MEKETA
INVESTMENT GROUP

Vermont Pension Investment Commission ("VPIC")

Climate Change Investment Exposures and Policy Options

January 2024

Meketa Project Team

Project Director: Sarah Bernstein, Managing Principal, Head of Sustainability
Project Strategic Advisor: Stephen McCourt, Co-CEO
Stephen MacLellan, Managing Principal, Consultant
Zach Stevens, Sr. Quantitative Research Analyst
Sabina Panthi, Sr. Investment Analyst - ESG
Matthew Parla, Client Service Assistant

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Preface

Overwhelming scientific evidence indicates that climate change has, and will have, major impacts on all aspects of life on our planet. These changes are creating material risks and opportunities for institutional investors that are expected to be material throughout the 21st century. Determining how VPIC can best address investment climate risks and opportunities is an ongoing process. Meketa's report was developed for VPIC within the context of VPIC's ongoing policy evolution. Our 2023 Climate Change Investment Exposures and Policy Options project for the Vermont Pension Investment Commission ("VPIC") provides data, analysis, and investment policy options for consideration as the VPIC continues to develop its strategy to address long-term material investment risks and opportunities associated with climate change.

The project scope of services includes:

a. A risk assessment of the portfolio's exposure to climate-related risks and a decarbonization transition plan for pension holdings that seeks to support VPIC's ability to uphold its fiduciary duty and meet the needs of the pension liabilities and aligns with the Paris Agreement goals.
b. Guidance to efficiently and cost effectively improve the VPIC established multi-dimensional approach to climate-related considerations within the portfolio while maximizing returns and minimizing risks. This may include the use of engagement, executing shareholder rights, divestment, investment, or other measures.
c. Guidance on how to measure climate-related risks within the portfolio, set climate related-targets and/or goals, and transparently report on progress.
d. An evaluation of existing and recommended new investor coalitions and reporting resources that could make VPIC more efficient in its climate-related work.
e. Climate scenario analysis on the portfolio holdings.
f. The quantification of the impact of fossil fuel divestment from the VPIC portfolio holdings on or before December 31, 2030, with an exception for private market investments that are to be divested on or before December 31, 2040.
g. Additional information and analysis upon reasonable request of the VPIC Staff and agreed upon by Meketa.

To complete the scope of services, in this report, we highlight global climate trends; analyze the VPIC portfolio's current exposure to climate risks and opportunities by analyzing the VPIC's funds and underlying portfolio companies; present portfolio-wide climate scenario analyses; and provide policy options for the VPIC to consider as it continues its efforts to implement a successful climate transition strategy consistent with the VPIC's fiduciary duty and the terms of the Paris Agreement. Key climate-related issues, including biodiversity and physical climate risks and opportunities, are not addressed in this report. In our opinion, such issues should be considered as VPIC develops its overall climate-related investment strategy.

We thank the VPIC for engaging Meketa to work on these critical issues. We thank the VPIC Staff, VPIC investment managers for their insights and information, and MSCI, BlackRock and LGIMA for providing information on newer climate-related indexes, and examples of passive and active climate-related investment vehicles that helped make this report possible.

Overview

The 21st century will likely mark both rising physical climate risk and accelerating global efforts by regulators, governments, businesses, and investors, to address the drivers and impacts of climate change. Climate change, including an implementable transition from fossil fuel energy to renewable energy, are critical investment issues that are not going away.

Climate investment issues were primarily first raised by climate activists twenty to thirty years ago. Today, climate change is a global mainstream investment issue across all asset classes and is recognized as a systemic risk and opportunity. As science developed, and the 2015 Paris Accord articulated the goal of net zero emissions by 2050 to keep global warming below 2 degrees C. above pre-industrial levels, attention from many institutional investors grew and focused on global energy transition needs. To reach net zero emissions by 2050, the International Energy Agency estimates that annual clean energy investment worldwide would need to more than triple by 2030 to around $4 trillion per year [1].

Institutional investor consideration of climate risks and opportunities has taken many forms. They range from broad divestment of fossil fuel energy supply companies, to actively engaging with companies on transition strategies and to investment in climate solutions and in companies transitioning across the economy.

Energy transition Risks and Opportunities

Energy transition is systemic. Over time, energy supply and consumption are expected shift away from fossil fuels. A transition from fossil fuels to sustainable sources appears to be underway in every economic sector and in every part of the globe.

