IMPACT INVESTMENT AND INSTITUTIONAL INVESTORS

How can pension funds help enable a transition to a sustainable low-carbon economy?

Columbia University
Master of Science in Sustainability Management Program
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Foreword

This report was developed as part of an integrative capstone workshop by students in the Master of Science in Sustainability Management program at Columbia University in the City of New York at the behest of two clients: the Organization for Economic Co-Operation and Development (OECD) and Mercer. The OECD is an international economic organization made up of 34 countries that seeks to promote policies that will improve the economic and social well being of people around the world. Mercer is a global consulting firm that provides investment guidance and data management.

The interests of both clients overlap on the topic of climate finance: climate change is both a socio-economic and an investment management issue. The OECD has an interest in closing the financing gap for climate change mitigation and adaptation. Mercer is interested in the risk that climate change and the rising resource scarcity pose to investor portfolios. Both organizations have a shared interest in how institutional investors are measuring and reducing the carbon intensity of their portfolios in a way that minimizes risk, maximizes return, and scales up impact.

COLUMBIA UNIVERSITY
IN THE CITY OF NEW YORK

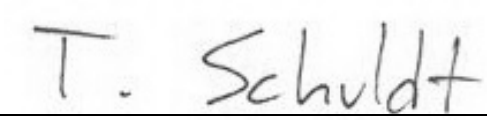
Faculty Advisor:

Jessica M. Prata

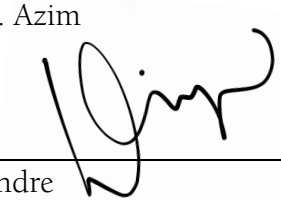
Assistant Vice President - Environmental Stewardship; Columbia University

Prepared By:

Ameer H. Azim



Thomas Schuldt



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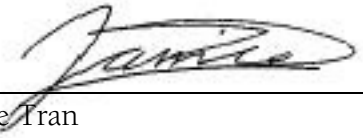
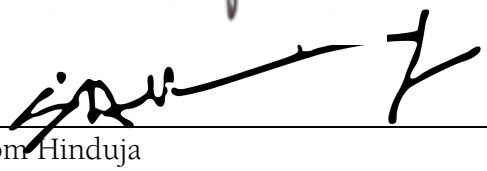
Parham Gerami



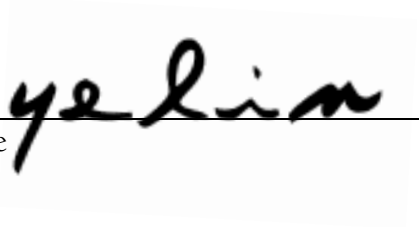
Janice Tran



Shom Hinduja

Kurt Vogt

Sophie Dejonckheere



Lin Ye

Ufroz Ayyub

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Executive Summary

Climate change is a major risk for our planet, its inhabitants and consequently for the value of global assets. The increasing number of headlines dedicated to the threats posed by climate change, and data proving mankind's culpability for these changes, reinforce the harsh reality of a changing world. While climate change will ultimately touch everyone, the poor are already feeling its devastating effects and are set to absorb a disproportionately high amount of the total negative impacts. There is a pressing need to proactively mitigate the socio-economic impacts that climate change will have on the most vulnerable.

Perhaps surprisingly, large universal asset owners like pension funds are also vulnerable. Pension funds cannot ignore a risk that could potentially have damaging effects on investment portfolios. On the contrary, combating and dealing with climate change risk has to become an integral part of a pension fund's strategy.

Climate Change is also a major opportunity for pension funds. The World Economic Forum (WEF) estimates that about US$ 0.7 trillion, or roughly 1% of world GDP, is required annually to deliver the mitigation and adaptation infrastructure required to keep the planet within the 2 degrees Celsius warming goal.[1] While a hefty objective for the financial sector at large, this provides new investment opportunities for pension funds. Green asset classes are growing quickly. As an example, green bonds, which were a niche market until 2012, took off in 2013 and reached US$ 11 billion. Volume for the first 6 months of 2014 is at US$ 18.35 billion, and the market is expected to reach US$ 100 billion for the full year of 2015.[2]

Green asset classes and investment opportunities will continue to grow as the new "clean economy" substitutes the old "dirty economy." The pension funds most prepared for climate change, which consistently reduce the carbon footprint of their portfolios, will show the best returns for their beneficiaries.

The contents of this report study the variety of ways pension funds can build internal alignment and capabilities, engage effectively with stakeholders, and shift assets into 'green' investments to effectively tackle a traditionally amorphous subject in the financial community. With recent climate change negotiations gaining positive momentum, pension funds need to act now to build their internal capabilities so they are in a position to capitalize on upcoming opportunities.

I. Project Background

Sustainable investing is an evolving field that is slowly gaining traction with both individual and institutional investors. What was once grounded in morals, driven by politics, and described as a negative screen of sin stocks is now increasingly integrated into mainstream investment practices and considered a proxy for good management. A growing pool of investors and civil society organizations are calling on financial markets to revisit their traditional focus on short-term returns. "Short-termism", is increasingly viewed as the key contributor to the 2008 financial crisis, the 2010 BP oil spill, and China's present-day air pollution. Sustainable investment, according to leaders of this new field, is about long-term preservation of society, the environment, and portfolio returns.

Sustainable investment is an umbrella term that encompasses a variety of strategies that address environmental, social, and governance issues (ESG); decarbonization is one of these strategies. It focuses on emissions and exposure to risk as a function of climate change. Although climate change has system-wide impacts on the global economy, the world's poorest countries are the most vulnerable. Resource scarcity, the result of climate change-driven droughts, floods and rising sea levels, is a direct threat to the 'bottom billion' that depends so fully on natural resources for survival. Based on 2012 estimates, climate change contributes to the deaths of nearly 400,000 people per year, and the annual economic costs of climate change are expected to rise from 1.6% of global GDP ($1.2 trillion) in 2012 to 3.2% in 2030.[3]

While the human and economic costs of climate change have intensified in recent years, initiatives to drive political consensus to address it have also gained momentum. The US and China reached a historic emissions agreement in 2014[4] and numerous governments, investors, corporations, and advocacy organizations are rallying behind the adoption of a global climate accord in 2015. Regulatory uncertainty at the regional and national levels remains a challenge but many mainstream investors and consultants have already developed sophisticated analytical tools and investment strategies that examine climate risk.

Investors have a sacred and legal fiduciary duty to engage with this issue. We have 15 months to put a regulatory framework in place to guide us over the next 50 years. If we do not do this in Paris, it will take another 10 years to rally the political will to come to another agreement. By 2025, it will be too late to keep us under 2 degrees and it will be incredibly expensive.

Christiana Figueres
Executive Secretary of the UNFCC

In 2014, some of the world's largest institutional investors signed the Montreal Carbon Pledge - a commitment to decarbonize their investment portfolios by measuring, disclosing, and reducing their portfolios' carbon footprint.[5] Montreal Carbon Pledge signatories include several pension funds. Pension funds control 48% of the world's investable assets[6] and have a financial imperative to act: they hold investments in every economic sector and have a multi-generational fiduciary duty that compels them to consider the long-term stability of returns. As such, pension funds' fiduciary responsibilities will require them to mitigate the adverse impacts of climate change on the global economy over the next 20-30 years.

II. Methodology

A. Project Objective

This project explores the financial risks and opportunities that climate-sensitive finance presents to institutional investors by profiling leading pension funds' initiatives to assess and manage their portfolios' environmental impact. It builds upon a 2014 UNEP-FI study[7] that provides examples of institutional investors' actions on climate change. The project takes a holistic view of pension funds' ability to help decarbonize the economy through engagement, advocacy, and asset allocation activities. In collaboration with the clients, the following three project objectives were outlined:

1. Help define the business case for pension funds to address climate change risks and opportunities
2. Describe the processes, policies, and initiatives through which pension funds can act on climate change
3. Identify investment strategies that allow pension funds to measure and reduce their net carbon impact

B. Sources of Information

The findings in this report are derived from an analysis of interviews, pension fund disclosures, and published research from thought leaders in sustainable investment. Together, these sources provided information on the history, progress, and outcomes of climate change initiatives at pension funds.

B1. Interviews

Phone interviews with investment managers and sustainability officers at 6 leading American and European pension funds are the foundation for the internal change management narratives presented in this report. These were complemented by 12 interviews with experts from advocacy organizations and service providers who are helping pension funds implement their climate change initiatives.

Interviewees included:

- Ulrika Danielson, AP2
- Christina Olivecrona, AP2
- Fredrik Regnand, AP4
- Mikael Johansson, AP4
- Andy Behar, As You Sow
- Brian Rice, CalSTRS
- John Wunderlin, Carbon Tracker Initiative
- Patrick Bolton, Columbia Business School
- Sean Kidney, Climate Bonds Initiative
- Danyelle Guyatt, Independent Consultant
- Faith Ward, EAPF

- Reyas Ahmed, IFC
- Luc Dejonckheere, IFC
- Nathan Fabian, IGCC
- Piet Klop, PGGM
- Frido Kraanen, PGGM
- Fiona Reynolds, UNPRI
- Bruce Kahn, Sustainable Insight Capital Management
- Steve Bolton, Trucost
- Ophir Bruck, University of California

B2. Pension Fund Disclosures

Pension funds' annual reports and sustainable investing reports, where available, provided details on climate change investment strategies, financial returns, and their environmental and social impacts. Pension funds' press releases, policy documents, and whitepapers provided further details on their engagement and advocacy initiatives. A brief review of 140 pension fund 2013-2014 PRI signatory disclosure reports provided background information on ESG activities undertaken by institutional investors. A detailed review of over 30 pension funds' PRI signatory disclosure reports provided key inputs for initiatives and case studies profiled in this report.

B3. Published Research

Published research studies, articles, and datasets from key thought leadership institutions and sustainable investment consultants provided background information on the climate finance challenge and on the business case for institutional investors to act on climate change risks and opportunities.

Key sources of information include:

- Organization for Economic Cooperation and Development (OECD)
- Mercer
- United Nations Principles for Responsible Investment (UNPRI)
- Investor Group on Climate Change (IGCC)
- Carbon Disclosure Project (CDP)
- Investments and Pensions Europe (IPE)

C. Analysis and Case Study Development

The project focused on identifying and analyzing the following:

- Triggers that initiated pension funds' inquiry into climate change risks and opportunities
- Barriers to measurement, engagement and asset reallocation that pension funds faced while integrating climate change considerations
- Mandates, processes, and initiatives that helped pension funds develop organizational capacity and motivation to address climate change considerations
- Investment strategies that measured or addressed climate change impacts associated with underlying assets

Based on an analysis of over 30 pension funds' climate change initiatives, detailed case studies were developed on three pension funds:

1. California State Teachers' Retirement System (CalSTRS)
2. Environment Agency Pension Fund (EAPF)
3. Fjärde AP-fonden (AP4)

These three pension funds were chosen because they represent three distinct regulatory climates, asset allocations strategies, and investment mandates. Together, these three case studies provide a meaningful representation of environmental impact initiatives undertaken by small, medium, and large pension funds.

D. Project Framework

This report puts forward an actionable framework pension funds can use to address climate change risks and opportunities. The framework addresses three general kinds of initiatives: 1. strategies to build internal buy-in to analyze and address climate change impacts; 2. strategies for advocacy and engagement; 3. strategies for asset allocation in green investments.

The report explores each element of this framework. It starts with a review of internal change management, including an analysis of the key triggers that have spurred pension fund environmental initiatives, an overview of the initiatives themselves, and summaries of the key barriers that pension funds faced in this area. It then details engagement strategies at the corporate, policy and advocacy levels, and details asset allocation that pension funds have used to reduce net carbon impact. Lastly, the report presents three case studies that illustrate the journeys of three different pension funds.

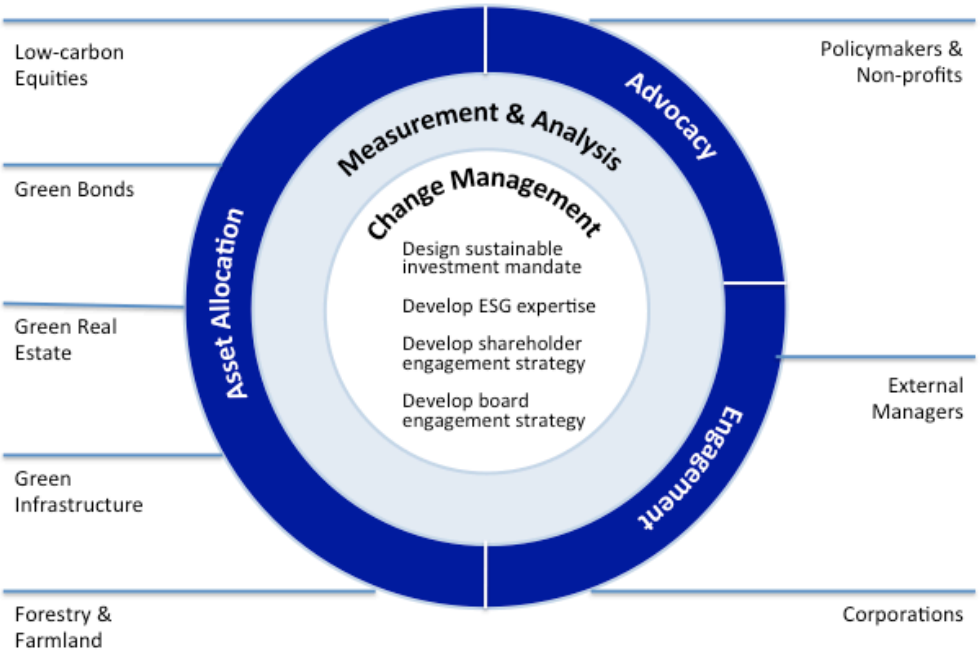


Figure 1: Climate Change Action Framework for Pension Funds

III. Internal Change Management

Building internal buy-in and momentum is a critical first step in pension funds' journey to assess and manage environmental impact. In each case studied, decarbonization initiatives sprang from an established fund-level sustainable investment strategy. The sections below provide a high-level overview of why pension funds chose to assess their environmental impact (Triggers: Why Pension Funds Decide to Act), the challenges to implementation of climate-sensitive strategies (Barriers to Implementation), and what strategies they employed to build buy-in and internal capacity (Initiatives Driving Internal Change).

A. Triggers: Why Pension Funds Decide to Act

Each pension fund started its journey in a different way, but common themes emerged on the triggers that prompted funds to assess and act on their environmental impact. The following content provides a broad overview of the triggers and includes fund-specific examples.

A1. Executive Leadership & Board of Directors

High-level endorsement of decarbonization initiatives is powerful and effective, and can effect rapid change. For example, AP4's CEO Mats Andersson attended Columbia University's Global Thought Conference in 2010, which raised questions for him about AP4's environmental impact and exposure to climate risk.[8] Andersson had recently effected deep institutional changes that had turned AP4 into the top-performing Swedish pension fund. He used this credibility and political capital to drive decarbonization initiatives past initial investor concerns about jeopardized returns. Similarly, AP2's Chief Investment Officer initiated divestment from a large group of fossil fuel company stocks.[9] Without the CIO's support, such a high profile undertaking would not be possible. As evidenced by several interviews and public material from other leading pension funds, C-suite leadership is a key factor for success.

A2. Cultural Context

Cultural context is a powerful driver, particularly in Europe. This trigger differs from fiduciary duty, because it is an unwritten social responsibility rather than a legally binding directive. PGGM/PFZW's provides a clear example with their development of a new Investment Framework that governs their investment decision-making. Although long-term financial returns were at the heart of the strategy, the fund sought a way to use its size and influence to "steer the power of money" towards a sustainable future. PGGM/PFZW enjoys widespread support for its decarbonization initiatives from its board, executive leadership, and beneficiaries. An investment professional at PGGM said it quite simply: "It's a European thing; we just don't have many people denying climate change here." Climate-friendly initiatives are generally well received by beneficiaries across the board, and are even demanded by certain demographics.

