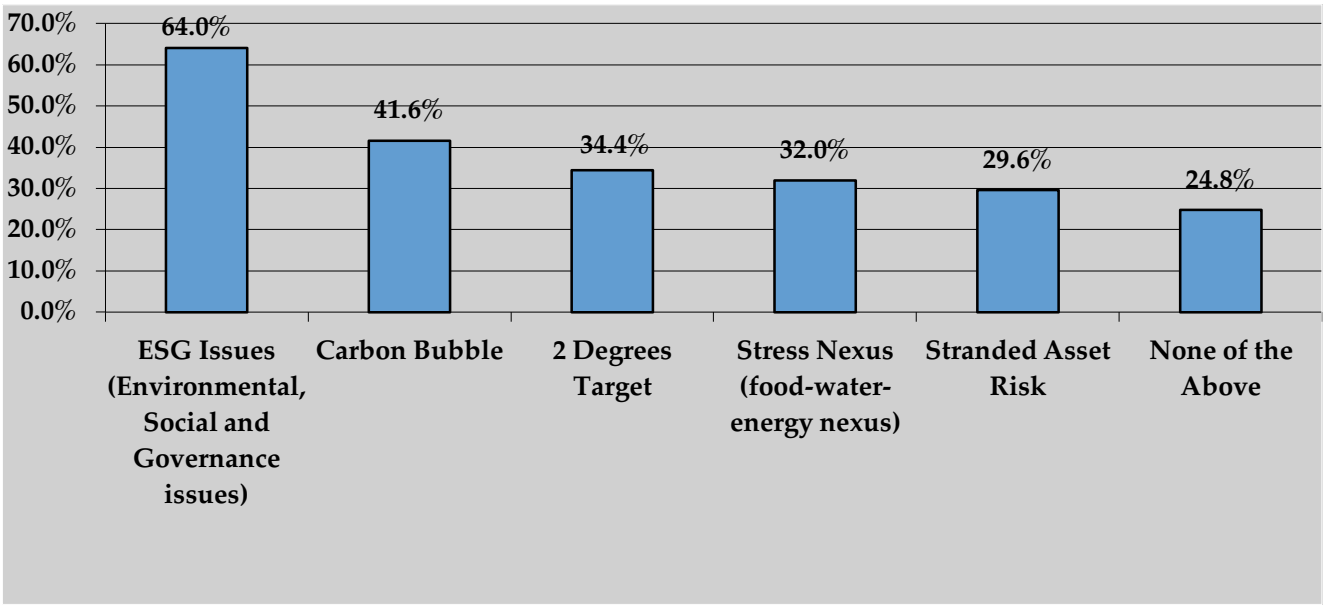


There was also a broad understanding among interviewees that climate change extends beyond the issue of carbon emissions and global warming, with one saying *'Most people, our general population, when you talk about climate change, just think about global warming. There is a lot more to climate change like water shortages and environmental pressures rather than just global warming; there are more issues and more could be done on how to conserve water' (Aus22)*. As would be expected, RI and ESG professionals had a greater degree of understanding regarding the complexity and feedbacks involved in the likely impacts and opportunities of climate change, but there was also a sense that non-specialist investors would define climate risks and opportunities differently for different investments and were aware of the variety of impacts that climate change could have over a range of time scales; '*It would depend on the investment. So if it is a seaport then it will be more water risk than carbon risk. So it is specific to the investment. If it is a generation plant, then it will be more carbon risk than water risk. And if it is a coal mine or an asset that transports fossil fuel supply, then it will be more a supply and demand risk so regulatory outlook, energy demand outlook. So it really depends on what the asset is*' (Aus03). There was thus some, but not universal, understanding of the nuance and multifaceted nature of climate change and that it can act as both a risk and opportunity. However, climate change is still seen as a "long-term issue" rather than one that is already impacting on economic productivity and investment returns, despite scientific and market evidence of the financial impact to date (Caldecott, Tilbury, & Ma, 2013; Holodny, 2016).

3.2 Familiarity with Climate Language and Concepts

Regardless of definitions, 113 (88.3%) of survey respondents said that they were 'somewhat' or 'very' familiar with sustainability investment topics, with only 4 (3.1%) saying that they were 'somewhat' or 'very' unfamiliar with them. This was despite only 4.7% of survey respondents being RI specialists. However, respondents were less familiar with specific climate-related concepts. Almost a quarter (24.8%) said they were unfamiliar with all five listed terms (Figure 2). Only the general term 'ESG' was familiar to more than half of respondents, suggesting a tendency to focus on sustainability rather than climate change specifically. Only 34.4% said they could explain the 2°C target, which is perhaps concerning, as this target is key to understanding the policy urgency surrounding climate adaptation and mitigation, and the science behind carbon budgets. Only 32% of respondents were comfortable with the holistic concept 'stress-nexus' of water-energy-food. Although divestment and stranded assets debates have been recent but growing phenomena, while only 29.6% understood 'stranded asset risk', 41.6% were familiar with 'carbon bubble'.

Figure 2. Have you heard about the following climate-related concepts? Please tick all that you would feel confident in explaining to a friend or colleague. Source: Survey.



These are all key terms within climate dialogues, and without clarity on this language, understanding and integration into investment decisions will likely be limited. Further efforts by academics and concerned professionals alike will be need to continue educating the investment audience on the key terminology relating to climate change and the ways in which it will affect the investment markets. In particular, this will require a translation of the climate science into accessible and relevant language and communicated through common channels including investment intermediaries and news providers, with this translation and communication issue explored in more detail in Harnett (2017).

3.3 Risk vs. Opportunity

It is widely accepted among scientists and leading thinkers in the field that climate change will present both economic risks *and* opportunities to investors (IPCC, 2014; Turnill, 2016). While demonstrating that both are important, Figure 1 shows that risks are perceived by survey participants to be slightly more important than opportunities, which is in keeping with predictions from behavioural finance literatures (Kahneman & Tversky, 1979), with regulatory and physical risks both receiving more 1st rankings. Appetite for different risks and opportunities necessarily varies based on individual and institutional beliefs. This variety of approaches was evident throughout the interviews in both the UK and Australia, with one AM in Australia spending time speaking with experts and universities to invest in new technology, whereas another spent longer trying to understand regulatory risk because it was seen as "one that analysts can get their head round" (UK24).