It is important to recognize that while the energy transition unfolds, fossil fuel energy is expected to be a key part of the global economy for decades.

Transition efforts are garnering greater support from government initiatives domestically and abroad, along with companies, advocacy groups and the public.

Transition risks can be material even in renewable energy sectors due to potentially swift technology changes, labor and skill shortages in new sectors, key supply shortages, and macro factors such as the current high interest rate environment.

Energy transition risks and opportunities are escalating across the global economy.

In our opinion, these developments necessitate re-evaluations of risk and return, prudent investment strategies and actions that may better manage portfolio long-term risk and return.

[1] https://www.iea.org/reports/net-zero-by-2050, November 2023.

Institutional Investor Market Developments

Investment strategies are evolving to include focus on energy transition risks and opportunities across the economy.

Passive equity strategies exemplify this trend. Early climate-related passive equity strategies focused on broad ex-fossil fuel indexes. These were followed by economy-wide low carbon emissions efforts. Paris Aligned top-down equity indexes emerged more recently that target economy-wide carbon emission reductions at a set rate. More focused energy transition strategies increase investments in companies transitioning from brown to green and investments in climate solutions companies. Energy transition investment strategies are becoming more common across asset classes, rather than being concentrated in public market equities.

As investors concerned about climate risk seek ways to implement decarbonization and net zero investment strategies, differences between decarbonizing an investment portfolio and contributing to decarbonizing the economy have gained attention.

Proxy voting and engagement

Proxy voting on climate issues more regularly escalates to votes against Board members at companies that do not appear to be actively adjusting their business model to benefit from the energy transition.

Engagement efforts that historically focused primarily on institutional investors and/or investor coalitions engaging with portfolio companies is shifting to also address how asset managers engage with portfolio companies, in both public and private markets. Recognition of the critical role of government policy and regulators has increased institutional investor attention to engaging with government entities.

Climate data

Climate transition-related corporate reporting continues to improve with efforts to harmonize reporting on decision-useful investment metrics and new regulatory reporting requirements. Data availability is an essential element of investment analysis. In general, we found sufficient, but far from complete, quality climate data, with more data available for larger companies than for smaller companies and more data for publicly held companies than for privately held companies. The quality of climate data on companies is expected to continue to improve; and the coverage of companies is expected to continue to expand. Climate metrics continue to be developed and refined, potentially enhancing investor's ability to analyze their climate risks and opportunities.

As investors concerned about climate risk move toward seeking ways to implement decarbonization and net zero investment strategies, the difference between decarbonizing an investment portfolio and contributing to decarbonizing the economy has gained attention.

VPIC Investment Portfolio Findings

Meketa surveyed VPIC's public and private markets investment managers to gain information on each strategy's climate monitoring and attention to climate issues in their investment process. Every manager responded to the survey. We also assessed VPIC's public markets investment strategies using ISS ESG data to calculate VPIC's public markets exposure to carbon emissions, fossil fuel holdings, renewable energy generation and green revenues.

VPIC carbon emissions

→ No emissions data is available for 38% of the VPIC portfolio assets under management (AUM). An additional 9% of AUM are estimated, not reported. In total, VPIC reported emissions data covered approximately 53% of the total portfolio AUM.

→ Most Scope 1+2 emissions were in passive global equity, the largest sub-asset class by AUM.

→ VPIC private market carbon emissions: Eight of the 39 private markets funds provided carbon emissions data, representing five of 25 private equity funds, one of nine private credit funds, and two of five real assets/real estate funds.

VPIC fossil fuel exposures

→ The top 170 publicly listed fossil fuel companies (identified in the MSCI ACWI ex-fossil fuel index) represented 2.5% of the VPIC total public equity and fixed income AUM. The largest number of fossil fuel companies were in VPIC's global equity and international equity portfolios. In total, VPIC public market investments included exposure to 149 of the top 170 fossil fuel companies.

→ Twenty three of the 149 VPIC public market fossil fuel companies were also among the top 200 global renewable energy generation companies.

→ VPIC private markets included 18 funds with some investment in fossil companies. In total, the private market exposure was $1 million of the $1.2 billion VPIC had invested in private markets.