A3. Reputational Risk

Failure to comply with culturally driven expectations can endanger a fund's reputation. For some pension funds, negative public media scrutiny triggered a hasty re-evaluation of investment strategies. PGGM faced public criticism for holding companies that manufactured cluster ammunitions, which was amplified when the leadership team at PGGM was unaware of these

holdings in their portfolios. This public scrutiny underscored the need for a revised investment strategy and forced PGGM to react. The fund created a formal internal structure to address the perceived social and environmental risks.[10]

A4. Financial Market Volatility & New Investment Strategies

The breadth and depth of the stock market turmoil created by the 1990s dot-com bust, and 2008 global financial crisis forced pension funds to adapt quickly to changing market conditions and triggered widespread reassessment of investment strategies. At Dutch pension fund PFZW, board members used financial losses to challenge whether the "efficient markets" principle was still a relevant strategic guide for the organization, and reflect on what their investing strategies would look like if they could start from scratch.[11] This reflection led to an ambitious new investment framework that included changes to asset allocations over time and addresses pensioners' demands for sustainable investing. Similarly, the UK's EAPF responded to the volatility of global financial markets by adjusting their asset allocation strategies to better address risks and reap maximum returns from long-term investments. Environment Agency Pension Fund (EAPF) developed a flexible approach to their investment strategy that would allow them to react quickly to changing global economic conditions and risks associated with climate change.[12]

A5. Climate Change Regulation

Regulation can act as a trigger for climate change action directly, through federal-level mandates, or indirectly, through subsidies or fines. In some countries, federal regulations directly mandated the implementation of socially responsible investment practices. This was the case for ERAPF, an organization that started taking sustainability issues into consideration for all of its asset classes as a consequence of a French pension reform law in 2003.[13] Environmental regulation of emissions or other types of pollution drive up compliance costs for resource-intensive industries and indirectly drive a shift in mentality; subsidies give industries incentives to expand into climate-neutral or climate-friendly technologies and practices. Several examples of these indirect regulatory drivers exist in Europe and the United States. The Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) regulation in the European Union aims to control the chemicals industry's impact on the environment;[14] the European Commission estimated a cost of up to €5.2 billion to the industry in fines for environmental infractions. Similarly, the implementation of mandatory greenhouse gas reporting in the European Union and the state of California is prompting industries to measure and reduce their emissions. The US and China, two of the world's largest economic players and also the two largest greenhouse gas emitters, set the foundations for climate action through their public agreement to reduce national-level greenhouse gas emissions by 25% in 2025, and peak emissions by 2030, respectively.[15] These high-profile, public commitments to emissions reduction is prompting industries to re-examine their processes internally and along their value chains, and sparks critical dialogue about decarbonization. Although progress has been slow, it is evident that momentum for climate regulation is building. As CalSTRS CEO Jack Ehnes remarked, "The world is taking climate change seriously and global pressures to reduce fossil fuel use will only grow stronger. As long-term investors, we see the world moving toward a low-carbon future in

which fossil fuel reserves that companies continue to develop may actually become a liability, which could take a toll on shareholder value."[16]

A6. Carbon Risk and Stranded Assets

Pension funds are beginning to re-define their fiduciary duty to include mitigation against carbon risk. CalSTRS CIO Christopher Ailman stated: "The integration of environment-focused investments is part of our fiduciary responsibility to secure the long-term financial future for generations of California's educators."[17] Carbon risk refers to stranded assets, or proven and potential coal, oil, and gas reserves that will lose value before they can be used, assuming a unilateral global effort to limit the average increase in temperature to 2 degrees above pre-industrial levels. The International Energy Agency estimates that the global economy has a carbon budget of around 560 to 990 Gt of CO_2; existing reserves represent between 2,000 and 2,800 Gt of CO_2. This means that between 50% to 80% of oil, gas and coal must be left in the ground, untouched if we are to avoid dramatic shifts in climate. The 2 degree threshold was agreed to by the global community in 2010 and plays a critical role in the discussion about stranded carbon assets.

There are three main drivers that threaten fossil fuel assets: regulation, market forces, and physical characteristics of the assets. As mentioned above, regulation that enforces the 2 degree scenario could leave up to 80% of existing reserves unburned and devalued. Market forces and technological innovation is driving the price of renewables down to compete with oil and gas prices, making them increasingly more attractive. Project location can also affect the financial liquidity of carbon-intensive assets. Reserves that are in geopolitically risky zones or in technically difficult and high risk work sites, such as deep sea and arctic drilling, will become more expensive to extract or transport, making it harder to recover invested capital. These rising costs make oil and gas companies vulnerable to decreasing fuel prices.

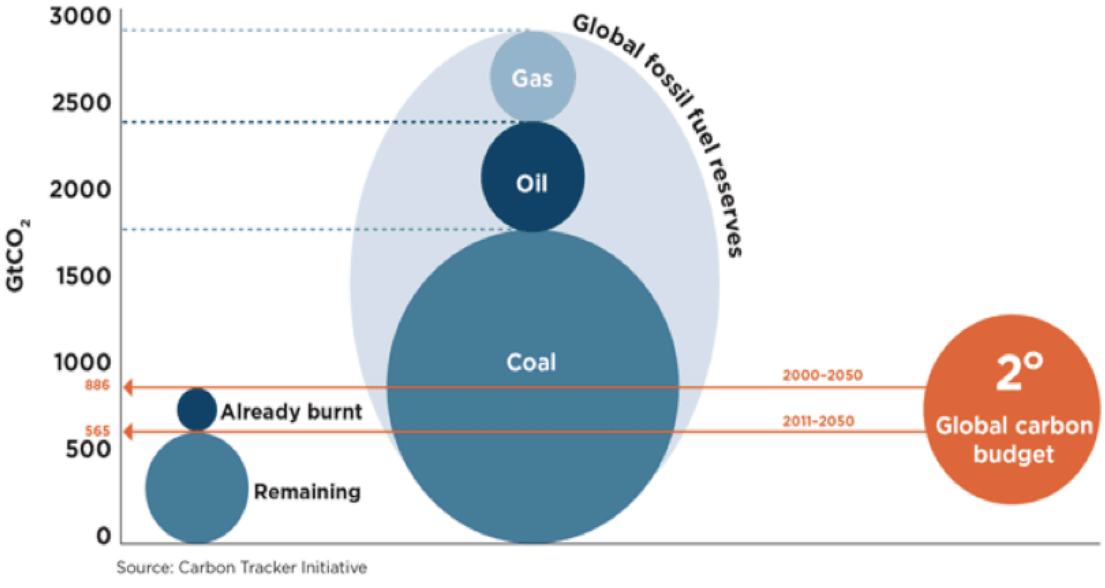


Figure 2: Allowable carbon budget versus reserves

Investors are starting to realize that this could represent a real cost. CDP has 767 investors that have come together to ask for companies to disclose their exposure to stranded assets. Exposure to devalued carbon-intensive industries could represent a real risk to universal investors like pension funds. AP2 sold their shares in 20 fossil fuel companies, valued at approximately $113 million, to reduce their carbon-risk exposure. Eva Halvarsson, CEO at AP2, stated, "Our starting point for this analysis has been to determine the financial risks associated with the energy sector. By not investing in a number of companies, we are reducing our exposure to risk constituted by fossil-fuel-based energy. This decision will help to protect the fund's long-term return on investment."[18] The concern around stranded asset risk has grown since the Carbon Tracker Initiative report was released, and volatile oil prices are calling additional attention to the issue. Stranded assets are now seen as a key trigger for portfolio decarbonization and have led to the development of carbon risk valuation tools in the market.

B. Barriers to Implementation

Once triggers have started the conversation about climate risk, the pension funds were met with several obstacles they had to consider, confront, and overcome. There are four key barriers that were or continue to be deterrents in pension fund's journey towards decarbonization.

They include the following:

1. Industry Awareness and Education
2. Political Uncertainty and Lack of Regulatory Framework
3. Availability of Investment Vehicles
4. Data Availability and Measuring Climate Impacts

B1. Industry Awareness and Education

The common perception that sustainable investment comes with a reduced investment universe and returns has limited investor engagement for decades, despite substantial quantifiable evidence disproving this perception. Understanding how climate change issues impact pension fund performance is critical for action. Pension funds' external fund managers are rarely sufficiently educated on climate change science or on the incorporation ESG indicators. They are also not adequately equipped to identify desirable green investment opportunities. To overcome this, pension funds have created their own training programs on diverse topics. For example, PGGM holds training sessions on stranded assets for their beneficiaries and asset managers, commenting that there are reputational and strategic drivers for undertaking these educational initiatives.[19]

Similarly, although pension funds might have a sustainable investment strategy, their asset manager's investment policy may not incorporate ESG and climate change issues into their analysis. EAPF commented that the knowledge transfer is too slow, specifically among external investment consultants, which many small pension funds heavily rely on.[20] As advisors to asset managers, investment consultants are a critical point in the knowledge gap. French pension fund ERAFP adopted a set of standards for shareholder engagement to guide their asset managers in 2012. The standards included a voting policy to help align their asset managers with their investment principles.[21]

B2. Political Uncertainty and Lack of Regulatory Framework

Climate change investment strategies depend heavily on clear political and regulatory environments. In addition, many climate change-related investments, such as in renewable energy, has historically relied on government subsidies for economic feasibility as market demand strengthens and costs are lowered. Although the pension funds surveyed represent a variety of geographic regions, a consistent barrier that has been identified is that a lack of clarity and consistency on climate change-related issues deters investors. This is particularly true for pension funds, which are long-term investors that look for steady returns over extended time horizons. The risk of subsidies being cancelled, or the sudden imposition and removal of carbon taxes like in Australia, can severely alter investment calculations and make pension funds hesitant to act on these important issues.

B3. Availability of Investment Vehicles

The availability of low carbon investment vehicles is seen as a significant hurdle in decarbonization. The climate finance bond segment is a recent development and has yet to reach the critical mass required providing investor confidence in liquidity options. In addition to the availability of suitable low carbon investments, another contributing barrier is the lack of analytical research and back testing to ascertain the investments' effects on financial returns. Many of the funds surveyed have successfully worked around these barriers; low-carbon investment options are explored in detail in section IV, Asset Allocation Strategies.

B4. Data Availability and Measuring Climate Impacts

Although some pension funds have started using tools and market resources to measure their portfolio carbon footprints, the field of climate metrics is still in its infancy. The metrics on climate risk and impact, and methodologies used to collect and report them, are still being analyzed and defined. Although market data aggregators like Bloomberg, CDP, UNPRI and the Global Reporting Initiative (GRI) are building impressive reserves of raw data, they depend on voluntary disclosure from companies whose data and methods do not require third party verification. Market capacity for precise measurement and analysis of climate risk and impact is limited; many investors are waiting for the raw data to be turned into actionable information.

A broader challenge applies to all pension funds: the ability to tangibly and precisely link climate strategy to impact. While some tools and methods provide the ability to generate reasonable estimations of portfolio carbon footprints, it is much more difficult, if not impossible, to directly quantify the effects of a climate-sensitive strategy on the environment. Similarly, it is difficult to relate the threat that climate disasters, such as rising sea levels or droughts, pose directly to a specific fund's assets. This ambiguity of cause-and-effect can reduce the urgency of and incentive to develop climate-sensitive investment strategies.

C. Initiatives Driving Internal Change

UNPRI has been actively promoting integration of ESG indicators into investment practices, and has defined six principles that serve as a guide for investor's sustainable investment strategies. 285 asset owners and 1,330 investment organizations collectively signed an agreement to abide by six key principles on responsible investing.[22]

The six principles are: [23]

Principle 1: We will incorporate ESG issues into investment analysis and decision-making processes.

Principle 2: We will be active owners and incorporate ESG issues into our ownership policies and practices.

Principle 3: We will seek appropriate disclosure on ESG issues by the entities in which we invest.

Principle 4: We will promote acceptance and implementation of the Principles within the investment industry.

Principle 5: We will work together to enhance our effectiveness in implementing the Principles.

Principle 6: We will each report on our activities and progress towards implementing the Principles.

Nearly all of the funds examined in the study are signatories to UNPRI and follow these investment principles. Funds surveyed responded to triggers and surmounted barriers with changes in internal policies, establishment of investment mandates and goals, development of task forces or focus groups, and introduction of new processes that built internal awareness and buy-in for climate strategies and targets. This section provides a broad overview these initiatives.

C1. Setting Internal Climate Mandate and Policy

All leading pension funds reviewed had well-established sustainable investment mandates, although the rigor and robustness of the environmental components differed from one fund to the next. For funds like CalPERS, ERAFP, and EAPF, sustainable investment mandates have been in place for over a decade and been continuously refined and integrated into core functions. This provided an enabling framework for climate-specific investment strategies. The climate-specific strategies typically consisted of the four following elements:

1. Defining investment beliefs
2. Defining screening and engagement policies
3. Measuring portfolio environmental performance
4. Defining emissions reduction and green investment goals

C1a. Defining Investment Beliefs

As mentioned above, the pension funds studied had well-established sustainable investment platforms that lay a firm foundation for their climate strategies. This is important because the funds were already working under the premise that protecting long-term social and environmental benefits was part of their fiduciary duty. This foundation allowed the funds to sharpen their focus on climate risk and impact more easily.

CalPERS employs a total fund approach to sustainable investment, and has developed a set of 21 Investment Principles to guide its investment decisions across the entire portfolio. The fund describes the principles as follows: “The Investment Beliefs provide context for CalPERS actions, reflect our values and acknowledge our responsibility as a long-term investor to sustain our

ability to pay benefits for future generations."[24] The fourth investment belief in particular set the scene for CalPERS' climate change strategy; it asserts that "Long-term value creation requires effective management of three forms of capital: financial, physical and human."[25]

C1b. Defining Engagement, Positive and Negative Screening Strategies

The policies for engagement and screening ranged across a broad spectrum, and the merits of each strategy are continuously being defined and debated in the field. The Council for Institutional Investors describes a "continuum of engagement" (Fields) that ranges from relationship building and dialogue to shareholder resolutions and divestment.

CalPERS and CALSTRS tend towards engagement, and ERAFP presents a balanced mix. CalSTRS CEO Jack Ehnes explained, "Based on our experience, an effective strategy to mitigate risk, such as climate change, is through engagement. Aligned interests working in concert can influence capital market change. Engagement operates under the principle that inappropriate actions call for correction." IN 2013, CalSTRS used performance metrics on energy and water use to target 100 companies in the Russell 1000 index portfolio. More than 30 companies responded with commitments to disclose efficiency initiatives and set targets for improved performance. CalSTRS has since expanded this engagement strategy to include fossil fuel valuation.[26] In an interview with the New York Times Dealbook, Anne Sheehan, director of corporate governance at CalSTRS, says pension fund "As universal owners, how can we not assert our rights and develop a relationship with companies in our portfolio?"[27] Similarly, CalPERS' policy is to use company disclosure and ESG performance metrics to screen for underperformers and engage with them. The policies of both funds present a clear preference for engagement, reserving divestment as a strategy of last resort.[28] ERAFP has a strong company engagement practice. They combine this with a best-in-class approach to investment strategy and a traditional exclusionary screen for investments that fit the following criteria: non-abolition of capital punishment, use of child soldiers, and practice of torture. (ERAFP)

MetallRente and AP2 are on the other side of the spectrum. MetallRente favors an SRI overlay and screening strategy that excludes certain companies based on poor environmental performance. The organization has a strict policy against engagement or proxy voting, instead moving directly to fund re-allocation.[29] AP2 has not shied away from divestment either, as evidenced by their recent divestment of $113 million worth of holdings in fossil fuel companies.[30] According to the fund spokesperson, this decision was strictly based on risks and returns, and not a result of a values-based decision. There is not a lot of consensus on the divestment issue, and some funds try to distance themselves from the word and its association with the activist fossil fuel divestment campaign sweeping the industry. Depending on the fund's investment policies, some funds prefer to call it "asset reallocation" or "adjusting the portfolio for risk."

C1c. Measuring Portfolio Environmental Performance

Measuring a fund's environmental performance is still an inexact science that is approached in various ways by the studied funds. As previously mentioned, CalPERS uses ESG metrics to gauge performance, while EAPF contracts external provider Trucost to measure it's portfolio emissions

and ERAFP has developed its own custom rating system. EAPF is a leader in this area; they disclose portfolio emissions transparently in their annual report.