Both research methods thus demonstrated the consideration of both risks and opportunities relating to climate change: 27 interviewees consider risk and opportunities relating to climate change equally (Figure 3) and 40.2% of survey participants said they read about risks and opportunities equally (Figure 4). Only 8.7% of those surveyed said that they do not read reports about either.

Figure 3. Do you consider risk or opportunities relating to climate change? Source: Interviews.

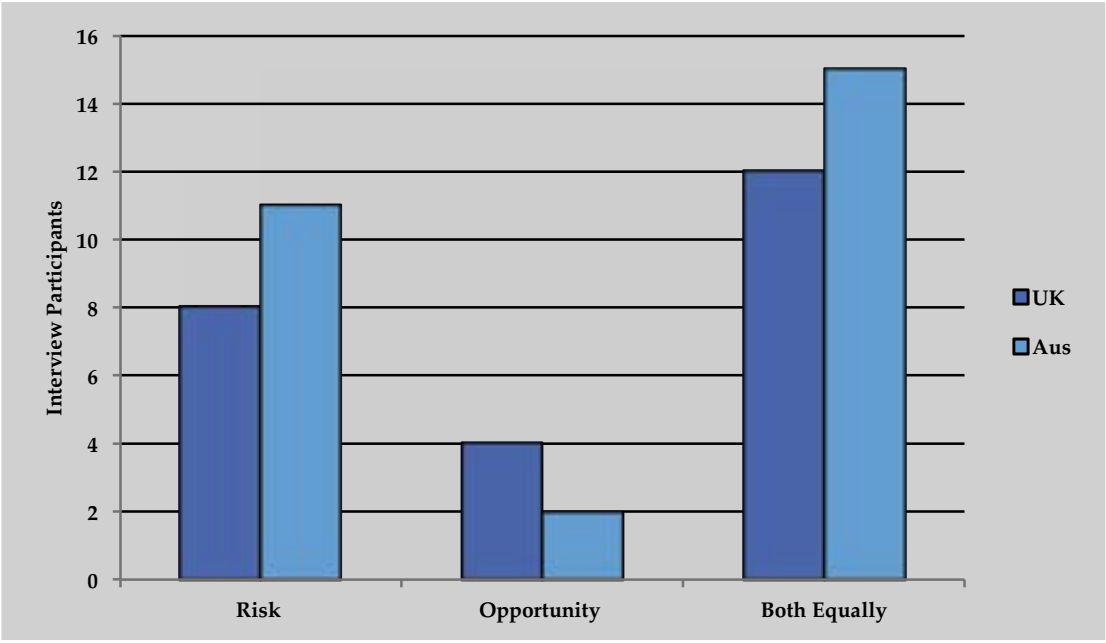
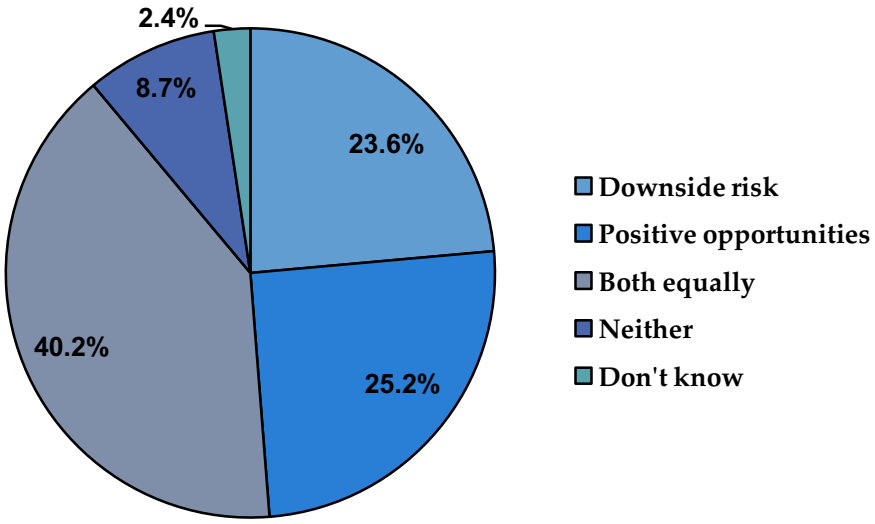


Figure 4. Do you read more information about the climate investment downside risk (e.g. flood risk) or the positive market opportunities (e.g. clean tech developments)? Source: Survey.



However, there was still a concern among interviewees that *"we are still wrestling with a perception that the environment and adjusting to the pressures which are taking place either are a source of losing competitive advantage, or they are a costs, there is not a widespread understandings that there are opportunities"* (Aus09). 19 interviewees focused more on the risks relating to climate change, and this response was greater in Australia than in the UK (Figure 2). Regulatory risk was a particular concern for Australian investors, with carbon pricing mentioned by 11 Australian interviewees (compared to 5 UK participants). Only 6 interviewees focus more on the opportunity side and 4 of these were UK investors. However, this risk bias did not extend to survey participants, with 32 survey participants looking at positive opportunities more than downside risks, compared to 30 who focus on the downside risks more (Figure 4). This perhaps suggests that the USA (where a larger proportion of the survey participants were located) has more climate-friendly investment opportunities due to the larger size of the market, especially compared to Australia. Although the majority of investors understand climate as a risk and opportunity, this research has shown that there are still individuals in the market acting without this understanding, and particularly that there are opportunities for supplying more products that could aim to cater to those investors seeking to make money from climate changes both now and in the future, with a number of individuals saying that the lack of suitable products on the 'opportunity' side meant that they had thus far been more interested in simply managing climate risks.

Definitions of climate risk and opportunity also varied. Some searched for opportunities in a negative sense by exploiting cheap fossil fuel assets that others were divesting from, or opportunities to 'play' or 'hedge' regulatory changes in search of profit. However, others explored positive investments including green property/infrastructure, renewable energy, battery storage technology and climate/green bonds. Furthermore, the binary between risk and opportunity was problematized, with investments in renewables traditionally seen as a climate-related opportunity but is actually viewed by some interviewees as a liability in the wake of regulatory uncertainty. Perception of policy risk also varied. Although a majority acknowledged growing uncertainty *("there was a time when the only risk around coal mines was where they would get built and around price, whereas now … there is massive risk that they are never going to see the light of day"*, Aus07), one RI manager said *"there is very little regulatory risk in Australia"* because the government is not willing to tax mining (Aus04).