VPIC investment manager clean energy and low carbon economy approaches

→ All VPIC managers responded to the climate survey. Most indicated that they consider material climate risks while some stated that they consider low carbon economy investment opportunities. Many VPIC managers are signatories to climate related investor efforts, while two have a public net zero pledge – one public real asset, and one private real assets manager.

Climate scenario analyses findings: incorporating climate change reduced 20-year annualized expected return, increased risk, and displayed wider distributions of returns in each asset class (Appendix V).

In VPIC global and international equity, the percent of total portfolio carbon emissions was higher than the percent of total portfolio AUM.

Passive equity emissions percent of total emissions was higher than their AUM percent. Active equity emissions percent of total emissions were lower than their percent of AUM.
VPIC had minimal exposure to fossil fuel energy companies.

Climate Investment Policy Approaches

As VPIC considers how to further develop its investment strategy to reduce climate risks and improve climate investment opportunities in ways that seek to support VPIC's ability to uphold its fiduciary duty, meet the needs of the pension liabilities, and align with the Paris Agreement goals, Meketa offers four broad policy approaches. We find no broad consensus in the institutional investment community on best practices. We find increasing attention to transitioning in the real economy through engagement, investment in climate solutions and transitioning companies and industries. The approaches are not mutually exclusive. There are many variations within each approach.

Figure 1: Climate Investment Policy Approaches

Approach	Implementation	Pros	Cons
Climate Aware (Current)	Maintain existing approach to investment climate risks and opportunities.	No additional time or resources required	Low-to-medium expected contribution to lowering real economy climate risks and increasing risk-adjusted return of investment portfolio.
Energy Supply Exclusion (Broad FF Exclusion)	Exclude fossil fuel suppliers; maintain rest of existing approach to climate risks and opportunities.	Minimal to medium implementation costs and resources, depending on approach to private markets and immediate versus long-term approach.	Low expected contribution to lowering real economy climate risks and expected low contribution to improving risk-adjusted return of investment portfolio over the next 10-20 years. Reduces investment options in asset classes such as private credit and infrastructure. Would constrain VPIC engagement efforts.
Portfolio-wide Net Zero Goal	Adopt a portfolio-wide net zero goal of, for example, 7% annual reduction in emissions employing investment shifts to reduce portfolio emissions, increase investment in climate solutions and engagement.	Expected long- term contribution to lowering real economy climate risks and to potentially improving risk-adjusted return of the investment portfolio.	Systematic annual reduction in portfolio emissions may be misaligned with economy emissions. Most time and resource intensive. Implementation would likely evolve as conditions change.
Portfolio-Wide Real Economy Net Zero Approach	Take greater advantage of opportunities and attention to material risks by increasing investment in climate solutions and engagement; using backward-looking and forward-looking metrics to monitor engagement and investment strategies.	Expected greatest long-term contribution to lowering real economy energy transition risks and to potentially improving risk-adjusted return of the investment portfolio	Expected to require more internal (a full-time investment staff person) and outsourced (regular monitoring of climate metrics for portfolio, managers, and underlying companies) to amplify VPIC engagement and climate solutions investment efforts. Foregoes big picture direction that a Net Zero pledge can bring.

Each of these broad climate policy approaches may overlap, and each bring pros and cons.