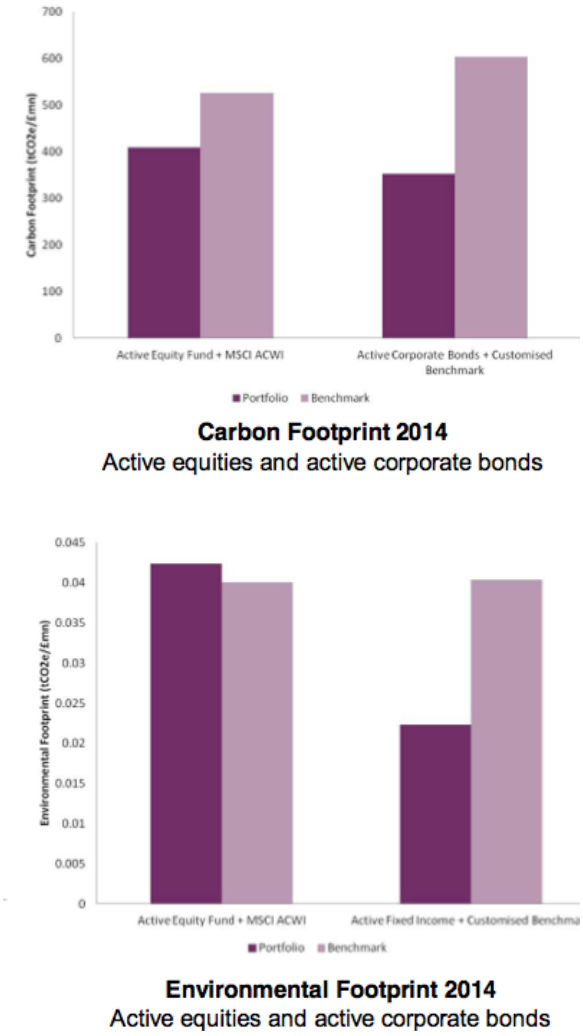


Figure 3: Carbon Footprint of EAPF's active portfolio

Portfolio' emissions measurement is still a very new practice, and has not yet been internalized with funds. Providers like Trucost and SouthPole Carbon specialize in building carbon footprints for fund portfolios, but they are niche firms in a very specialized field with rapidly growing demand. SouthPole Carbon partnered with Bloomberg to develop a more accessible approach to measuring portfolio emissions. The resulting Bloomberg Carbon Risk Valuation tool allows investors to type the tickers of the companies in their portfolios into a tool that auto-generates an emissions profile, pulling from existing ESG data in the Bloomberg terminal.

2014 marked the launch of the UNPRI's Montreal Pledge and UNEP's Portfolio Decarbonization Coalition (PDC), both of which call for disclosure of portfolio emissions and fund-level emissions reduction targets. Signatories are expected to measure, disclose and reduce emissions by the 2015 climate talks, but no methodology or best practice for measurement has been formally endorsed by either organization. Of the funds studied, ERAFP, EAPF, PGGM, CalPERS, and AP4 are signatories.

C1d. Defining Emissions Reduction and Green Investment Targets

Portfolio decarbonization can be effected by encouraging companies in the portfolio to reduce emissions, or reinvesting funds into green alternatives. The Montreal Pledge and the PDC are meant to encourage funds to set targets and disclose progress. Few funds have explicit targets for emissions reduction. However, several funds have targets for green investments. EAPF plans to have 25% of their portfolio invested in the green economy by 2015; as of March 2014, they had achieved 24%. CalSTRS publicly committed to increasing its investment in clean energy and technology from $1.4 billion to $3.7 billion over the next five years.[31] CalPERS' board set an energy reduction goal of 20%, in its $5 billion core real estate portfolio, to be implemented over the next five years.[32] See section IV. Strategies to Address Climate Change Risks and Opportunities for more detail on funds' green investments.

C2. Building Internal ESG and Climate Expertise

Given the relative infancy of the sustainable investment field in general and climate-sensitive investment in particular, many pension funds' first step was to build internal capacity through knowledge sharing and education. They did this by bringing in external experts, and creating think tanks and task forces. CalPERS' did this on several fronts: they collaborated closely with Ceres to facilitate knowledge transfer to the pension fund's executive leadership and board of directors and started an internal think tank, the Sustainable Investment Research Initiative (SIRI), to create thought leadership and sharing their findings externally. They also brought consulting firm Towers Watson in to help develop their 21 Investment Beliefs with key board members, executives, and stakeholders over a two-year period.

C3. Fostering Board Leadership and Education

Endorsement at the board of director level is not only a trigger, but a necessity for long-term, effective internal change. The board at PFZW set the bar for board-level leadership and engagement high. They created a sub-committee of six members that spent at least one day per week over a period of 18 months reviewing literature, interviewing experts, and debating external "contrarian thinkers" that challenged their sustainable investment principles, in preparation for regularly scheduled full board meetings. This fund leveraged this board-level engagement to develop a new Investment Framework that detailed the identity and ambition of PFZW, and the 16 beliefs and principles that now govern PFZW's investments going forward.[33]

IV. Strategies to Address Climate Change Risks and Opportunities

After developing internal capabilities to address climate change risks and opportunities, pension funds can leverage a variety of strategies to reduce their net carbon impact. The key strategies identified as part of this report consists of three Engagement and Advocacy Strategies and five Asset Allocation Strategies:

Engagement and Advocacy Strategies:

1. Engage Corporations
2. Engage External Investment Managers
3. Engage Policymakers and Advocacy Organizations

Asset Allocation Strategies:

1. Invest in Green Bonds
2. Invest in Low Carbon Listed Equities
3. Invest in Green Infrastructure
4. Invest in Green Real Estate
5. Invest in Forestry and Farmland

These investment strategies are an illustration of all the major strategies that leading pension funds are undertaking. The respective combination of these investment strategies that a single pension fund undertakes is dependent on its particular circumstances and previous progress towards addressing portfolio climate risks and opportunities. The purpose of this section is to both identify the leading investment practices and support the prioritization of strategies for pension funds at any stage of the decarbonization process.

Engagement and Advocacy Strategies

Engage Corporations

As large, universal investors, pension funds are concerned with long-term and stable returns from the companies in which they invest. They are also in a position to influence change within these companies if they decide that current practices are not aligned with sustainable growth. As a result, corporate engagement represents one of the key strategies by which pension funds can reduce portfolio carbon risk and optimize their investments. This is generally implemented via three particular pathways. First, pension funds can engage directly with companies on a one-on-one basis. Second, they can join collaborative shareholder groups that serve as the voice of investors in engaging with corporations. Third, pension funds can affect corporate behavior by exercising their ownership rights through voting and shareholder resolutions.[34] All these strategies can improve corporate governance, environmental performance, and transparency. This can lead to more informed investment decision-making, reduced risk exposure, and improved long-term returns. Finally, engagement can also produce positive social outcomes for local communities through a reduction in the climate impacts of the company's operations.

Since 1987, CalPERS has engaged directly with corporations through its Focus List Program. As part of this program, CalPERS identifies companies in its portfolio that are underperforming with regards to both stock returns and risk management of environmental issues. Engagement occurs for up to three years, which includes the submission of shareholder proposals where necessary. This has been correlated with a positive impact on financial performance. From 1999-2008, 155 companies on the Focus List generated a return of 15.8% above their respective benchmarks after three years. This has come to be known as the "CalPERS Effect".[35]

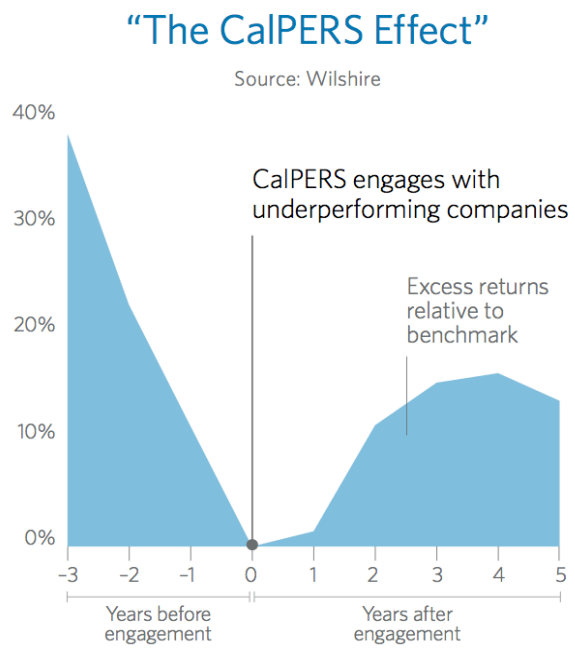


Figure 4: Average investment returns of companies on CalPERS' 'Focus List' preceding and following engagement[1]

Moreover, one of CalPERS' core beliefs is that business risk is not fully captured through volatility and tracking error. This underscores the importance of engaging corporations on improving environmental performance. For instance, CalPERS was a major shareholder of BP at the time of the Deepwater Horizon disaster in April 2010. Following the disaster, shares of BP reached a 14-year low. CalPERS and fellow shareowners engaged collaboratively with BP executives to discuss what practices were needed to reduce the risk of a future occurrence. This ultimately resulted in BP creating a new safety and operational risk organization, improving drilling standards, and incorporating better risk management practices. [36] Thus, the engagement led to a reduction in risk regarding both financial performance and climate impact.

Dutch pension fund PGGM sees the engagement process as an opportunity to control reputational risk while also creating financial and social added value. Within its corporate engagement strategy, climate change is considered a core focus area. As such, it prioritized engagement with Wilmar, a large palm oil company that has been criticized for involvement in deforestation and land grabs. PGGM involved fellow investors, customers, and other stakeholders in requesting that Wilmar improve the environmental and social impacts of its operations. This resulted in Wilmar creating a new policy that commits to no deforestation, no peat bog burning, and no exploitation of employees and the local population.[37] This engagement strategy has reduced Wilmar's reputational risk while also decreasing negative impacts on the climate and local communities.

ERAFP has been active in collaborating through coalitions on issues related to corporate disclosures and climate risk. ERAFP has been a member of the Extractive Industries Transparency Initiative since 2012, which is an initiative that promotes the transparency of accounting methods to monitor revenues in the oil industry. In 2013, ERAFP met with

representatives from three oil companies to discuss progress in transparency of payments, as well as the potential impacts on the companies from tighter future reporting regulations.[38]

In another example, the US-based pension fund TIAA-CREF considers proxy voting a key mechanism in its corporate engagement strategy. It believes that effective corporate governance must consider the effects of environmental and social impacts on shareholder value. As a result, its voting policy is to support shareholder resolutions that seek the disclosure of greenhouse gas emissions, climate change impacts on business activities, and products and strategies designed to reduce impacts on the global climate.[39]

Engage External Investment Managers

Pension funds often rely on external managers to invest a significant portion of their assets. As such, pension funds engage with investment managers to inform them of their investment objectives primarily with regards to risk and return requirements. Leading pension funds, however, are also requiring that their external investment managers integrate climate risks and opportunities into the portfolio construction and asset allocation processes. 104 of the 140 pension fund PRI signatories address ESG incorporation, engagement, and/or proxy voting in their external manager selection, appointment, or monitoring processes.[40]

PGGM, a leader in this space, believes strongly that climate change is a factor that can pose a risk to investment returns. As a result, PGGM seeks to ensure that its external investment managers are integrating ESG factors into investment decisions. One way it accomplishes this is through consideration of the Global Real Estate Sustainability Benchmark (GRESB). PGGM asks its external real estate fund managers to complete an annual GRESB questionnaire, which allows for a comparison of real estate funds with regards to ESG policy and performance. The accumulated scores also allow for a comparison to the overall GRESB average, as well as a tracking of year-on-year trends. On the basis of the GRESB scores, PGGM will identify and contact lagging real estate funds to request improvements in sustainability performance.[41]

Similarly, a significant portion of CalPERS' equity portfolio is managed externally. One of its core beliefs is that long-term value arises from managing financial, environmental, and social capital. To achieve this, CalPERS has developed Manager Expectations that requires it to consider the topic of sustainability when selecting and monitoring external managers. As an example, within its private equity portfolio, CalPERS implements an ESG questionnaire that is used to evaluate the extent to which external managers integrate ESG criteria. In addition, CalPERS' Infrastructure and Forestland Program has developed an ESG risk matrix that is shared with external managers who work on due diligence, but do not have their own ESG assessment tools. Within its global equity portfolio, CalPERS has selected the investment management firm Quotient Investors, an organization that has developed a proprietary quantitative valuation model that incorporates multiple ESG factors into its projections. This has guided CalPERS to invest in stocks with higher ESG scores relative to others in that industry.[42]

French pension fund ERAFP integrates a socially responsible investment (SRI) charter into its investment policy. Two of the five values of the charter include the environment and social

progress. Some of the criteria include management of environmental risks, limitation of greenhouse gas emissions, compliance with labor law, and contribution to employment growth. As of the end of 2013, ERAFP used more than 10 external asset management companies to oversee its investments in equities, bonds, and real estate assets. ERAFP management verifies that its SRI policy has been implemented by external managers with regards to both stock selection and voting policy at shareholder meetings. To accomplish this, ERAFP consults with external SRI rating agencies Vigeo and Oekom, which analyze and report on ERAFP's portfolio on a quarterly basis.

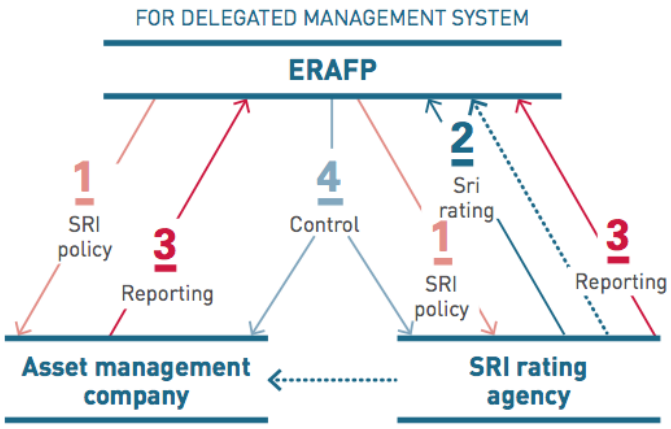


Figure 5: Implementation and control of ERAFP's SRI policy[43]

Engage Policymakers and Advocacy Organizations

Policy uncertainty is a significant contributor to the threats posed by climate change, which can negatively impact pension funds' financial performance. This policy uncertainty includes potential changes in policies on GHG regulation, land-use, transportation, buildings, agriculture, energy, insurance, and banking. These policies impact whether and how climate change risks are priced into companies' balance sheets and investors' portfolios. Pension funds recognize that policy changes are lagging behind capital market innovations in measuring and pricing climate change risks. As such, they are increasingly collaborating with other investors and advocacy organizations to engage policymakers at the national and regional levels. Of the 20 UK pension funds surveyed by ShareAction[44] in mid-2013, 12 support the lobbying of policymakers by investors and investor coalitions on climate change.

To engage with policymakers, pension funds can develop research papers, press releases, and statements. As an example, CalPERS supports the Sustainability Accounting Standards Board (SASB) in developing industry-specific sustainability accounting standards for publicly listed companies. CalPERS has also urged the US Securities and Exchange Commission (SEC) to use the SASB standards to review company filings and to issue comment letters addressing companies' inadequate disclosure of material climate change issues. LGS weighed in on the public debate after the introduction of a carbon tax in Australia through a newsletter that explained the tax's implications on the LGS and reiterated its commitment to carbon pricing.[45]

Pension funds, especially resource-constrained funds, can also engage policymakers through investor coalitions that pool the collective resources and influence of institutional investors. In 2013, 86% of asset owners surveyed by the Global Investor Coalition on Climate Change (GIC) stated that they predominantly use one of the four major regional climate change investor coalitions for public policy engagement.[46] As a part of an investor coalition, pension funds can partake in in-person meetings, letters, press statements, and opinion editorial articles. Pension

funds can use these channels to propose policy changes, public finance initiatives, and other government actions and lend support to policy proposals from other investors or advocacy groups. The 2014 Global Investor Statement on Climate Change[47] brought together five investor coalitions[48] with the UNEP-FI in a call for carbon pricing and an ambitious global climate accord. 364 institutional investors representing over $24 trillion in assets, including a variety of corporate and non-corporate pension funds, signed this statement, which argued that delays in implementing a global climate policy are increasing the risk profile of their investments.

In addition to engagement on specific policy issues, pension funds can also collaboratively support the development and adoption of new standards that promote sustainable investing. For example, several pension funds within the Investor Network on Climate Risk worked with Ceres to develop a proposal for stock exchange listing standards focused on corporate sustainability disclosure in 2014. This proposal is currently under review by stock exchanges that are members of the World Federation of Exchanges.[49] Pension funds can also take leadership positions within the investor coalitions to get greater exposure to policymakers and to help shape the coalitions' work plans and agendas. As an example, LGS is an active member of the Management Committee of the Investor Group on Climate Change (IGCC; coalition focused on Australia & New Zealand).[50] Similarly, in May 2013, ERAFP CEO Philippe Desfossés joined the Institutional Investors Group on Climate Change (IIGCC) board of directors and met with the EU Commission to promote IIGCC's position on climate objectives for 2030.