Similar discussions were evident in the UK, with some arguing that the failure of the European Emissions Trading Scheme demonstrated weak regulatory risk whilst others thought the carbon price would soon strengthen. Regulatory uncertainty also affects a range of asset classes, with one AM saying *"I think it has an impact both on equities and the way we look at bonds for countries. How well you manage environment security results in how stable your country is, with regards to the social-political spectra and that spectra is what will impact your bond so that is when you will get crashes in currency. It is all interlinked"* (UK17).

Many investors focused on 'risk and reward' (R&R), and were willing to take investment risk if they deemed the reward to be suitable, regardless of whether these investments were in coalmines or wind farms. The nuance between risk and opportunity was further explored: "*The two are so closely related, because if you are going to respond to the risks with money, you've got to invest somewhere else, so the two are moving a bit more in sync than they were*" (Aus25). Recent divestment announcements have demonstrated this, with leading institutional investment organizations, such as Rockefeller Foundation and AXA insurance, divesting from some fossil fuels and actively reallocating this capital to clean tech or other 'green' investments (Clark, 2015; Rockefeller Foundation, 2015), with this concept now transformed into a market platform labelled 'divest-invest'. While Painter (2013) argues for using risk language in climate communications, and Boykoff (2008) notes the lack of risk framing in UK media, this paper recommends a focus on the *materiality* of both climate risks and opportunities but notes that even this framing is problematic.

3.4 Focus on Holistic vs. Carbon Issues

Interviewees discussed the difficulty of considering climate change due to its multi-faceted and intangible nature: "*Climate change is a very wide concept, which is not very actionable*" (UK03). A global problem with localized impacts across multiple timeframes, climate change requires familiarity with a range of information and concepts. One RI manager thus said it "*is not just emissions, it is about rising sea levels, it is about changes in weather patterns and how that affects food and transport, and all of that global stuff*" (Aus03). Interview comments highlighted a gap between RI professionals and mainstream investors in their breadth of focus when defining and discussing climate change. More interview participants discussed climate as a holistic issue rather than focusing on carbon emissions (28 vs. 13). However, RI professions showed a greater tendency for this holistic thinking than mainstream investors (18 vs. 10 individuals; 81% vs. 53%) (Table 2). This could reflect their RI/ESG expertise and ability to spend more time researching these issues. There was also greater consideration of holistic issues in Australia compared to the UK, perhaps due to the greater frequency of extreme weather events, flooding and forest fires.

Table 2. Investor Consideration of Climate Change: Holistic vs. Carbon Focus. Source: Interviews.

	Carbon Focus		Holistic Climate Change	
	RI	Mainstream	RI	Mainstream
UK	4	4	10	1
Australia	0	5	8	9
Total	4	9	18	10

While holistic understandings of climate change are needed for its full integration into decision-making (Mercer, 2015), interviewees were sceptical of the extent that this occurred: *"I don't think this industry is very good at taking that broader view"* (UK06). This was seen as symptomatic of the wider financial system, where individual analysts and investors often focus on a specific sector, isolated from integrated macro thinking. Interviewees argued that integrating holistic climate information was challenging, as different facets are *"quite difficult to price"* (Aus24). Interviewees and academic literatures alike therefore suggest that companies must do more to demonstrate the materiality of climate change in all its guises (A4S, 2015; Eccles, Krzus, Rogers, & Serafeim, 2012; UNEP FI, 2009), with investors saying that they do look at these issues if they affect bottom lines. This has been the focus of the recent Task Force on Climate Disclosure, established by the FSB and G20 under the guidance of Mark Carney and Mike Bloomberg (TCFD, 2016).

Water was one environmental issue identified as both a risk and an opportunity in the UK and Australia: *"I guess water risk … is the key because people can get their head around it: either there isn't enough water or there is too much water. It is something that translates it to the here and now; it is already having direct financial impact on communities and business operations…I don't think there is that understanding in other areas"* (UK25). Water has gained increasing attention from the RI community; PRI and CDP have established water-related research and engagement projects, and Bloomberg publishes corporate water-use data linked to a World Resources Institute tool illuminating exposure to future water scarcity (WRI, 2015). This focus on water was particularly emotive in Australia, where the Millennium Drought (and subsequent flooding) led to a *"sophisticated water market"* and a greater awareness of weather-related climate changes: *"We know that there will be more evaporation, there will be more extreme weather events, basically the price of water is likely to continue to rise, and so that is one area that we could invest"* (Aus01). However, others were more sceptical of the opportunities around water: *"the challenge of water is that there aren't many ways of investing in water companies from an innovation perspective"* (UK04), with another saying that *"either they are not listed or they are very small or they are a small part of a very large company so you are not going to see the market impact of what they are doing"* (UK14). Interdependencies between water and energy were also discussed by investors, both in noting the holistic nature of climate change and in questioning the environmental benefits of large-scale solar projects, due to their dependence on water. Regardless, water issues are becoming more material for investors, particularly in emerging economies such as China and India, with water scarcity limiting growth across different time-frames: *"Water risk can be immediate or a bit more long-term, conceptual. Even within the same issue, it varies according to the geography and sectors"* (UK24).

While some investors are considering the broad materiality of climate changes, concern remains that this is not implemented in a strategic or systematic way. *"Natural resource usage intensity is a huge part of the conversation that is often overlooked. Unfortunately it is not really connected so people understand curbing carbon but don't understand what it has to do with water intensity. I think there is a lot of work to do on that front"* (UK27). While it is perhaps easier for investors to consider the risk of rising sea-levels when they own a coastal airport, or water scarcity when they invest in agricultural land in California, a consideration of climate change at a strategic level requires an appreciation of climate interdependencies. The recent media focus on fossil fuel divestment and unburnable carbon have concentrated RI discourse around carbon and energy debates, perhaps to the detriment of wider discussions: *"Too many pension funds at the moment are thinking about it in terms of corporate engagement and individual fossil fuel companies"* (UK25). Sustainability organizations, corporations and investment analysts could better highlight the materiality and interdependencies linking different aspects of climate change to investment decisions.

This section has shown that many investors still lack basic knowledge and understanding of key climate terms and processes, to the extent that the education of investment audiences remains a priority for those seeking to

engage with and catalyse further Responsible Investment practices. However, it has also pointed to the need to focus more holistically on the range of both risk and opportunities surrounding climate change, including but not limited to the issue of carbon emissions as different investors will have varied interests and exposures to the complexity that is climate change.