I. Global Climate Trends

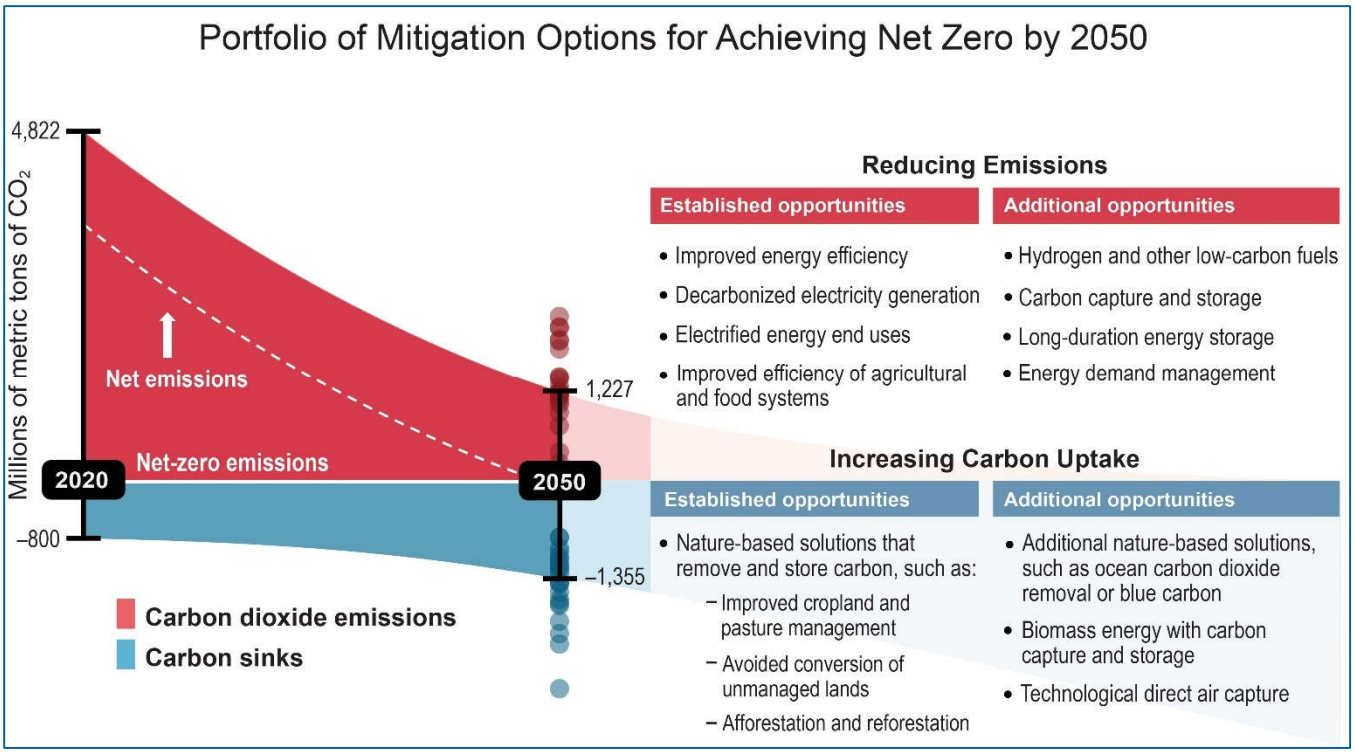
An energy transition towards clean energy is underway. The transition is systemic. It encompasses changes in energy supply and demand. This section is intended to provide a backdrop for developments on climate investment issues including:

- Energy Transition Investment Opportunities
- Climate Related Risks
- Institutional Investor Market Developments

Energy Transition Investment Opportunities

Reaching net-zero emissions will require deep reductions in emissions and carbon removal from the atmosphere to balance the hard-to-abate sectors. The figure[1] below shows established investment opportunities for reducing emissions and increasing carbon sinks, including upcoming technological options such as hydrogen, alternative fuels, carbon capture, and storage.

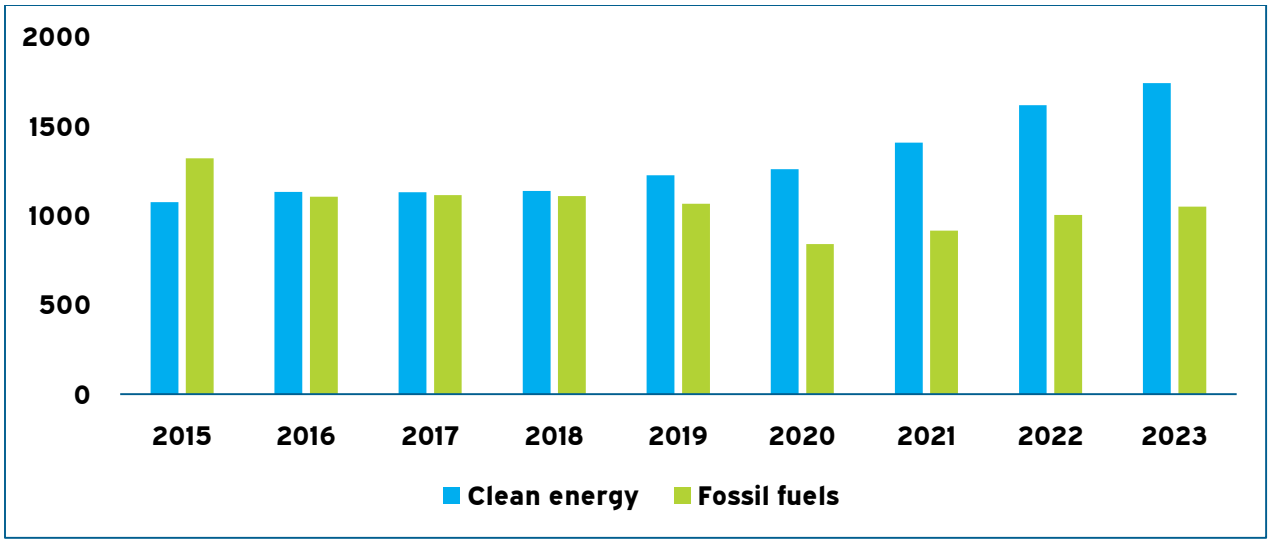
Figure 2: Low Carbon Economy Opportunities[1]