Asset Allocation Strategies

Invest in Green Bonds

With over $100 trillion outstanding, the bond (fixed income) market is the largest global asset class and is significantly larger than the $63 trillion global listed equity market.[51] Pension funds are important investors in the bond market, as evidenced by a survey of 86 large pension funds that showed the average pension fund allocation to fixed income was 56% in 2012.[52] Although pension funds have invested a significant portion of their portfolios in fixed income assets as a whole, their allocations vary significantly from fund to fund.

Green bonds are fixed income securities that use the proceeds to finance climate or environmental projects. Green bond categories include, but are not limited to, renewable energy, energy efficiency, sustainable waste management, sustainable land use, biodiversity conservation, clean transportation, clean water, and drinking water.[53] Green bonds are a subset within the $502 billion climate-themed bonds category (as of 2014).[54] The universe of climate-themed bonds includes various corporate and government bonds whose proceeds are used primarily for financing the transition to a low carbon economy.

The green bond market stood at around $35 billion, as of June 2014,[55] which is very small when compared to the overall fixed income market (0.035% of the market). The World Economic Forum (WEF) estimates that about $0.7 trillion, or roughly 1%, of world GDP is required annually to deliver the mitigation and adaptation infrastructure required for keeping the planet within a 2-degrees Celsius warming goal.[56] This global demand for infrastructure investment will be a strong driver for growth of the green bond asset class.

Other than funds focused on sustainable investment, mainstream institutions have traditionally been cautious about the green bond trend. Novelty, small issue size, and a concern about inferior risk/return characteristics were prominent barriers, which has now changed as a result of larger issuances in 2013 and financial characteristics that more closely match 'vanilla' bonds from the same institutions. Pension funds, asset managers, and insurance companies are increasingly participating in this market and are fueling the growth of this asset class with green bonds expected to grow to a $100 billion market by 2015.[57]

According to a green bonds expert, the returns and price differential between green bonds and other debt instruments from any given issuer is negligible, making green bonds an ideal instrument for pension funds to address both financial imperatives and sustainable investment commitments. For example, PGGM invested in an EDF green bond[58] that is dedicated to renewable energy projects in Europe and North America with an allocation of 75% to wind and 25% to solar projects. Thus, the investment directly contributed to a low carbon economy. Another example is ERAFP's investment in the first environmental and social bond issued by Ile-de-France.[59] Through this investment, ERAFP financed both energy-related (zero energy schools, geothermal energy and sustainable mobility) and socially motivated projects (social housing, biodiversity protection and social and solidarity economy).

International finance institutions such as the World Bank and IFC issued the first green bonds, but now pension funds have a wider range of borrowers to choose from. At the end of 2013, Électricité de France became the first corporate issuer of a green bond.[60] In addition, pension funds now have access to green bonds issued by corporations from a variety of sectors, including:

1. Utilities: GDF-Suez (GSZFP 1 ⅜ 05/19/20), Iberdrola (IBESM 2 ½ 10/24/22)
2. Real Estate Companies: Rikshem (RIKSHM 0 12/02/16), Vasakronan (FASTIG 0 11/18/19) [24]
3. Consumer Goods Companies: Svenska Cellulosa (SCABSS 2 ½ 04/01/19), Unilever (UNANA 2 12/19/18)

Recent green bond issuances have been significantly larger than the early issuances from the World Bank and IFC, and this has improved the liquidity in the green bond market. Overall, green bonds present an attractive investment opportunity that can meet pension funds' financial returns and time horizon needs while directly enabling the development of low carbon infrastructure.

Invest in Low Carbon Listed Equities

Listed equities make up the largest portion of holdings, by asset classes, within a typical pension fund portfolio. Equities are by far the most mature among all investment classes and make up more than $64 trillion of market capitalization globally.[61] Equities have the highest possible potential for return and risk in order to achieve long-term growth of capital.

Exposure to equities comes through direct stock scripts, pooled funds, and exchange-traded funds. Pension funds can adopt active strategies with direct exposure to stocks or passive strategies where they invest through exchange traded funds or indices. Within active strategies, pension funds can adopt exclusionary or positive screens that remove or add certain companies from the investment universe based on environmental performance metrics, such as carbon intensity or energy efficiency. Within passive strategies, pension funds can choose exchange traded funds or indices focused on sustainability, low-carbon performance, and fossil fuel exclusion.

Pension funds are increasingly applying both positive and negative ESG screens to their investment holdings. While a negative screen excludes companies from the investable universe, positive screening looks to support and encourage investment in companies with more responsible business models (such as renewable energy companies or companies with relatively low carbon footprints). MSCI research shows that exclusionary portfolios can achieve relatively low tracking errors (0.69%).[62] The study also found that positive screening methodologies that overweight higher ESG-rated securities further reduced tracking error from benchmark indices.

As an example, the Swedish fund AP2 recognized the mispricing of market risk posed by carbon reserves that certain oil, gas, and mining companies hold. In 2014, the fund decided to divest from 20 oil and coal companies, citing that the reserves these companies hold are stranded assets and risky investments.[63] In another example, ERAFP has a $900 million portfolio managed by Amundi with a negative filter aimed at excluding companies with the highest carbon-intensity.[64] As a result, this portion of the fund's portfolio excludes 5% of the most polluting companies and 20% of the highest carbon intensive companies in each sector. Within its European equities portfolio, ERAFP has also adopted an aggressive positive screening strategy where 40% of the portfolio is invested in companies with the highest quartile SRI scores in their respective sectors.[65] Dutch fund PGGM has gone one step further and designed an ESG index for its passively managed equity portfolio. This $40 billion portfolio comprised 28% of its AUM in 2013. This strategy has resulted in the exclusion of 210, out of a possible 2,800, companies that are part of the FTSE All World Index.[66] Finally, CalPERS maintains exclusion lists throughout its portfolio and positive screens within its smaller global equity portfolio that provide for additional investment in firms with higher ESG scores relative to others in their industry.[67]

Active management also includes pooled funds such as mutual funds, hedge funds, and funds of funds. These types of equity holdings are attractive to pension funds as they present a diversified mix of holdings and can be thematic in their investment objective and returns targets. US-SIF maintains a database of such mutual funds where institutional investors can compare performance, costs, screens, and voting methods used by these funds.[68] Leading asset management firms like Amundi and Calvert have been working with pension funds over the past few years to develop other funds that not only reflect the SRI philosophies of the asset owners, but also aggressively invest in companies with lower carbon footprints.

Within passive strategies, pension funds can invest in exchange traded funds that can be more cost effective than active management strategies. Pension funds can choose from well-established

indices such as the Dow Jones Sustainability Index, as well as ESG or low-carbon indices launched by iShares, MSCI and S&P. For example, MSCI offers indices under three fund families categorized as low carbon, fossil fuel exclusionary, and thematic index funds. These low carbon indices are designed to achieve 0.3% ex-ante tracking error while minimizing the carbon exposure relative to the parent index.[69] The fossil fuel exclusions index goes one step further and completely eliminates carbon asset risk by excluding companies with oil, gas and coal reserves.

Along these lines, CalPERS has allocated $500 million to an index approach that is modeled on the HSBC Global Climate Change Benchmark Index.[70] Through this strategy, these funds are allocated to over 380 securities that source most of their revenues from low carbon sectors like renewable energy production, energy efficiency, and carbon trading.

Advocacy organizations and service providers are exponentially improving the quality and volume of available data on listed companies' ESG performance. Pension funds can use increasingly high quality ESG analytics to develop low carbon investment strategies within both actively and passively managed portfolios. With the proliferation of cost effective low carbon and other environmentally-themed indices, pension fund investments in low carbon equities are expected to become mainstream in the coming years.

Invest in Green Infrastructure

Pension funds in most countries allocate approximately 1% of their assets to infrastructure investments.[71] Infrastructure assets can provide a good hedge against inflation, have long-term predictable cash flows, and relatively low risk.[72] In addition, the long-term horizon of infrastructure projects often matches pension funds' investment horizons. The top 100 pension funds currently have roughly $108 billion invested directly in infrastructure funds, which include investments in energy, transportation, water systems, and electric transmission lines.[73]

Screening strategies can be applied to infrastructure investments as well. For example, the Australian Superannuation fund Local Government Super (LGS) scheme reallocated 8% of its portfolio through a positive screen focused on low carbon assets, including low-carbon private equity investments.[74] CalPERS invests in infrastructure projects for their inflation hedging, portfolio growth, and diversification benefits[75] and also has invested $480 million in clean energy and technology funds.[76] AP2 invests 4% of its portfolio in private equity funds. This portfolio produced returns of 14.3% in 2013.[77] AP2 invests in several green infrastructure funds such as Riverstone Holdings, a private equity fund focused on renewable energy that invests in solar, wind, and geothermal energy projects in North America[78].

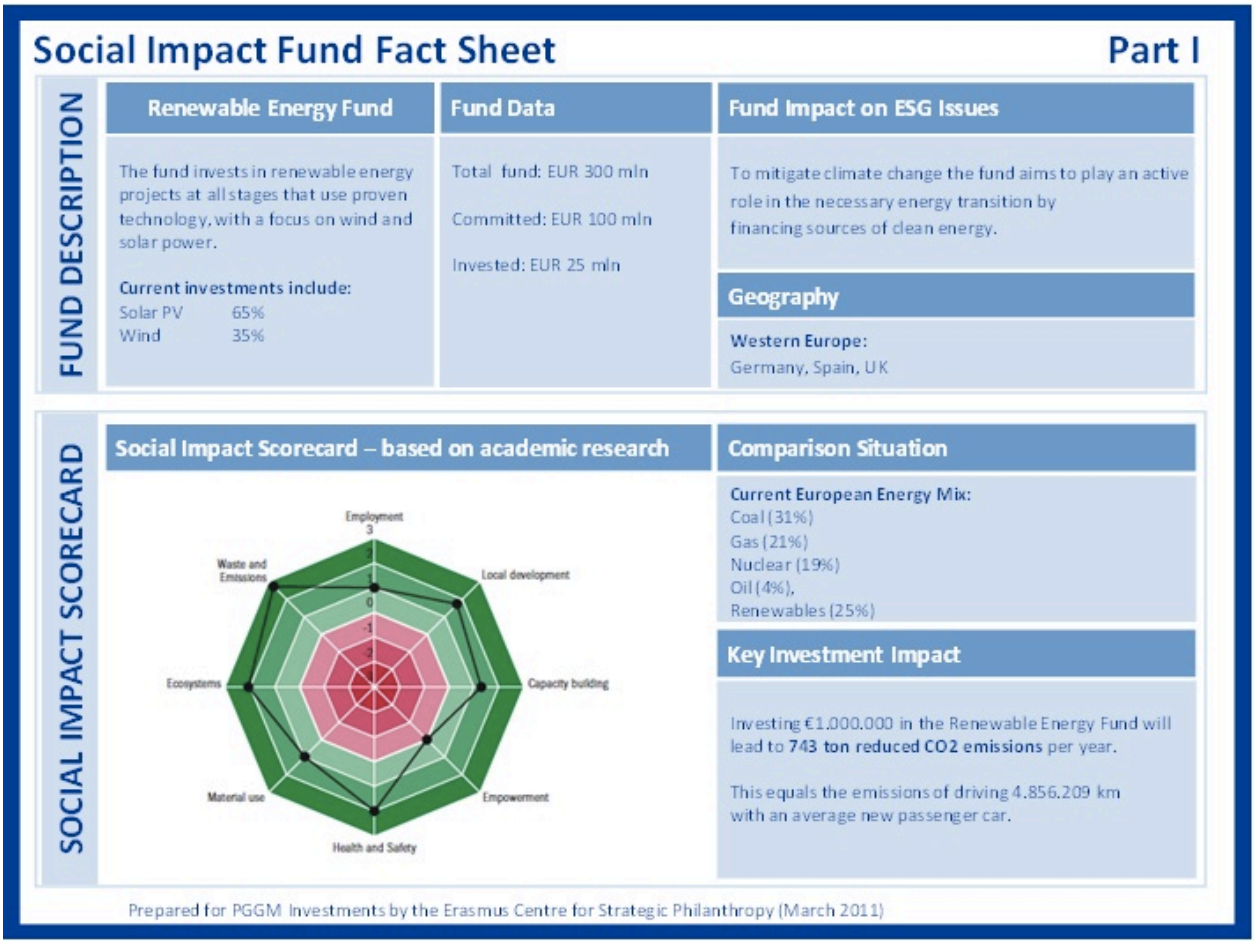
In addition to investing in private equity funds, pension funds can directly invest in infrastructure assets. For example, PensionDanmark has directly invested $890 million in wind farms. In 2013, it invested $200 million[79] to acquire an ownership stake in the NGT gas pipeline that carries gas from the North Sea to the Uithuzen terminal.[80]

Pensions funds also incorporate green infrastructure topics as part of their engagement process with fund managers. PGGM encourages its infrastructure managers and funds to look beyond

local legislation risks and reputational risks within the ESG framework and expects them to adopt process optimization methods so as to reduce energy consumption and waste.[81] PGGM has collaborated with the Centre for Strategic Philanthropy at Rotterdam's Erasmus University to develop an innovative tool that measures the expected impact of infrastructure investments on environmental, social, and economic development factors.[82] The tool is comprised of a two-page template that collates academic data and qualitative information on the ESG impacts associated with specific funds. The tool provides an estimation of expected ESG impacts and enables PGGM to work with fund managers to enhance positive impacts and attenuate negative ones.[83]

Green infrastructure includes private equity investments in clean and renewable energy, and other climate change adaptation and mitigation infrastructure. Pension funds face unique barriers when considering investments in clean energy infrastructure:[84]

1. Lack of an environmental policy backdrop
2. Lack of a carbon price
3. Presence of fossil fuel subsidies
4. Regulatory uncertainty
5. Technology risks



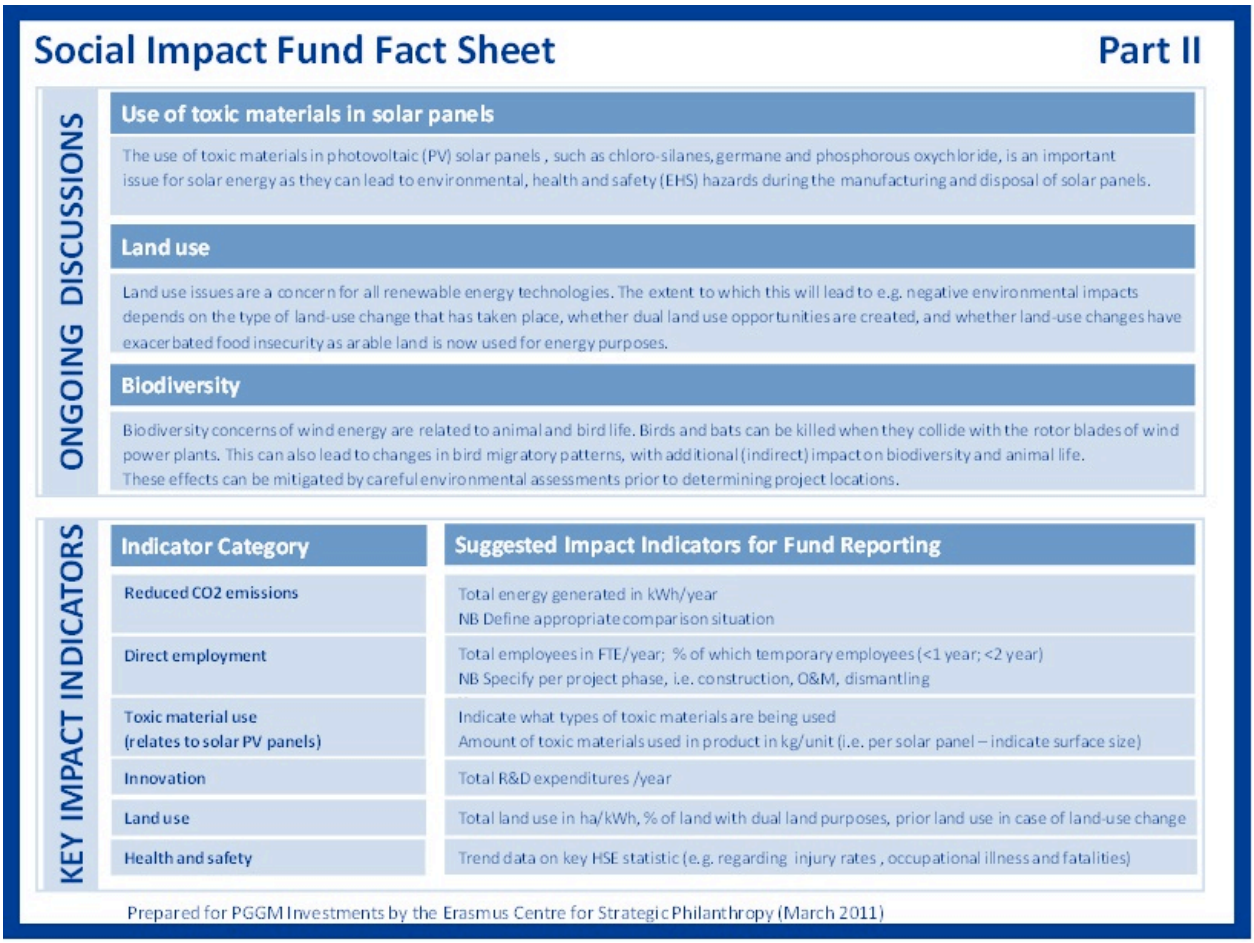


Figure 6: PGGM Social Impact Scorecard[85]

Despite these challenges, clean energy investments are critical for each country's competitiveness. Given pension funds' interest in promoting global economic growth, green infrastructure investments are well aligned with pension funds' missions and fiduciary responsibilities.