4. Integration

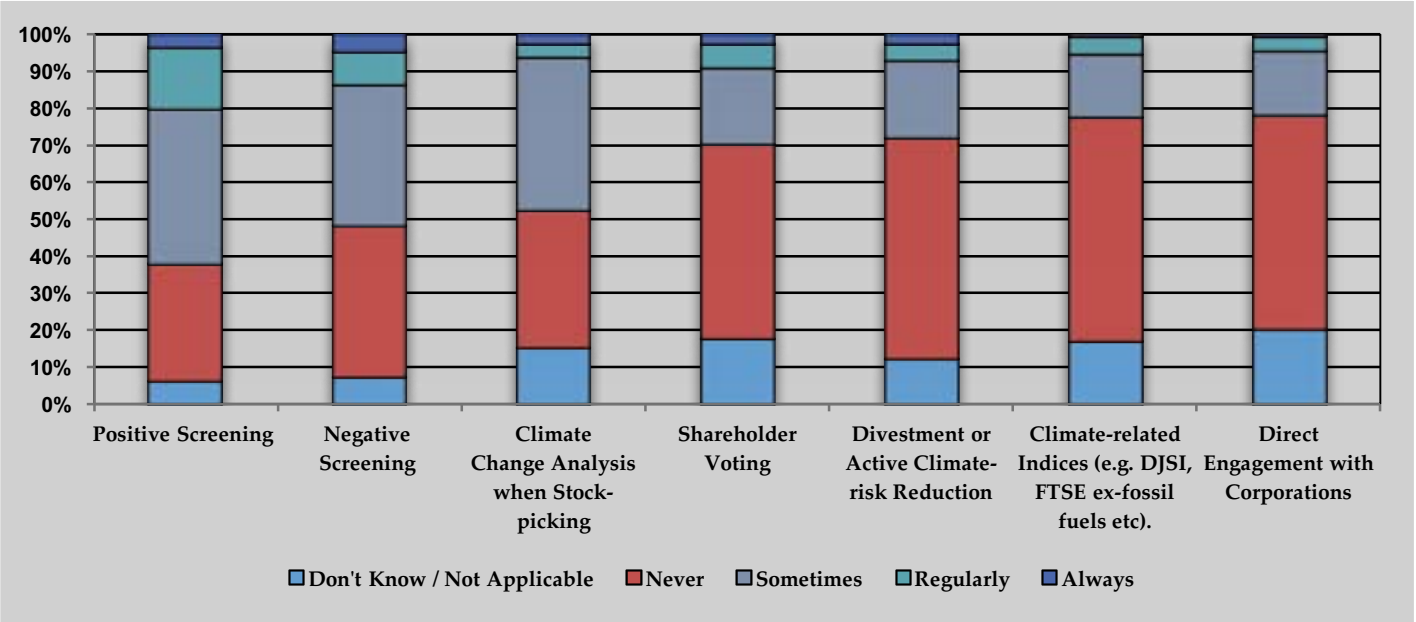
This section explores the different ways in which ESG, and specifically climate change, is being integrated into investment decisions. Integration is a difficult but necessary step to influence asset allocation and shift towards a lower carbon economy (Bourghelle, Jemel, & Louche, 2009; de Graaf & Slager, 2009). Integrating climate change into institutional frameworks facilitates management of risks and opportunities in a 'prudent and consistent way' (IIGCC, 2015). Many interviewees agreed that investors *"are becoming more aware of climate change… But there is a bit of a way to go"* (Aus11). The Global Sustainable Investment Alliance (2014) suggest that the global sustainable investment market has risen from US$13.3tr in 2012 to US$21.4tr in 2014. However, funds integrating climate risks and opportunities will likely be much lower (in a study of 550 institutional investors who had made climate commitments, only 5 had invested in low-carbon indices, and of the 194 who had divested from some fossil fuels, only 18 were AMs and 6 were PFs (Novethic, 2015). As such, further integration is required to scale-up responsible capital allocation (Arjaliès, 2010). Buy-side integration rankings demonstrate its rising prominence in the investment industry (Extel, 2015), but no standard for 'integration' exists although a number of guidelines have established various pathways to integration (c.f. PRI, 2014; VicSuper, 2014).

This research highlights the diverse integration strategies available: 14 different methods were mentioned by interviewees (Table 3), and 7 strategies were ranked by survey participants (Figure 5). Table 3 shows that climate change can be integrated at various levels, from an operating principle, to an engagement strategy or stock selection screen. Consequently, at least one method should suit any institution, from simply adding a risk overlay to altering the entire management and operational structure of the firm.

Table 3. List of Integration Methods. Source: Interviews.

Integration Methods
Active Investment in Green Bonds/ Clean Tech/ Renewables etc.
Capital Investment Appraisal
Carbon Foot-Printing and Target Setting
Climate Change Integrated into Fundamental Analysis Reports
Direct Engagement with Corporations
Divestment / Decarbonization
Education of Managers and/or Members
ESG as Central Operating Principle
ESG-tilted Management Incentive Structures
Negative and Positive Screening
RI Policy (Investment policy; risk management policy; ESG-focused hiring policy)
Shareholder Voting
Strategic Asset Allocation

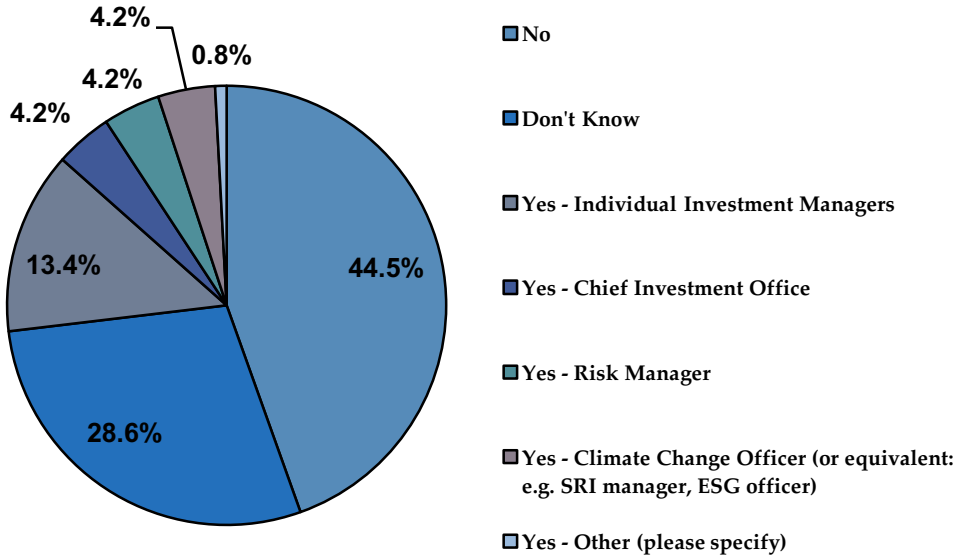
Figure 5. How do you incorporate climate change in your investment process? Please answer for each practice. Source: Survey.