Invest in Green Real Estate

Investments in real estate represent 3.6% of the average US pension fund portfolio.[86] State pension funds alone hold $234 billion in real estate assets globally.[87] Green real estate investments, which are investments in assets that have superior environmental performance, can outperform vanilla real estate investments due to cost savings and rent premiums. Investments in green real estate are critical for a transition to a low-carbon economy because buildings, both commercial and residential, account for 32% of the world's total energy consumption.[88] In many markets, regulations specifying minimum standards for building environmental performance are accelerating the demand for green real estate.

Pension funds can invest in green real estate through real estate investment managers or via their directly managed real estate portfolios. As an example, ERAFP invests 2% of its portfolio in real estate and has adapted the SRI approach to its real estate portfolio.[89] It uses a best-in-class principle, which targets only new properties constructed based on superior environmental and social practices. ERAFP's approach to green real estate integrates the five values enshrined in its

SRI charter – human rights, social progress, labor relations, environment, and good governance. On the environmental front, it specifically focuses on GHG limits and the management of environmental impacts and risks. PensionDanmark has a $2 billion real estate portfolio (80% commercial property and 20% residential property) through which it both owns and develops properties. As both the developer and asset owner, it is in the position to recoup upfront investments in energy and water efficiency over the lifetime of the asset. As a confirmation of its leadership in this space, PensionDanmark was recognized as Europe's best investor in property and infrastructure in November 2013.[90] CalPERS employs a different model as it works with Greenprint Foundation to track the energy usage and carbon footprint of its real estate portfolio.[91] It has reduced the energy consumption of its assets by 22.8% over 2004-2009, accounting for a 126,000-ton reduction in CO^2 emissions.

Several pension funds, asset managers, and real estate developers use the Global Real Estate Sustainability Benchmark (GRESB) to assess their real estate portfolios.[92] GRESB was the result of collaboration between three pension funds (Algemene Pensioen Groep, Universities Superannuation Scheme, and PGGM), Maastricht University, and a real estate firm. GRESB currently covers $2.1 trillion in property value globally and its members include over 50 pension funds.[93] In 2013, the GRESB Survey covered 49,000 assets in 46 countries and was used by investors managing $1.6 trillion in AUM.[94] Investors use this survey to better understand environmental risks (e.g., flooding, energy efficiency regulation) and identify investment opportunities, such as the repositioning of inefficient assets that might otherwise become obsolete. AP2, invests 9% of its portfolio in real estate assets and asks a select group of listed and non-listed real estate funds and companies to respond to the GRESB survey.[95] It uses these survey responses to benchmark their performance and to identify investments.

Pension funds can also use other rating systems and standards to screen green real estate investments. For example, the Australian CBUS (Construction and Building Industry Super) superannuation fund targets its real estate investments to buildings with a minimum of 4.5 stars on the National Australian Built Environment Rating System (NABERS). Its property portfolio returns increased from 9% in 2012-2013 to 9.4% in 2013-2014.[96]

Given pension funds' long-term investment horizon, the financial benefits of addressing the environmental performance of real estate investments are undeniable. There is minimal downside risk associated with this investment strategy. Moreover, pension funds have access to cost-effective and sophisticated green real estate portfolio services from external managers, advocacy groups, and other service providers.

Invest in Forestry and Farmland

Forestry and farmland represent other alternative asset classes that have drawn pension funds' interest in recent years. These assets represent approximately 1% of the AUM of leading pension funds, such as CalPERS. Investments in forests and farmland are a good match for the long-term nature of institutional investors' liabilities and pension funds can use such investments to hedge against inflation.[97] Sustainably managed forests offer a steady return potential over the long term and perform well when other assets are affected by inflation.[98] Investment returns are

uncorrelated with traditional asset classes, such as equities and fixed income. Based on the US NCREIF Timberland Index, forestry assets have delivered an annual return of 14.1% over the period of 1987-2010.[99] Farmland is also an attractive option as it has provided average annual total returns in excess of 10% over the period of 1969-1990.[100] This asset class also offers a play into several attractive thematic opportunities, such as deforestation, resource scarcity, and climate change.[101]

Timberland Investment Resources, LLC (TIR), estimates that institutional investors, including pension funds, currently own approximately $60 billion of the $300 billion global timberland market. This means that there is significant room for pension funds to expand their ownership in this asset class. Institutional investors own $40 billion in United States timberland assets, and the United States is the world's largest producer and user of timber products.[102] Other established forestry and farmland markets include Australia, Brazil, Canada, Chile, New Zealand, and Uruguay.

Pension funds can directly purchase timberland and farmland as a part of their real asset portfolios. Forestry and farmland portfolios can be constructed by diversifying the management styles, vegetation, and geographic distribution within the portfolio. There is a growing trend towards sustainably managed forestry portfolios that conform to standards such as those developed by the IFC, Forest Stewardship Council (FSC) or the Program for the Endorsement of Forest Certification (PEFC). Pension funds can use these sustainability standards to develop screening and investment criteria in this asset class. For example, EAPF chooses investments based on the following screening criteria:[103]

- Preferred Assets: Assets certified by FSC
- Acceptable Assets: Asstes certified by PEFC
- Restricted Assets: Assets where the manager is working towards, but has not yet achieved certification
- Excluded Assets: Assets associated with illegal logging, UNESCO World Heritage sites, Ramsar certified wetlands, or forests with high conservation value

Alternatively, pension funds can invest through Timber Investment Management Organizations (TIMOs) or Real Estate Investment Trusts (REITS) that hold forestlands on behalf of large institutional investors.[104] Examples of investment managers in this space include Campbell Global[105], Timberland Investment Resources LLC[106] and BTG Pactual.[107] Pension funds can combine their forestry investments with thematic goals, such as conservation and deforestation. For example, PGGM has a Conservation Forestry Fund, which invests in forestry in the United States. Through this investment, institutional funds are combined with funds from nature conservation organizations.

Pension funds can also indirectly invest in sustainable forests through innovative investment vehicles such as the Althelia Climate Fund. This is an $80 million closed-end fund comprising a diversified portfolio of real assets such as forests, farmlands, and grasslands. The fund will finance forest-based emissions reductions that will be verified through standards such as the

Verified Carbon Standard and REDD+ (Reduction in Emissions from Deforestation and Forest Degradation) developed by the UNFCCC.

Over the last 25 years, most of the publicly held integrated forest product companies in the US have either sold or divested their forestlands to reduce debt, increase cash flow, and refocus on core manufacturing. Institutional investors have much longer investment horizons and are better suited to own forest assets, so divestment by forest product companies presents investment opportunities for pension funds. With finite amounts of quality farmland available and rising demand for food and industrial agricultural products, investments in farmland are also increasingly attractive for institutional investors.

V. Conclusions and Recommendations

Our research project describes how leading pension funds are in fact starting to tackle the climate change challenge by reducing their portfolio carbon footprint. Pension funds control a considerable amount of global investment wealth and will need to work on minimizing the risks their assets face from climate change while also providing adequate returns. Unforeseen negative financial impacts from carbon taxes, stranded assets, and resource scarcity could significantly alter future fund performance. Thankfully, sustainable investments that protect capital and follow long-term time horizons provide a new and ideal opportunity for pension funds. These new investment vehicles also allow pension funds to use their resources and clout to steer the power of money to help accelerate tangible action on climate change issues.

Pension funds' natural alignment with long-term climate finance leaves them well positioned to both serve as a catalyst for change and benefit from climate-sensitive investment strategies. Our study attempts to provide a roadmap and recommendations for action for other pension funds to follow on their journey to decarbonization, based on the initiatives and strategies at leading funds. We outlined the journey that leading pension funds took to embed the climate change challenge in the DNA of their organizations. We discuss what "woke them up" to take action, we review the internal resistance they had to contend with, and finally we describe the policies and procedures they have put in place to establish the organizational capacity to address climate change considerations.

On the investment side, we reviewed the strategies leading pension funds use to reduce their environmental impact. These strategies include using positive screens for best-in-class environmental performers and investing in carbon reducing investments, such as green bonds and green listed equity. All of these investment opportunities are still modestly represented in pension fund portfolios when compared with the rest of the market. They make up less than 10% of current assets under management within existing pension funds, so there is ample room for growth.

The move to decarbonize pension fund portfolios has just begun. This review of leading pension funds demonstrates that building a sustainable investment platform with actionable decarbonization goals is a long-term, iterative process that is unique to each fund. There is no singular blueprint for success. Each pension fund's journey will require careful structural adjustments and capacity building that engages a range of stakeholders, including beneficiaries, companies, asset managers, peripheral service providers, civil society, and policy makers.

Moving forward, pension funds have to continue flexing their muscles to encourage a global shift away from "short-termism" and its damaging repercussions. Engaging with policy makers to remove regulatory uncertainty and to improve the environmental policy backdrop for green asset classes will ensure they not only continue growing, but also grow at an accelerated rate. Measurement and reporting tools for the environmental impact of investment portfolios need to be standardized and scaled, and the concept of portfolio carbon footprints with actionable emissions reductions targets needs to become an industry standard.

VI. Case Studies

California State Teachers' Retirement System (CalSTRS)

CalSTRS Fund Overview

Country:	United States
Website:	http://www.calstrs.ca
Interviewee:	Brain Rice - Senior Portfolio Manager, Corporate Governance
Assets:	$186.4 billion
Membership:	Serves California's 868,000 public school educators and their families from the state's 1,600 school districts, county offices of education and community college districts.
Description:	The California State Teachers' Retirement System (CalSTRS) is the largest educator-only pension fund in the world. CalSTRS administers a hybrid retirement system, consisting of traditional defined benefit, cash balance and voluntary defined contribution plans. CalSTRS also provides disability and survivor benefits.

Internal Change Management

Triggers

CalSTRS started their journey towards sustainable investing in 2004 with a request from their Board to formalize the CalSTRS Environmental Program. The first rendition of the CalSTRS Environment Program consisted of four key components: an environmentally focused equity program, targeting private investment in clean technologies, increasing real estate operational efficiency, and demanding environmental accountability and disclosure from portfolio investments. This program laid the foundation for all of the fund's current initiatives with continued refinement of each component and the addition of more progressive ones.

In 2005, the Board voted to take their environmental commitment further by authorizing the creation of a Sustainable Equity Manager portfolio, where the board tasked four sustainable managers with developing a sustainable portfolio of equity investments totaling $225 million. In 2008, CalSTRS became one of the first North American pension funds to formally integrate environmental, social and governance considerations into its investment policies.

In 2006, the Corporate Governance Unit was tasked by the Board to make climate risk management one of its principle focuses. The company began to recognize that environmental

issues presented risks to the portfolio and that engagement with financial market participants on these issues were warranted. Today, CalSTRS believes that environmental, social and geopolitical issues can affect the performance of their investments. The fund takes the view that investment activities impact other facets of the economy and the globe. As a significant investor with a very long-term investment horizon and expected life, the success of CalSTRS is linked to global economic growth and prosperity. Actions and activities that detract from the likelihood and potential of global growth are not in the long-term interests of the Fund. Therefore, consideration of select environmental, social, and governance issues are consistent with its fiduciary duties. In being consistent with its fiduciary responsibilities to members, CalSTRS believes it has a social and ethical obligation to require that the corporations and entities in which securities are held meet a high standard of conduct and strive for sustainability in their operations. CalSTRS also states that it is a long-term investor and therefore short-term gains at the expense of long-term gains are not in the best interest of the Fund.[108] Instead sustainable returns over long periods are in the economic interest of the Fund. Similarly, unsustainable practices that hurt long-term profits are risks to CalSTRS' investment.

Carbon risk is a new trigger that has led the fund to explore decarbonization initiatives. The fund's first introduction to carbon risk occurred in 2011 after reading a study released by Carbon Tracker Initiative on the carbon bubble. The fund realized its exposure to carbon-heavy industries could present a risk to their portfolios in the future.[109]

In 2012, the development of the CalSTRS overarching 5-year strategic plan set forth the foundations for further integration of sustainable investing practices. Goal 2 of the strategic plan, which relates to responsibly managing risk to the organization, recognizes sustainability and environmental issues.[110]

Initiatives

CalSTRS is a leader in sustainable investing and has several initiatives that are pushing the boundaries to address climate change issues through capital markets. A list of noteworthy initiatives include the following:

1. Green Initiative Task Force: The Task Force works to identify and develop environmentally focused strategies intended to enhance the risk-adjusted returns of the overall CalSTRS portfolio. The group searches for new investment opportunities and provides leadership in this area, maintaining their position at the front of the green movement.[111]

2. Green Team Strategic Plan: Every year, the CalSTRS Green Initiative Task Force outlines a set of goals for the next fiscal year.

   In the 2013 report, CalSTRS outlined its goals for 2014 as:
   2.1 Continue education on environmental risk issues and environmental-themed investment opportunities
   2.2 Integrate environmental risk factors into manager procurement processes and ongoing due diligence efforts

2.3 Consider increasing allocations to environmental-themed investments

2.4 Integrate environmental considerations into asset allocation considerations

2.5 A discussion about the progress of the goals and whether the fund reached its targets are openly discussed in their Green Initiative Task Force Annual Report. Surprisingly, both success and failures are disclosed in the report. This act of honest transparency not only keeps the fund accountable to its commitments to sustainable investing, but also demonstrates that CalSTRS practices what it preaches, since corporate transparency is a governance value the fund looks for in their invested companies.[112]

3. 21 Risk Factors and Committee: To help manage the risk of investing a global portfolio in a complex environment, CalSTRS developed the 21 Risk Factors as a tool that both internal and external investment managers are expected to use to assess the impact of ESG risk when making an investment. Although these risks alone cannot justify rejecting investments based solely on social criteria, a series of procedures are followed when conflict with a risk factor occurs. However, taking it one step further, CalSTRS staff recognized that developing a set of ESG risks to consider and risk management procedures to follow was not enough to ensure an appropriate level of risk management. A process needed to be developed that would allow CalSTRS ESG risk management procedures to be implemented, leading to the development of the 21 Risk Factor Committee. This committee is led by CalSTRS' CIO and is composed of senior staff representatives from each asset class who help the CIO evaluate exposure to ESG-related risks and take appropriate actions to ensure that CalSTRS policy on managing ESG risk exposure is adhered to. When faced with a corporate decision that violated CalSTRS 21 Risk Factors, at the direction of the Investment Committee or at the discretion of the CIO, the investments staff will directly engage management to seek a change in the corporate behavior that violates the risk factors in the following manner.[113]

4. Notable Investment Initiatives: CalSTRS has also been a leader in low carbon investment. CalSTRS created a sustainable portfolio program in 2007 after a mandate from the board. In 2013, the US portfolio added 0.13% of excess return to the Global Equity portfolio while the non-U.S. sustainable portfolio has enhanced the return of the global equity portfolio by generating 2.59% of excess return. CalSTRS has also started benchmarking their green portfolio returns to the newly created Barclays MSCI Sustainability Credit Index, in addition to the S&P 500 and other indexes to provide a more comprehensive indicator of market performance. CalSTRS has also invested $25 million in green bonds to date. In September of this year, CalSTRS committed to raising its investment in clean energy and energy efficiency by 150%, from $1.4 billion to $3.7 billion, over the next five years. It could increase that to $9.5 billion, nearly 7 times its current commitment, with certain policy changes like a price on carbon.