The traditional method of screening (both positive and negative) remains the most common strategy among survey respondents (Figure 5), in line with industry reports (Eurosif, 2014; Global Sustainable Investment Alliance, 2014). However, the dominance of 'sometimes' or 'never' in this chart demonstrates continued inaction within the investment industry. Low corporate engagement is particularly surprising given the high profile campaigns to encourage such action (Flood, 2015) and comments by interviews suggesting that this practice had increased, particularly in the UK, with one Australian SF Executive saying *"I think that Europe is just a million miles ahead of anywhere else on issues of engagement"* (Aus23). Integration appeared more common within interviewee institutions, although this did vary from institution to institution.

The use of RI teams in the integration process also varied. One interviewee outlined two different approaches: *"Some take a holistic approach and don't have a separate RI team, so they try to integrate ESG principles directly for the portfolio managers to handle. Some have a separate RI team but they sit closely with the fund managers and provide research and information"* (UK02). Each approach was visible in the UK and Australia. ESG teams can provide useful research insight, but can be one step removed from the investment process so can be overlooked and overruled by some Managers. However, delegation and expertise is seen as an important part of investment organizations' structure: *"we shouldn't expect our general managers to be experts in everything … our ESG people have excellent access to their Investment Committees … and the appropriate decision-making forum has the necessary input from the ESG person or the RI person with due consideration from the CIO, so I think it is actually integrated very well"* (Aus25). Regardless of strategy, employees must know what is expected of them, and who is responsible for sustainability and climate change consideration. This was notably lacking within the survey sample: 44.5% of respondents said no-one within their firm was responsible for climate consideration, and 28.6% did not know who was responsible (Figure 6). Furthermore, 83.3% never have climate change as a standing agenda point in Investment Committee Meetings, and only 12.5% discussed climate risk 'regularly' or 'always' with clients.

Figure 6. Is somebody in your organization responsible for ensuring that climate change considerations have been properly analyzed? Source: Survey.



Many RI managers discussed strategies for integrating climate change from the *"bottom-up"* (Aus24), including helping AMs consider climate change issues on a *"case-by-case"* (Aus02) basis. Bottom-up approaches can be an effective approach in the short-term, particularly as investors learn and adapt through social interactions (E. S. Harnett, 2017). However, interviewees in both the UK and Australia acknowledged that *"Top down emphasis is really important. Support from the Executive Board mean that all analysts need to be thinking about these things"* (UK22). Unless the vision and motivations behind climate change integration are clearly communicated, and the tools for change identified, institutional cultural and practices are likely to remain largely unchanged (Kotter, 1995):*"Because we took sustainability to our central operating principle it affected everything we did as a company and as a fund"* (Aus12). Implementing both top-down and bottom-up integration simultaneously can help 'translate their beliefs and policies into priorities and asset allocation decisions' (IIGCC, 2015; Mercer, 2015).

Some investors struggle to understand *"how you make this into an investment case that our Investment Committee will respond to"* (Aus08). Others have recognized its importance, saying *"We don't find it difficult. It goes into risk and reward"* (Aus07). The possibility of integrating climate and ESG considerations into the fabric of the investment process and culture of the firm, whereby the goals and corporate structure are affected, has been evidenced by a number of ethical and RI funds, as well as integration into mainstream institutions (Global Sustainable Investment Alliance, 2014). However, just having a policy may not lead to integration: *"Just because they don't have a climate change policy doesn't mean they are not doing it, but there are people who have policies who may not implement them very well either"* (Aus13). Integration of ESG is a key step towards climate-aware investing but requires top-down structural change, with bottom-up efforts able to contribute but ultimately limited.

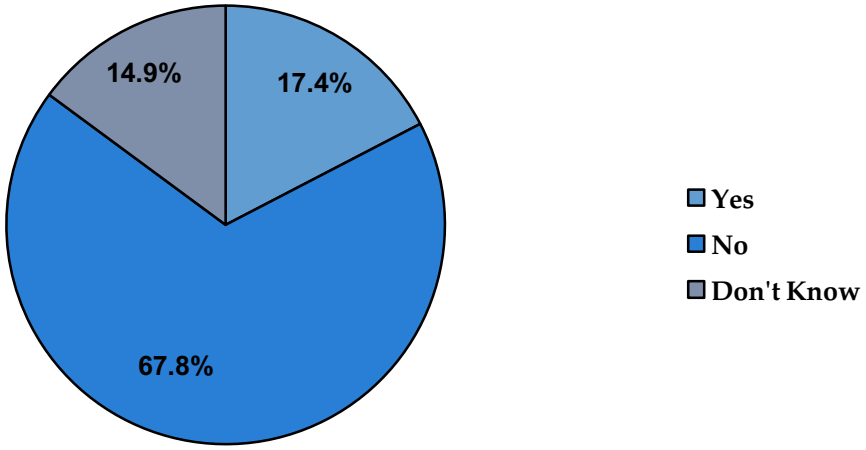
4.1 Belief Formation and Crystallization into Action

Investors manage and direct their actions by following dominant conventions (Kahneman, 2011). Changing beliefs can be an important intervention point within a system (Meadows, 2008), with investment beliefs shown to affect market outcomes and investment returns (Koedijk & Slager, 2007; Kurz, 1998). Collective norms are shared and disseminated across the market, and consequently 'the integration of ESG information will become a mainstream practice if, and only if, there is a shared belief among investors that ESG information is relevant' (Bourghelle et al., 2009). One SF Executive commented "*If its not philosophically driven, you leave yourself very open for criticism. I think we are better off doing nothing than going off down a path half-heartedly*" (Aus23). Beliefs drive operational practices, with one interviewee stating that "*Our beliefs are how we should be managing money; they are the foundation of everything we do*" (Aus23). For climate change to be given sufficient focus in investment organizations, it needs to be explicitly acknowledged in investment beliefs and policies (Mercer, 2015). IIGCC (2015) thus suggest that investment beliefs should explain and reference:

- The fund's assessment of the most likely future climate change scenario.
- The degree of concern and the fund's level of conviction about future investment impacts.
- The way the fund intends to manage this exposure.

However Figure 7 shows that just 21of 121 survey respondents (17.4%) knew that climate considerations were in their organizations' investment beliefs, supporting the IIGCC's (2015) finding that 'the majority of funds still do not explicitly do this either as part of the responsible investment policy or core investment beliefs'. Interviewees in both the UK and Australia also acknowledged a lack of climate-related investment beliefs, with ten interviewees (8 in Australia, 2 in UK) saying that their firms had RI policies but not climate-related investment beliefs.

Figure 7. Is climate change a specified consideration in your organizations' official investment beliefs? Source: Survey.



Without the development of more climate-aware beliefs, it is likely that consideration of such climate factors will remain a secondary factor in investment decision-making and institutional focus. Encouraging greater analysis of existing and future investment beliefs could thus be argued to be a priority for those seeking to engage with

investment organizations, with evidence suggesting that those who have adopted are already seeing the benefit. For example, movement towards a set of climate-friendly beliefs can be seen to some extent within certain AM firms introducing policies to attract AO clients with existing climate beliefs, and AO firms adopting policies to appease beneficiaries and direct asset allocation: "*We actually adopted a policy around responsible investment … That is starting to be embedded into our process, so when we are looking at an investment we are looking at the ESG implications*" (Aus03). However, other interviewees discussed the difficulty in developing practical and transparent beliefs around climate change, saying *"We have a set of investment beliefs, one of them relates to ESG but it wasn't clear, and we didn't agree as to how much of it was branding and how much of it was aimed at investment returns."* (Aus02). Therefore, understanding the investment case for considering climate issues, and outlining how it will be implemented in practice, are key to the development of relevant investment beliefs and the crystallization of such beliefs into investment actions throughout the global investment system, with similar barriers and opportunities to integration in markets around the world.

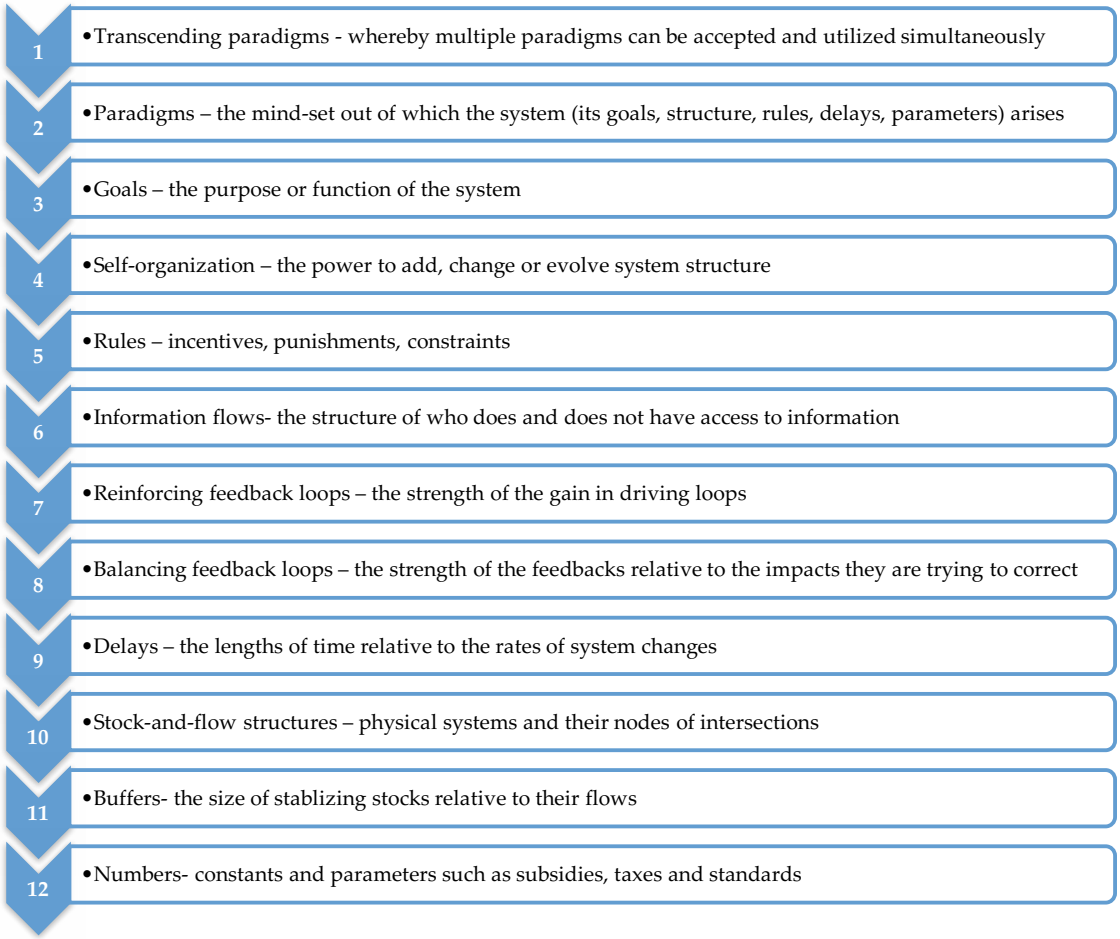
Without clear beliefs and enhanced understanding, it is unlikely that sufficient resources and institutional attention will be paid to the issue, whereby individual and institutional knowledge of climate change will be ossified and integration action delayed or negated entirely. Once these are in place, however, there are a number of different ways that climate change can be integrated into portfolio decisions, with a diversity of approaches found in each country studied. Further research could explore the efficacy of different approaches in creating positive impact and investment returns.

5. Interventions

This section explores the ways in which integration of climate change into investment decisions could be further catalyzed. In particular, this section will draw upon the work of Systems theory, building in particular on the work of Donatella Meadows (c.f. Meadows, 1999, 2008).