5. Develop ESG Expertise: The main objective for this initiative is accelerating the transformation of CalSTRS to a fully sustainable global organization by integrating EGS opportunities into its culture and strategies.[114] A few highlights of CalSTRS' Strategic Plan FY 2012-2017 are listed below:

    July 2013–14: Develop an organizational sustainability policy and educate staff
    July 2013–14: Engage stakeholders on sustainability policies and expectations
    July 2013–17: Establish an internal planning & reporting framework using GRI principles
    July 2012–17: Integrate environmental, social and governance factors into internal and investment operations, and across the entire investment portfolio

    The Investments Branch at CalSTRS is working to integrate environmental, social and governance factors into and across the CalSTRS Investment Portfolio. One key activity for fiscal year 2013–14 was the integration of language into each asset class investment policy that references CalSTRS ESG risk policy: CalSTRS believes that environmental, social and geopolitical issues can affect the performance of our investments. As a result, the CalSTRS 21 Risk Factors have been developed as a tool that both internal and external investment managers are expected to use to assess the impact of ESG risk when making an investment on behalf of CalSTRS.[115] Prior to this language update, ESG risks were identified only in the CalSTRS Investment Policy and Management Plan, which is the controlling policy document for the Investments Branch.

Barriers to Implementation

CalSTRS has faced several barriers in their early venturing into decarbonization and in sustainable investing. One barrier was the lack of information on sustainability related issues. CalSTRS overcame this challenge by creating a Green Task Force in 2006, which is a group dedicated to building internal expertise on environmental risks and identifying opportunities, and keeps the fund accountable to environmental goals. A second barrier was integrating sustainability metrics into investments. The company overcame this barrier, with the help of their Chief Investment Officer and the 21 Risk Factors Committee, by establishing sustainability risk policies and ensuring that all fund managers are adhering to them.

More specific to carbon risk, company transparency has been a barrier. CalSTRS has started engaging in dialogue with their companies on how they are considering fossil fuel reserve valuation in the future.

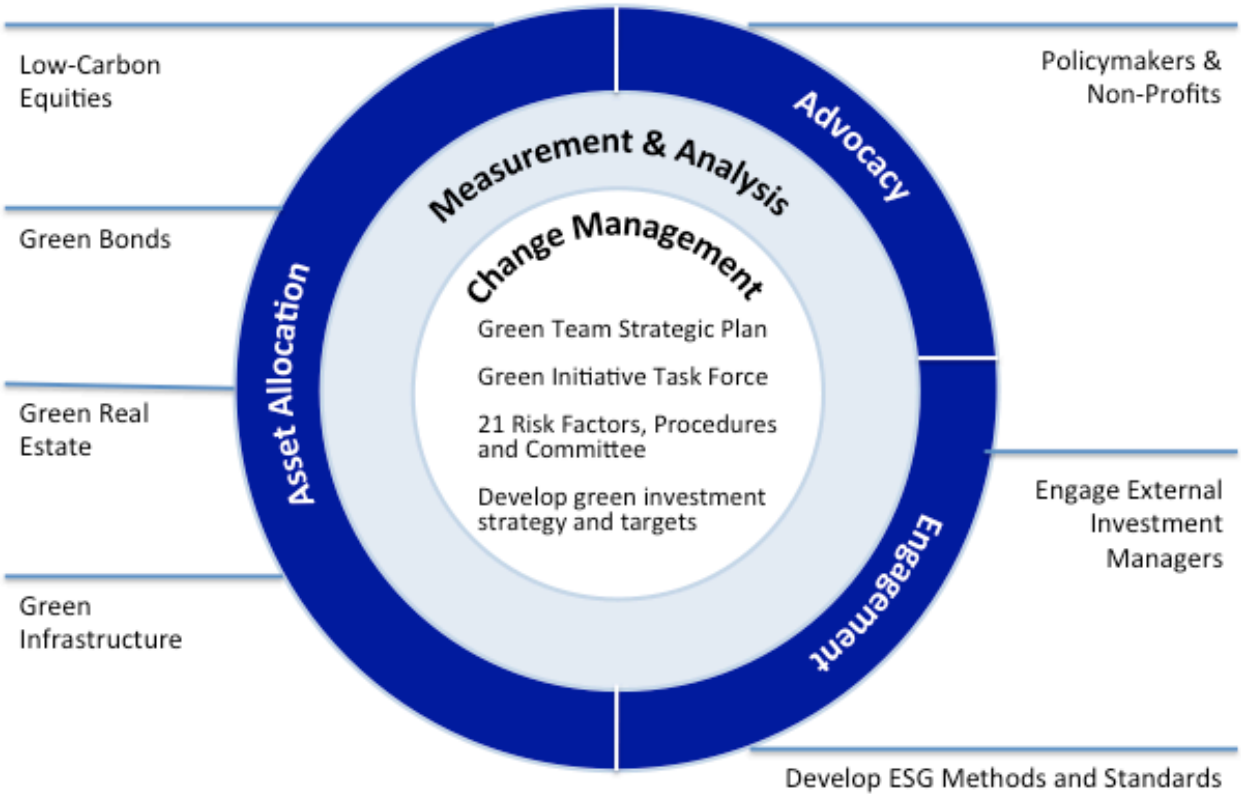


Figure 7: CalSTRS Climate Change Action Framework

Strategies to Address Climate Change Risks and Opportunities

Engagement and Advocacy Strategies

Engage External Investment Managers

Since 2010, all Global Equity external investment managers have been polled annually to assess the level of climate considerations in their respective processes.[116] Questions such as the following will be asked on a yearly basis:

1. From 2010 through 2012, questions asked included:
    1.1. Do you explicitly incorporate climate risk into your process?
    1.2. Is climate change a primary factor?
2. Beginning in 2012, the Global Equity external managers were also asked:
    2.1. Have you taken steps to better incorporate climate risk into your investment process since last year?
3. Starting in 2014, the Global Equity external managers were also asked:
    3.1. Is your organization a UNPRI Signatory?[117]

Asset Allocation Strategies

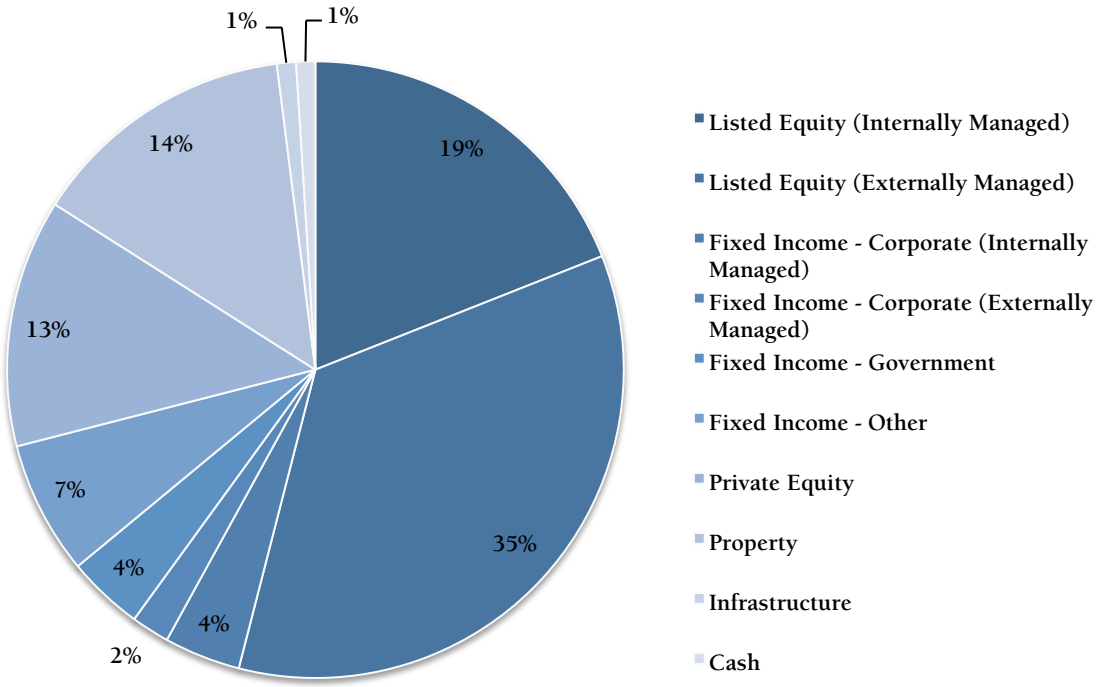


Figure 8: CalSTRS Asset Class Allocations

Invest in Green Bonds

The CalSTRS Fixed Income unit is a participating member of the Climate Bond Standards Board. This board is multi-disciplinary and multi-member nonprofit organization that seeks to establish standards along with a certification schedule for issuers and underwriters interested in issuing green bonds. In January 2014, the Green Bond Principles were developed through guidance from issuers, investors and environmental groups and serve as voluntary guidelines on recommended process for the development and issuance of green bonds. In May 2014, CalSTRS Fixed Income unit also joined INCR's Green Bond Working Group. This group was born through its role in Ceres flagship Clean Trillion initiative. Essentially, this group will focus on developing investor expectations for the green bond market while providing guidance to issuer and underwriters. As of today, CalSTRS holds $25 million worth of Green bonds.

Invest in Low Carbon Listed Equities

As of May 31, 2014, CalSTRS Private Equity unit has committed $696.4 million to private equity investments in the clean technology and clean energy sectors.[118]

Four investment managers are working for the Global Equities Sustainable Investment Program. The following sections provide a brief overview of each of the four managers:

- New Amsterdam defines environmental, social, and sustainability factors as ones that relate to alcohol, tobacco, gambling, military contracting, and nuclear activities. They also consider issues surrounding community, diversity, employees, environmental performance or non-U.S. operations/products. In its investment process, when building its socially responsible portfolios, New Amsterdam screens each security for these factors after it passes through the fundamental phase of the investment process. New Amsterdam has a U.S. mandate.

- Light Green Advisors and Rhumbline Index Management combined to create a sustainable investment fund focused on helping institutional investors channel their capital to innovative corporations that are adding value to the global economy in sustainable, resource-efficient ways. LGA has developed a systematic process, its proprietary Eco-Metrics™ research platform, to identify and manage a multi-sector portfolio comprised of leading corporations whose sustainability progress is generating environmental benefits and delivering competitive financial returns. LGA's Eco Performance Portfolio™ strategy is the longest-lived large cap sustainability and resource efficiency strategy in the U.S.

- AGF Investments America Inc.'s sustainable global equity strategy invests in securities that fit its proprietary environmental concept of sustainable development and believes that companies focused on innovative products and services, which use resources more efficiently, are being increasingly rewarded by investors. AGF's investment strategy employs thorough due diligence on company fundamentals and emphasizes companies with viable business models derived from sustainable competitive advantages. The portfolio focuses on four mega-themes within which market relevant sub-themes are identified. The main themes are energy and energy efficiency, water and wastewater solutions, waste management and pollution control, and environmental, health and safety. The portfolio will contain early-stage to mature- stage companies.

- Generation uses a global investment strategy to identify public equity companies that fit its concept of sustainable in- vestments. Generation believes taking a long-term investment horizon maximizes investment results for equity strategies. Furthermore, it believes that sustainability issues can impact a company's ability to generate returns and therefore must be fully integrated into its investment process, along with rigorous fundamental equity analysis, to achieve optimal long-term in- vestment results. Generation uses the term.[119]

Invest in Green Infrastructure

CalSTRS and the CBRE team were committed to implementing green initiatives and conserving resources in order to reduce energy costs and promote an environmentally friendly workplace.
Invest in Green Real Estate

In 2003, CalSTRS Real Estate staff directed all separate account investment managers to include a "Conservation/Sustainability Assessment" in their annual planning/budgeting process. The goal of the CalSTRS Real Estate Green Program is to increase the risk-adjusted returns by incorporating conservation and sustainability in the development and management of the Real Estate portfolio. As of today, 86% of office buildings Energy Star Certified and 24 out of 33 buildings are LEED certified.[120]

Decarbonization Impacts

CalSTRS is a part of the Carbon Tracker 200 campaign.[121] Staff sent engagement letters to 44 U.S.-based companies with significant involvement in the exploration and production of oil, natural gas and coal asking for a dialogue on how they value their fossil fuel reserves.[122] All companies engaged to date advised CalSTRS that they adhere to strict Securities and Exchange Commission rules on reserve valuation, and that the reserves that are the basis for their share price values are expected to be produced and sold within the next five to 10 years, making sequestration unlikely. Additionally, all companies take the position that environmental related risks, such as climate change, are continuously evaluated and ways to mitigate carbon emissions are being actively pursued. Staff intends to continue this engagement in the upcoming fiscal year.[123]

Portfolio Financial Performance Impacts

The U.S. sustainable portfolio has added 0.13% of excess return to the Global Equity portfolio while the non-U. S sustainable portfolio has enhanced the return of the global equity portfolio by generating 2.59% of excess return.[124]

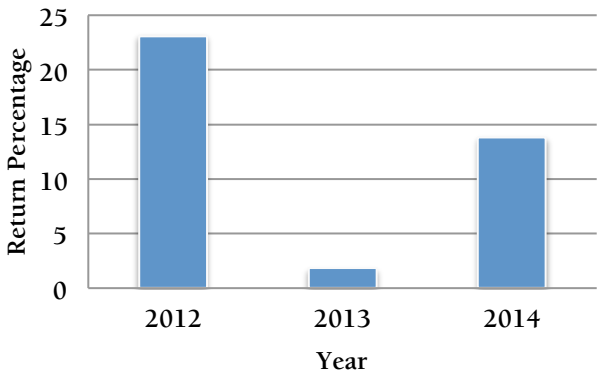


Figure 9: CalSTRS Annual Portfolio Returns

Environment Agency Pension Fund (EAPF)

EAPF Fund Overview	
Country:	United Kingdom
Website:	http://www.environment-agency.gov.uk
Interviewee:	Faith Ward - Chief Responsible Investment and Risk Officer
Assets:	$3.43 billion (Active Fund – all externally managed)
Membership:	23,000
Description:	The Environment Agency is the environmental regulator for England and Wales. The principal aim of the organization is to protect and improve the environment, and to promote sustainable development.

Internal Change Management

Triggers

The United Kingdom's Environment Agency states that their principal aims are to protect and improve the environment, and to promote sustainable development. Given this organizational context, it is only natural that the Environment Agency Pension Fund's (EAPF) beneficiaries have high expectations of the Fund to invest responsibly in the pursuit of financial results. However, what is surprising about EAPF's responsible investment journey is that the catalyst for the initial deployment of a formal strategy to address these critical issues was actually triggered by negative media attention on EAPF's investment choices.

An article published on January 7, 2003 by The Independent, a British national morning newspaper, detailed EAPF's £64 million investments in oil heavyweights BP and Shell.[125] Although it was quite normal for mainstream pension funds to hold significant stakes in these types of organizations, EAPF's financial stakes were viewed as hypocritical given that these very companies had been repeatedly fined by the Agency for polluting British waters with petrol and oil products. While EAPF's initial response was to minimize reputational risk, this unexpected event allowed the Fund to formalize and more aggressively implement the extensive internal work that had been done around the topic of responsible investing. For years, several of EAPF's staff members had been dedicated to environmental finance, reviewing company reporting, investigating stock listing rules, as well as studying how best to incorporate ESG issues into investment decisions without compromising returns. But, it was the surprise revelation of EAPF's holdings that facilitated the swift transition of responsible investing from an internal initiative to the forefront of the Fund's investment strategy.

Market volatility and changes in the regulatory environment within the UK also played critical roles in pushing the integration of environmental, social, and governance issues more heavily into EAPF's investment strategy. In the early 2000's, and again after the global financial and Euro-zone crises of 2008 and 2011, EAPF saw weak stock market returns as an opportunity to re-assess and adjust their investment strategies. The objectives of these strategy overhauls were to de-risk investments through diversification, allow for greater investment flexibility to more quickly react to market conditions, and to reduce the Fund's vulnerability to climate change. From a regulatory perspective, the 2001 Pensions Act served as a major catalyst for the Fund to shift to a strategy of responsible investing. The Act required pension funds to disclose in their 'Statement of Investment Principles' (SIP) the extent to which they considered environmental, social and governance risks in their investment strategy.[126] This led the Fund to pay closer attention to environmental risks and opportunities and prompted the organization to conduct a strategic review of their investments resulting in a change to their overarching asset allocation strategy.

As an organization, EAPF, its staff, and its beneficiaries have long shown a commitment to environmental stewardship and preservation. While these principles have long been of paramount importance and set the cultural tone within the Fund, a series of external events ranging from media coverage, market volatility, and regulation were key triggers for the Fund to develop and implement a robust responsible investment platform that now is arguably one of the most advanced for a pension fund anywhere in the world.

Initiatives

EAPF's journey in becoming one of the world's leading pension funds in the field of responsible investment did not materialize overnight. Instead, the Fund has seen their strategy evolve as part of an iterative and organic process spanning more than a decade. This evolutionary path has allowed EAPF to continuously push the envelope in addressing the most critical of ESG issues and has positioned them to be one of the very few pension funds adequately prepared to tackle the de-carbonization challenge.