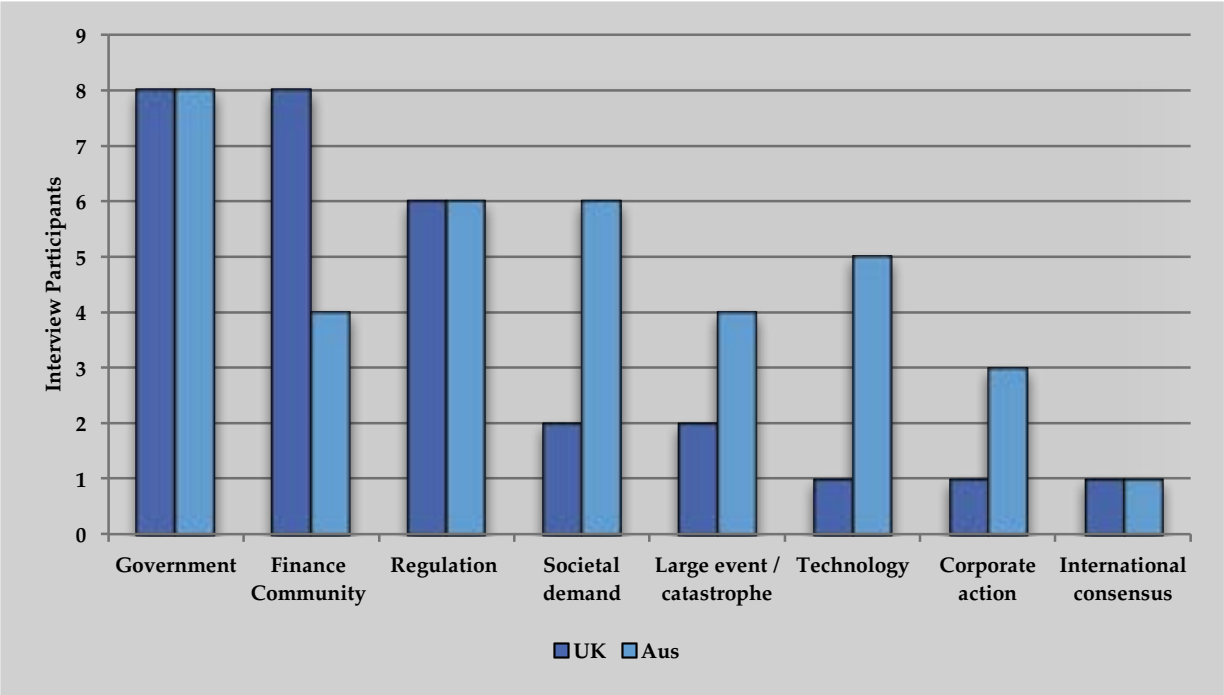
A system is an 'interconnected set of elements that is coherently organized in a way that achieves something' (Meadows, 2008). The institutional investment industry is a system with capital, stocks, portfolios, interconnected investors and beneficiaries, and the provision of pensions and investment returns as its goals, though it does not exist in a silo. 'Leverage points' are points of 'power' within a system that can affect system dynamics, alter behaviour and change beliefs (Meadows, 1999). Figure 8 demonstrates that the goals and paradigms of a system are the most effective intervention sites to alter system behaviour, but are the most difficult to change. Krosinsky and Purdom (2017) argue that 'people have the power to transcend paradigms, but it will take mass awareness, willpower, and asking the right questions while developing the right positive culture and incentives'.

Figure 8. Places to Intervene in a System in Order of Effectiveness. Source: Meadows 2008.



While such a paradigm shift in finance towards Responsible Investment could occur, this research sought to establish which intervention points investment professionals perceive as having the potential to enhance the dissemination and understanding of climate change in the investment system, and encourage the integration of Responsible Investment practices. Figure 9 provides a frequency analysis of the eight drivers mentioned by interviewees when asked 'where do you think systemic change will come from?'. These results demonstrate demand for financial and political systems to work together to tackle climate change. This re-emphasizes the Systems theory acknowledgement that the investment system does not act in a silo (Meadows 1999).

Figure 9. Drivers of Future Integration of Climate Change Into Investment Decisions. Source: Interviews.



Interestingly, 'government' and 'regulation' are equally important to both UK and Australian interviewees. Tighter policies and regulation were seen as necessary to incentivise investment towards a lower carbon economy by 28 interviewees: "*At the end of the day I think that governments have to be the ones who put the constraints on, there has to be some sort of constraint on carbon emissions*"(Aus08). Carbon pricing was discussed by 16 interview participants; mostly in the context of regulatory risks, but also for its potential to catalyse a large-scale shift in investment if a credible and long-term pricing structure was introduced. This could change the rules of the market, altering the stocks and flows of goods and services internationally. Despite recognizing the need for a carbon price, one Consultant said that investors are "*nervous about the fact that if we do … there is a potential to be left with a stranded asset and lose money*" (Aus12). It was argued that national and sub-national level pricing would be vital to change, with interviewees sceptical about the likelihood of international carbon pricing: only 2 mentioned international consensus as a driver of change (Figure 9).

Twelve interviewees suggested that the finance community would catalyze change, particularly given the inconsistency of climate policies in the UK and Australia, which are liable to change under different

governments: *"the finance community will probably lead ahead of the government, as is the case now"* (UK27). This belief was greater in the UK (8 mentions) than Australia (4 mentions), perhaps due to the larger size and national importance of the finance industry in the UK. One interviewee thus commented *"I think regulation on this is difficult … what tends to happen is that the big funds start doing something and gradually the world moves that way"* (UK08), suggesting that herding behaviour and peer-learning, if channelled in the right direction, could cause a cascade of responsible investing. Catalysts for such a change could include further information on the materiality of climate change, and momentum behind discussions of climate change integration as a fiduciary duty and legal requirement (as espoused by groups such as ClientEarth). Improving information flows is an important intervention within a system (Meadows, 2008), perhaps particularly in the UK, where more interviewees believe there is not enough information (Harnett, 2017). Furthermore, if fiduciary responsibilities did require a consideration of climate change in the future, this could alter the rules of the system, and potentially even cause a paradigm shift towards climate change as an overarching focus in investment decisions due to its potential for industrial-scale changes to socio-economic systems.