Immediately following the article published by The Independent, Howard Pearce, then Head of Environmental Finance and Pension Fund Management at EAPF, ordered the implementation of a 10 point plan that drove the generation of policies on corporate governance and environmental issues, thus formally capturing the work that had been going on internally for years. Over the next couple of years, EAPF continued to review its investment policies and conducted strategic reviews of its investments that led to the development of an Environmental Overlay Strategy (EOS) in 2005 that shifted asset allocations across the Fund. This EOS applied to all of the Fund's investments and formally recognized the organization's fiduciary duty to take environmental risks into consideration when trying to maximize financial returns for beneficiaries. Because the Fund outsources the management of its assets, a significant portion of the EOS is dedicated to the selection, appointment, and monitoring of external fund managers and it requires them to: research financially material environmental risks and opportunities, collaborate with other bodies where appropriate, and to take steps to minimize the Fund's exposure to financially material environmental risks. In terms of performance evaluation, fund

managers are required to report quarterly on their implementation of the EOS, which is monitored by an independent performance measurer who calculates 'risk and return measures' for each manager and for the fund as a whole.[127] The EOS plays a key role in the Fund's aim to invest 25% of its assets in companies that make a positive contribution to the global 'green' economy by 2015. As of March 31, 2014, 24% (£558m) of the fund was invested these assets, 13% (£285m) of which is specifically invested in companies with significant revenues (in excess of 20%) involved in energy efficiency alternative energy, water and waste treatment, public transport together with property and infrastructure funds with a low carbon, or strong sustainability criteria.[128]

While many pension funds have integrated ESG factors into their investment strategies, EAPF has continued to lead the way by becoming the first pension fund in Europe to establish an environmental and carbon footprint for their entire portfolio.[129] Although the process of finding readily available, accurate, and comparable supply chain and waste data has proven difficult, EAPF regularly reports on its portfolio's performance relative to global benchmarks and is working with partners like Trucost to further refine performance measurement criteria. EAPF has also partnered with Trucost to develop a fossil fuel stranded assets report, which provides a level of awareness related to climate change risk that very few pension funds have attained. The stranded assets report confirms EAPF's excellent performance in relative embedded carbon exposure risk and provides a series of recommendations to continue engaging companies included in their portfolio to reduce their carbon exposure rather than divesting.

Barriers to Implementation

EAPF's organizational mandate and culture made the adoption of environmentally responsible investment practices a relatively smooth transition. Both beneficiaries and leadership within the Fund believed strongly in responsible investment, thus the barriers faced by EAPF in this transition were less related to internal change management as compared to external factors. The key obstacles the Fund faced in its adoption of environmentally responsible investment strategies were questions around regulation, a lack of experienced investment consulting services, and little to no investment vehicles that met the Fund's requirements.

One of the key early barriers to the integration of environmental factors within investment strategies at British pension funds was regulatory uncertainty. Pension funds believed there was a lack of clarity as to whether the inclusion of ethical and environmental, social, and governance filters, as well as more advanced sustainable investing strategies, conflicted with their fiduciary duty to maximize returns for their beneficiaries. The government of the United Kingdom has sought to address this uncertainty and their efforts culminated in the 2001 Pensions Act and in a recently released Law Commission Report on the Fiduciary Duties of Investment Intermediaries. The latest report clarifies that pension fund trustees do not have to maximize returns in the short-term at the expense of risks over the longer term, and as a result, where trustees think ethical or ESG issues are financially material they should take them into account. With the continued refinement and clarification on the legal obligations pension funds face in addressing certain risks relative to their fiduciary duty, the regulatory environment has become significantly easier navigate for pension funds like EAPF.

EAPF also faced significant challenges in finding competent investment managers and investment vehicles to meet their needs when they initially decided to revamp their strategy. Many pensions funds, particularly smaller ones in the UK, rely heavily on advisory services from outside investment consultants as they lack the manpower and technical depth within their own organizations. EAPF found that many of these individuals lacked a detailed understanding on the intricacies of responsible investing and were constantly behind the curve on where the organization wanted to go. In addition, investment products that met the requirements of the Fund were hard to come by and the organization often had to compromise on what it sought to invest in until more products became available within the financial markets. While both of these issues still exist even today, the landscape for responsible investment has evolved greatly from the early days of the movement when EAPF sought to be amongst the first pension funds to radically change the way they invested.

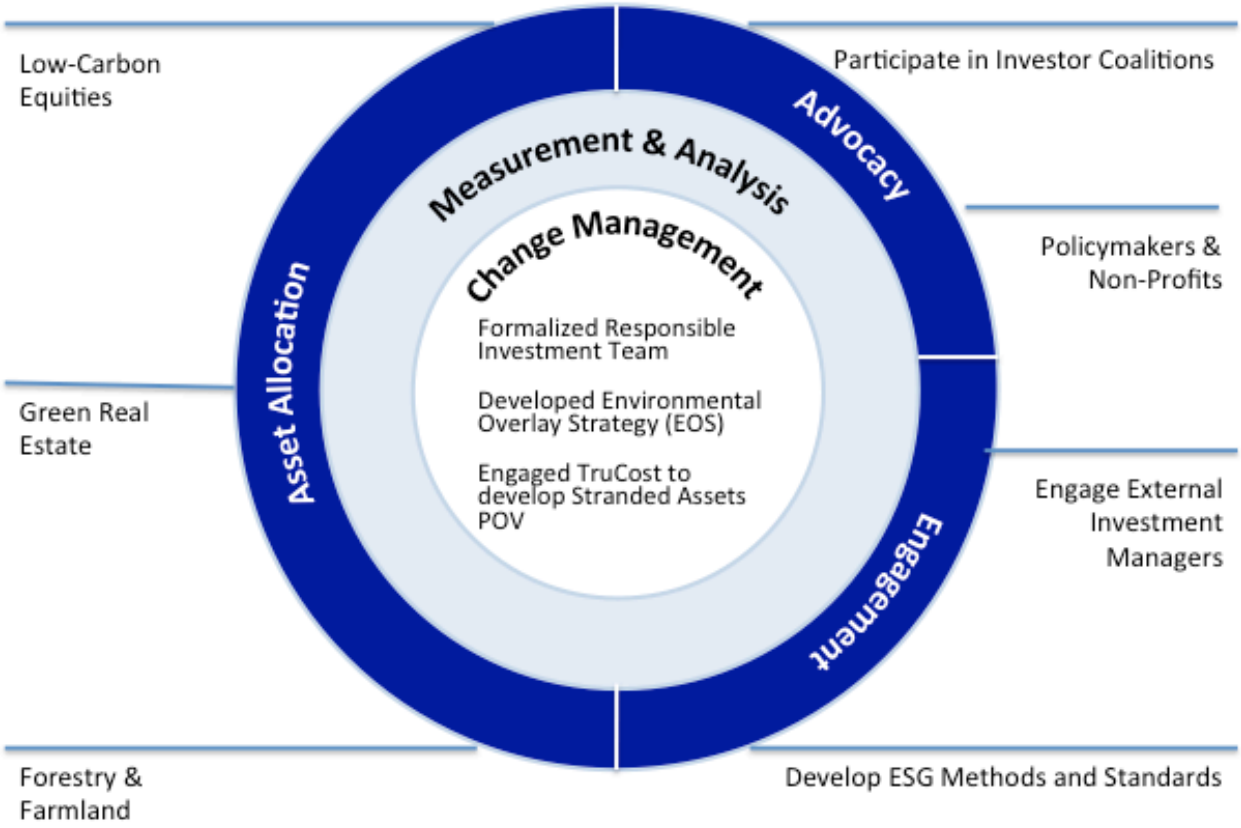


Figure 10: EAPF Climate Change Action Framework

Strategies to Address Climate Change Risks and Opportunities

Engagement and Advocacy Strategies

Engage External Investment Managers

Independent organizations appointed by EAPF are taking part in carbon footprinting and impact measurement exercises. As a result, the average ESG score for 2013 is 72.4%, up from 63.9% in

2007. This is despite increasing the thresholds for each criteria, making it harder to score well and allowing better differentiation in performance. The new investment strategy requires EAPF fund managers to strictly follow the company's ESG policies along with its reporting and monitoring requirements. In addition, the core of this new investment strategy was making a material commitment to real assets of up to 12% of the fund. Such real assets include property, infrastructure, forestry and agriculture. It is now a prerequisite of investment towards newly appointed fund mangers.

Engage Policymakers and Advocacy Organizations

In July 2006, EAPF became the first Local Government Pension Scheme signatory of the United Nations Principles of Responsible Investment (UNPRI). The principles reflect the view that ESG issues can affect the performance of investment portfolios and therefore must be given appropriate consideration by investors in fulfilling their fiduciary duty.

EAPF is also the founding member of the Institutional Investor Group on Climate Change (IIGCC) where IIGCC is a collaborative platform to encourage public policies, investment practices, and corporate behavior that address long-term risks and opportunities associated with climate change. EAPF continuously supports the activities of IIGCC through participation in the policy and property working groups. Such engagement creates a collaborative platform to work alongside other investors and asset owners to encourage the adaption of credible public policy solutions and efficient move to a low carbon economy.

Asset Allocation Strategies

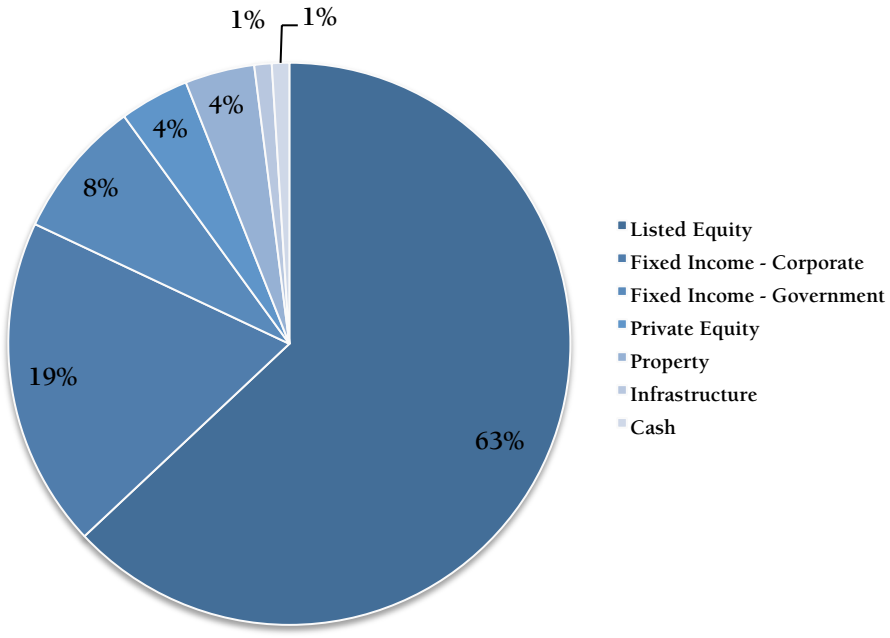


Figure 11: EAPF Asset Class Allocations

Investment Approach

According to fund's Responsible Investment Principles guideline, environmental, social and governance (ESG) issues are key factors in all of its investment processes. EAPF aims to invest 25% of its fund in companies that make a positive contribution to a green and sustainable economy, in part by reducing equity/climate change risks to the Active Fund and investing in environmental themed funds, sustainably themed equities as well as diversification of the fund's investments into new asset classes, e.g. infrastructure, timberland and farmland assets. As of March 30, 2014, EAPF has successfully invested 24% (558 million GBP or $869 million USD equivalent) in the sustainable and green economy, specifically, 13% (285 million GBP or $443 million USD equivalent) of its fund is invested in companies with significant revenues (in excess of 20%) involved in energy efficiency alternative energy, water and waste treatment, public transport together with property and infrastructure funds with a low carbon, or strong sustainability criteria.

Invest in Low Carbon Listed Equities

EAPF has invested in two environmental themed funds for several years: a global equities fund run by Impax and part of a portfolio of global private equity funds runs by Robeco. Today these investments amount to around 100 million GBP (or $156 million USD).

Invest in Green Real Estate

EAPF has invested 15 million GBP (or $23 million USD) to the Thread-needle Low-Carbon Workplace Trust – a partnership that refurbishes properties to best practice low carbon standards, set by the Carbon Trust, which offers occupiers ongoing advice and support to ensure the building's efficiency specification is achieved in-use. It targets outperformance for investors through generating strong capital returns from its refurbishment activities as well as delivering a secure, long term income stream satisfying the considerable demand from high quality occupiers for low carbon properties.

Invest in Forestry and Farmland

EAPF sets out a clear hierarchy of the types of assets and/or environmental guidelines or standards the assets should meet with respect to timberland and forestry:

- Preferred assets: Forest Stewardship Council (FSC)
- Acceptable assets: Program for the Endorsement of Forest Certification (PEFC) certification
- Restricted assets: Assets where the manager is working towards, but has not yet achieved FSC/SFI certification
- Excluded assets: Illegal logging involving deforestation; operations in UNESCO World Heritage Sites; operations in wetlands protected by RAMSAR – a wetlands convention; projects or operations involving primary or high conservation value forests

Decarbonization Impacts

In 2004, EAPF became a signatory to the Carbon Disclosure Project. By supporting the project, it has engaged its fund manager, highlighting companies within portfolio who are failing to disclose greenhouse gas emission levels to the project, and urged them to do so.

EAPF constantly measures relative carbon footprint at its active equity portfolio. Its portfolio is currently 26% less carbon intensive than the MSCI All Country World Index (ACWI). The overall footprint of EAPF active portfolio has been reduced by 39% since 2008. Achieving such superior performance not only needs a tremendous amount of time and energy, but also requires collaboration with Trucost – an independent environmental consultant company. EAPF eliminates companies from their active portfolio by evaluating how efficient they are in the use of raw materials, water and energy, the waste produced, and carbon emitted. Specifically, the methodology used, developed by Trucost, calculates inputs via a company's supply chain and waste outputs based on publically available information. This year alone, EAPF eliminated three companies (representing, in aggregate, less than 1% of active equities) based upon footprinting practices.

Portfolio Financial Performance Impacts

EAPF thinks that within an equities context, excellent performance is worth little if the associated managers do not have a strong commitment to sustainability. Managers like Generation, Sarasin, Impax, and First State who dedicated their portfolios and investment strategies towards sustainability all outperformed their benchmarks by an average of 6.76%.

It is worth pointing out that Townsend Group, who manages 4.2% of the EAPF's fund has made their portfolio diversification in sustainable real assets. Townsend Group set its own target: 250 million GBP (or $389 million USD) to real assets covering real estate, infrastructure, forestry and agricultural land. Such mandate places a high priority on long-term responsible investments that meet its financial targets, with a preference to invest positively in sustainable real assets such as energy efficient buildings, renewable energy projects, public transport, water treatment facilities, eco-friendly farming, and sustainable forestry. As a result, during year 2013- 2014, Townsend's target return was 4.0% comparing its actual return at 9.1%. Unquestionably, sustainable strategy created a direct positive financial impact.

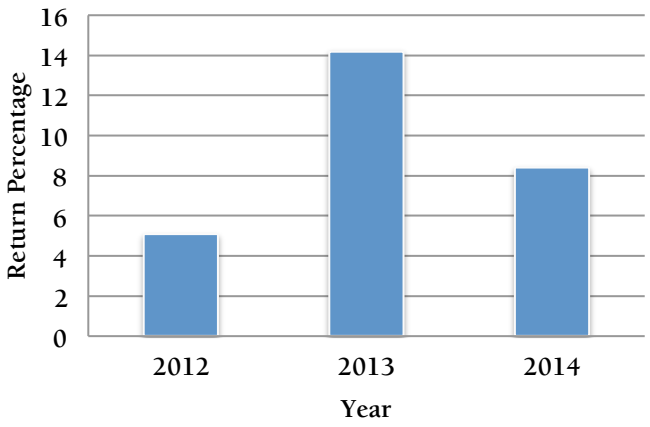


Figure 12: EAPF Annual Portfolio Returns

According to EAPF's statement of investment principles, financially material risks that need to be considered and controlled including, but not limited to, corporate governance, climate change, pollution, and other environmental issues. EAPF's active Fund managers are required to consider these sources of risk when evaluating investments. In other words, the way EAPF diminishing its portfolio volatility is by reducing risks in the form of less carbon stranded asset risk along with adapting low-carbon investment strategies. Nonetheless, EAPF has been working to reduce overall level of exposure of the fund to climate related risks for over a decade.