Although momentum behind the evolution of fiduciary standards to incorporate climate risk is increasing (Barker & Youngdahl, 2015), paradigm shifts are unlikely to occur in the next few years. One SF Manager was keen to delineate meeting fiduciary duty and catalyzing a shift towards a lower carbon economy: *"we consider ESG but we do not make investment decisions just to drive an environmental outcome"* (Aus04). This suggests that while investors recognize climate change as a material risk and opportunity, they do not see a wider responsibility to drive structural change. Two strategies thus exist: a climate risk strategy and a climate impact objective. Available integration strategies do not always achieve both, so investors need to be clear on their reasons for integrating climate considerations (Dupré et al., 2015). Concern also exists that potential changes could end up pushing investors in the wrong direction, as Forrester (1971) argued with regards to 'leverage points'. For example, some interviewees fear litigation cases if they *do* invest for environmental rather than financial gain thereby breaking fiduciary duty, but also fear losing the best managers to competitors if they introduced more stringent monitoring and mandating towards environmental consideration. However, one catalyst that could have significant potential in the investment industry is that of 'self-organization'. One interviewee said *"Self-organization is more powerful than regulation"*, arguing that *"if you and I agree to do something we are more likely to do it than if we are told to"* (UK08). By establishing their own networks, initiatives and investment strategies, investors can alter the system through collaboration and peer pressure driving greater uptake of innovation, information and beliefs, and reducing fears of losing competitive advantage.

Australian interviewees appeared to recognize a wider variety of drivers for change than UK participants. UK interviewees focused almost entirely on the role of government and investment peers (22 mentions vs. 7 of other drivers) compared to Australia's 18 mentions of government and finance vs. 19 mentions of other drivers (Figure 9). Other drivers included technology developments, whereby renewable energy, battery storage and other low-carbon enablers reach price-parity and become sound economic investment decisions, or catastrophic / large-scale event causing businesses, governments and investors to recognize the risks (6 mentions each – Figure 9). However, others (particularly in Australia) lamented the slow nature of change, and the idea of waiting for catastrophe. Societal pressure was also seen as an important change driver, particularly through lobbying governments and AOs to act, with social campaigns against war, apartheid and tobacco successfully affecting investment decisions in the past (Renneboog, Horst, & Zhang, 2008). However, questions remain as to the impact of the divestment campaign, and whether engagement would have better long-term outcomes (Ansar, Tilbury, & Caldecott, 2013). Those putting pressure on investors must consider the potential positive and negative outcomes of their efforts, and recognize the need to seek common goals*: "The key thing is that different*

stakeholders have to play a role. What will make the most maximum impact is if everyone coordinated their impact" (UK24).

Facilitating a systems-focused viewpoint is perhaps particularly useful for the complex issue of climate change. Systems theory identifies the potential for non-linear changes to a system, whereby momentum from one actor or one initiative can be used to catalyze wider change somewhere else in the system. Krosinsky and Purdom (2017) thus suggest that 'these (ESG) issues won't be solved by investment alone, or by companies alone, or by just policymakers for that matter. All parties will need to move in tandem if any significant shift – say in low-carbon energy – at the scale required is to occur, supported by a consensus of scientists coupled with robust grassroots awareness and the average person insisting on change through asking the right kind of questions'. This was emphasized by one interviewee who said *"a little bit of fiduciary enlightenment, along with marginally better regulation, along with beneficial member input, all coming in relative proximity of each other drive significant steps forward and across the way the markets work, and that is the world we are in now. If any one of those elements is a drag or a negative, then you slow the system down, like we did with regulation in Australia, but if they all keep moving and edging forward then you get this acceleration in behavioural change"* (Aus25).

6. Discussion and Conclusion

This research has highlighted the opportunities for greater communication and integration of climate change knowledge into investment decisions, demonstrating that some investors are considering these risks in their portfolios, but many others lag behind on both action and knowledge.

Within the investment system, interviewees and survey participants identified a greater focus on climate risks than on opportunities relating to climate change, especially among Australian interviewees where focus on regulatory risk was high due to recent experience of uncertainty. However, experience of climate changes also appeared to have induced a more holistic understanding of climate change in Australian interviewees relative to UK interviewees, although both countries had a divergence in definitions between RI professionals and mainstream investors. This experience of climate change and government apathy appears to have influenced Australian investors to the extent that they are more aware of alternative drivers of climate integration and action, including the role of technology, social pressure and large-scale climatic events in catalyzing change. In particular, interviewees in the UK and Australia both highlighted the role of government and the finance community (both AMs and AOs) as being important drivers of change if greater consideration of climate issues in investment decisions is to happen on an industry-wide scale.

Both UK and Australian interviewees mentioned the disengagement of beneficiaries as a barrier to action on climate issues, as it weakens their feedback loop along the investment chain. This was particularly noticeable in the DC structure of Australia, whereby interviewees believed that the individualization of risk increased demand for financial outperformance. However, participants in both countries commented on the greater availability of investment mechanisms for integration of climate change within the investment system. Interviewees also noted the growth in corporate and policy engagement- largely collaborative in Australia and private engagement in the UK- although this finding was not extended to the survey participants. The development of sustainable investment practices can be seen as an 'unending process defined neither by fixed goals nor by specific means of achieving them' (Hjortha & Bagheria, 2006), with a diverse range of possible actions available and an array of intervention points identified in this research. Interviewees most frequently mentioned the changing of rules and goals of the system as the most likely catalysts (primarily by governments and investment Executives), although self-organization of investors around climate issues and efforts to increase information flows also appeared to be occurring through the growth of networks, collaboration and knowledge sharing within and between institutions. However, the continued lack of investment beliefs, understanding of key concepts or discussion at the Investment Committee level identified in the survey show that there is still progress to be made on a firm-by-firm and industry basis in integrating and understanding climate change in the investment systems.

6.1 Recommendations

- We found that the majority of investors are not familiar with climate-related terms and concepts, suggesting that more targeted education is needed. Regulators and financial institutions should proactively support enhanced professional training for investors about the material risks and opportunities relating to climate change.

- We found that there was significant uncertainty as to who is ultimately responsible for considering climate change within firms. This suggests that greater clarity of expectations regarding the integration of

climate change should be included in investor mandates and performance benchmarks. Financial institutions should outline explicitly the expectations of their employees as to the integration of climate change in investment decision-making.

- We found that a significant number of investment professionals view climate change only as a long-term risk, rather than an ongoing phenomena that is a material risk today. This could hinder awareness of current climatic change and transition trends that are already affecting portfolios. Greater emphasis should be placed on understanding and communicating the short- to medium-term impacts of climate change, as investors are more likely to alter their decisions based on these time horizons.

- We found that a majority of investment firms participating in this research do not include climate change in their investment beliefs. This suggests that many investment firms are not actively encouraging climate awareness and integration. Financial institutions should introduce climate-related investment beliefs; without these many firms will lack impetus to consider how climate change will affect their decisions.

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