Fjärde AP-fonden (AP4)

AP4 Fund Overview	
Country:	Sweden
Website:	http://www.ap4.se
Interviewee:	Fredrik Regland - Quantitative Analyst Mikael Johansson - Quantitative Analyst Patrick Bolton – Professor, Columbia University Business School
Assets:	$36.53 billion
Membership:	No direct membership since the fund is part of the Swedish National Pension Fund system
Description:	AP4 is the Fourth Swedish National Pension Fund, and one of the five Swedish public pension system's buffer funds. The principal aim of the organization is to contribute to the stability of the national pension system through managing Fund capital with the aim of generating the best possible return over time.

Internal Change Management

Triggers

Sweden is one of the role models when it comes to its inhabitants' environmental consciousness. This environmental consciousness is also reflected in the country's pension system, specifically when looking at the Fourth Swedish National Pension Fund (AP4). The democratically elected Swedish parliament ("Riksdag") is responsible for drawing up investment rules for AP4. The newest set of rules came into effect on January 1, 2001 and includes environmental targets.[130] Also, Swedish voters have indirect influence on the selection of the fund's board members.

This resulted in the appointment of Mats Andersson as AP4's CEO in 2006. In 2010, Andersson attended the first conference of the "Committee on Global Thought" at Columbia University. This conference was co-organized by Columbia Business School Professor Patrick Bolton, and Frederic Samama from Amundi, Credit Agricole Group. On the second morning of the conference, there was a smaller meeting where all executive conference attendants discussed more concrete decarbonization measures. Later in 2010, the Rockefeller Foundation organized a small fund manager meeting in the Bellagio in Las Vegas where Andersson was the only attending fund manager to pick up the idea of pension fund decarbonization. He understood that greenhouse gases will be evaluated and priced differently in ten years than they are today, which translates into low-greenhouse gas strategies yielding extra returns at approximately the same risk.[131]

Andersson internalized the idea of pension fund carbonization as a consequence of a larger conference held in Paris in Fall 2011. Decarbonization was discussed at length within the organization and a subsequent event with Prince Charles' charity at his residence Clarence House in Spring 2013 further convinced the CEO on AP4's future direction.[132]

In its 2012/2013 Sustainability and Corporate Governance Report, AP4 committed for the first time in writing to sustainable investing in terms of portfolio carbon intensity: "AP4 believes that current company valuations do not reflect the increased costs of fossil fuels. Companies with fewer emissions than their competitors will have an economic advantage and a relatively better value performance."[133] As a consequence, a positive feedback loop is created: decarbonizing investors will achieve higher financial returns, especially if climate change mitigation policies (e.g. carbon tax) are implemented, which is why they will increasingly lobby for additional climate change mitigation policies.

Initiatives

After Mats Andersson's internalization of the portfolio decarbonization idea, an internal project team was founded in order to brainstorm and implement the best decarbonization ideas, specifically on a strategic portfolio level. Conventional pension fund asset managers were trained to apply ESG metrics during the investment process.[134]

In terms of external initiatives, AP4 has turned the idea of pension fund decarbonization into various actions. For example, AP4 built a low-carbon index based on the S&P 500 with a carbon intensity that is reduced by 50% to 80% (The Portfolio Decarbonization Coalition), while still achieving a minimal tracking error. In addition, emissions of greenhouse gases from fossil fuel reserves are taken into consideration. As a consequence, they dropped 30% of S&P 500 corporations on a sector-neutral basis due to excessive carbon intensity. AP4 is also cooperating with MSCI, Amundi and FFR to advance with the standardization of its low-carbon indexing effort, which will result in broader decarbonization uptake of other investors.[135] [136] In practice, AP4 has already divested 10% of its most carbon-intensive holdings,[137] and is planning to fully decarbonize by 2020.[138]

Opposed to divesting, AP4 engages with companies in their portfolio to promote the goal of decreasing their carbon intensity. While the shared Ethical Council between AP1, AP2, AP3 and AP4 engages with 150 to 200 companies per year, AP4 engages with 10 to 15 companies per year via intensive negotiations.[139] Moreover, AP4 invested in a green bond for the first time in the first half of 2013.[140]

Barriers

Unexpectedly, no barriers during the internalization process of the decarbonization idea are known. The whole organization was immediately supportive of decarbonization. No changes in personnel and responsibilities needed to be made either.[141] A reason for that might have been the Swedish population's general acceptance of the fact of climate change realities and its effects on financial returns, combined with an environmentally conscious constituency. Another reason might be the strong credibility of Mats Andersson, AP4's CEO, which he had gained while

successfully turning around the fund in the previous years, and making it outperform its competitors, namely AP1, AP2, and AP3. Moreover, Mats Andersson's clear communication of his goal to keep fulfilling AP4's fiduciary duty by decarbonizing, while not compromising on financial returns, disarmed potential opponents in advance. Looking into the future, it can be expected that AP4's decisive measures to lower its portfolio's carbon intensity while financially outperforming all other Swedish buffer funds, will create significant incentives for latter funds, as well as foreign pension funds, to go down the same avenue and lower the carbon intensity of their respective portfolios while improving financial returns.

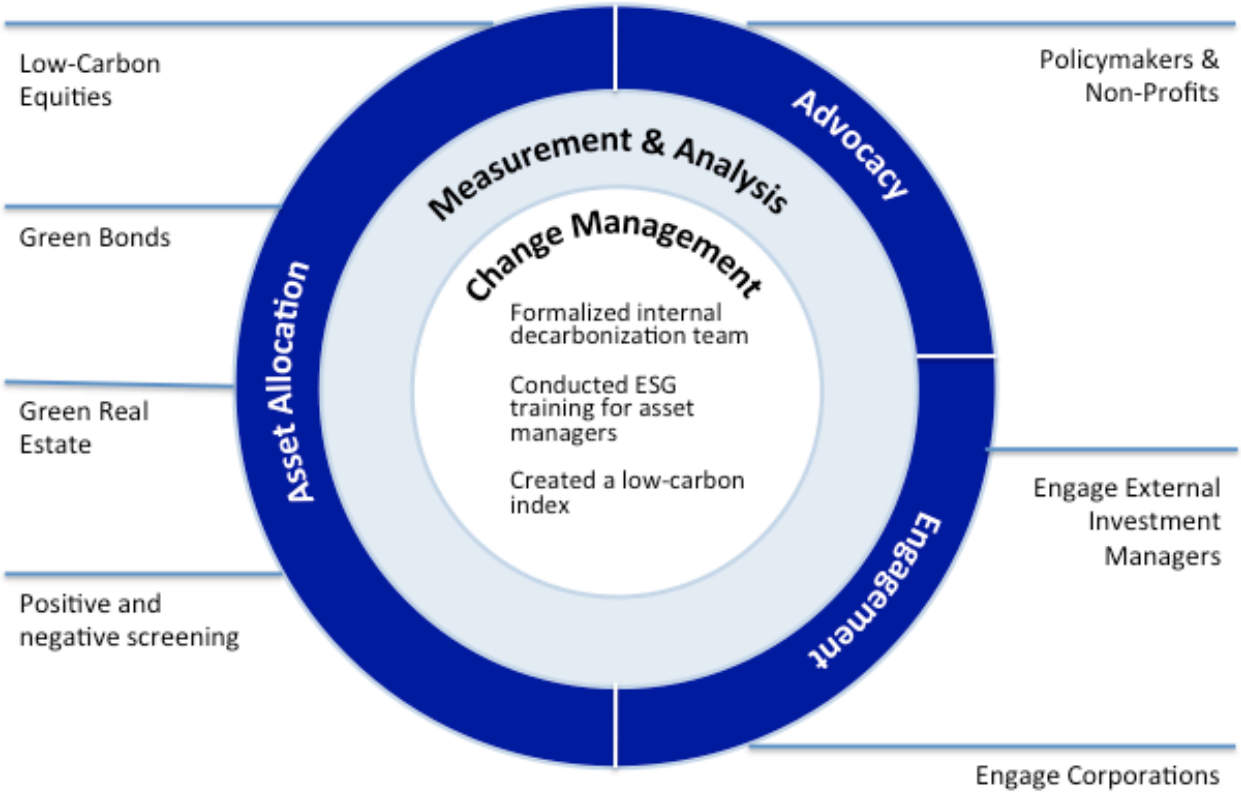


Figure 13: AP4 Climate Change Action Framework

Strategies to Address Climate Change Risks and Opportunities

Engagement and Advocacy Strategies

Engage Corporations

On a yearly basis, the ethical council from AP funds engages around 100 to 200 companies and furthers dialogue with 10-15 companies globally which it considered "intensified dialogue."
Engage External Investment Managers

The fund has invested in the Governance of Owners Japan engagement fund. Through the joint venture, it enables companies and asset owners to avoid complications that may arise from cultural and linguistic differences. In addition, external asset managers that manage AP4 funds are required to follow a unique and customized ESG policy.

Asset Allocation Strategies

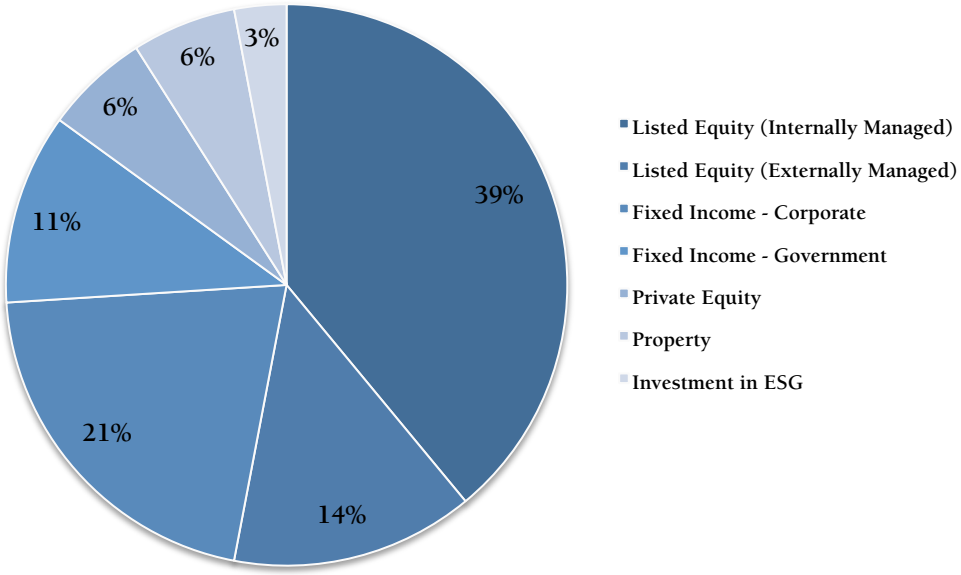


Figure 14: AP4 Asset Class Allocations

Invest in Green Bonds

The overarching opinion of the investment managers at the fund has been that green bonds do not currently have the kind of market that traditional fixed income has. Therefore, the lack of illiquidity has been a reason for the fund not to invest in these issues. Investing in green bonds took place for the first time in 2013. However, the financial performance of the green bond isn't very promising as of today. AP4 has also looked at different issues of bonds, but has decided against it since the availability of similar bonds in the secondary market has been priced competitively. Having said that, the fund keeps itself open to future subscriptions in the asset class provided the investment criteria for fixed income that the fund has set is met. The exclusion list that the company maintains extends to fixed income. Wal-Mart was one company that did not meet the stringent ESG requirements, and as a result, AP4 decided to divest from the bond holding.

Invest in Low Carbon Listed Equities

During 2012, the fund invested in a green stock index in the US, which has a low GHG strategy that excludes companies with the greatest GHG emissions. It also favors companies that work to minimize their GHG footprint. In emerging markets, the fund is employing a similar strategy that

drops both companies with high GHG and companies with extensive fossil fuel reserves. In other words, worse performers (GHG as indicator) in each of the sectors are dropped.

Invest in Green Real Estate

The fund has invested in 3 real estate companies and all of them are signatories and report to GRESB. In the last few years, AP4 has expanded within the real estate strategic asset class. The fund has chosen to essentially directly own real estate companies, like Rikshem, which offers greater opportunities to exercise active corporate governance. Direct ownership is both cost-effective and transparent and is expected to increase opportunities for good expected returns. By 2014, the market value of AP4's real estate position was almost SEK 15 billion (or $1.98 billion USD), corresponding to almost 6% of the fund's total assets. Return during the year was 27.2%, for an active profit contribution of 3.2 billion SEK (or $0.42 billion USD). The active real estate position generated an active return contribution of 0.1%, corresponding to more than 170 million SEK (or $22.49 million USD).

Decarbonization Impacts

AP4 has vastly integrated GHG measuring into its investment strategy. It is particular true when it comes to investing in green listed equities. It reduces the overall carbon intensity of the fund's portfolio by excluding companies that have high GHG emissions. Within their emerging markets portfolio, the screening of companies with high reserves of fossil fuels ensures that the portfolio's carbon footprint is maintained at a sustainable level.

Social Impacts

AP4 engaged Goldcorp for a mine in Guatemala and conducted a Golden Eye Review (GRE). The Goldcorp engagement was carried out to better the working condition of miners. The engagement was mostly covering health and safety issues. There were also improvements in water management as compared to the GER visit in 2008. Nonetheless, water recycle rate has also improved up to 97%.

Green bonds will ultimately lead to investments in projects that support economically disadvantaged areas. AP4 is making positive social impacts via Green bonds. The first green bond was issued with the specific mandate that the proceeds be used for social impact through the Development Bank of Korea. The other causes that were subscribed to include African Development Bank, which also has positive social impacts, generated from the issuance of the bond.

Rikshem participates in the social sphere by trying to improve the situation for young people in the neighborhoods where Rikshem has a presence. It supports a mentoring program for young people aged 13 to 17 years and partners with local companies by offering summer jobs to about 80 young people who lived in the company's buildings in several cities.

Portfolio Financial Performance Impacts

AP4 invested in indices and excluded the companies on the basis of their GHG footprint. The US low green house gas strategy that includes 350 companies has done considerably better than related indices, such as the S&P 500. In the scenario that carbon becomes a burden to these companies, the low-green house gas strategy will yield extra returns at approximately the same risk.

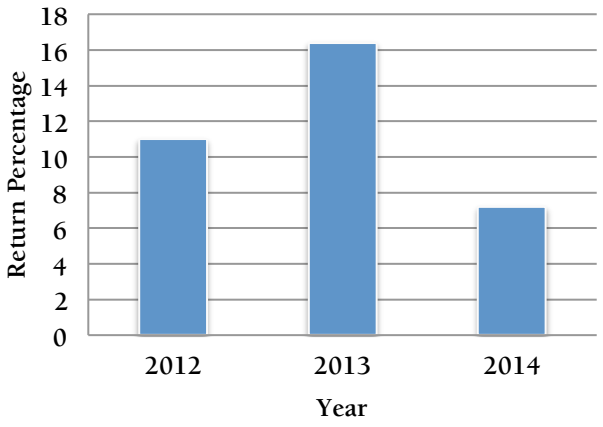


Figure 15: AP4 Annual Portfolio Returns

The real estate segment also brings positive financial performance impacts. Investments in residential properties in cities with high population growth have historically produced high returns at relatively low risk. In the last few years, AP4 has expanded within real estate in its strategic management, like with Rikshem. Such movement not only creates positive social impacts, as discussed above, but also suggests continued stable rental income in the foreseeable future.

Lastly, the low carbon strategy that the fund is implementing has not had a considerable impact on the volatility of the fund's holdings.

Glossary

AP2	Andra AP-fonden
AP4	Fjärde AP-fonden
AUM	Assets Under Management
CalPERS	California Public Employees Retirement System
CalSTRS	California Teachers Retirement System
EAFP	UK Environment Agency Pension Fund
ERAFP	Retraite Additionnelle de la Fonction Publique
ESG	Environmental, Social, Governance
FSC	Forest Stewardship Council
GHG	Greenhouse Gas
GRESB	Global Real Estate Sustainability Benchmark
GRI	Global Reporting Initiative
IFC	International Finance Corporation
LGS	Local Government Super
OECD	Organization for Economic Cooperation and Development
PEFC	Programme for the Endorsement of Forest Certification
PFZW	Stichting Pensioenfonds Zorg en Welzijn
PGGM	Pensioenfonds voor de Gezondheid, Geestelijke en Maatschappelijke belangen
PRI	Principles for Responsible Investment
SASB	Sustainability Accounting Standards Board
SRI	Socially Responsible Investment
UNEP FI	United National Environmental Program Finance Initiative
US SIF	The Forum for Sustainable and Responsible Investment

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