[1] Source: EPA; University of California, Irvine; NOAA NCEI; and CISESS NC. Adapted from: Fifth National Climate Assessment (globalchange.gov)

According to the International Energy Agency (IEA) World Energy Outlook 2023 report, clean energy investment was expected to reach $1.7 trillion vs. $1 trillion investment in fossil fuels in 2023. Clean energy investments include renewables, energy efficiency, nuclear energy, electric vehicles, alternative fuels, and carbon capture utilization and storage. While this is good news, IEA warns that the total spending in clean energy is still far from the estimated $4 trillion annually needed to achieve net zero by 2050.

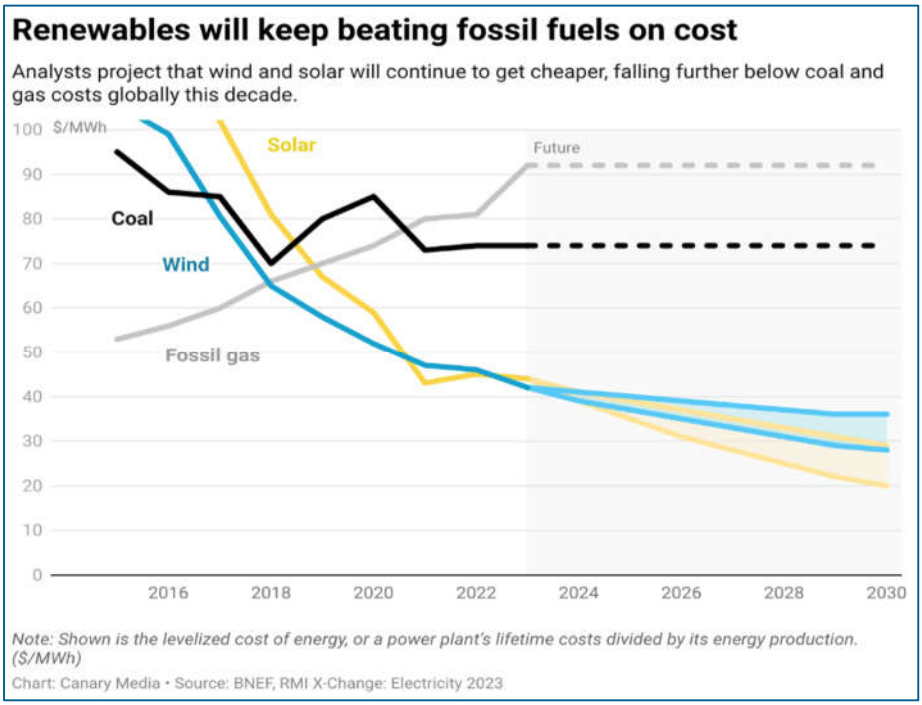
Figure 3: Clean energy global investment continues to widen lead over fossil fuels (in $billions)[1]



By 2030, technology improvements could slash today's prices by a quarter for wind and by half for solar, according to the authors of a recent report from clean energy think tank RMI[2]. Clean technologies are not all yet scalable.

[1] Souce IEA Global energy investment in clean energy and in fossil fuels, 2015-2023 – Charts – Data & Statistics - IEA
[2] X-Change: Electricity - RMI

Figure 4: Renewables expected to keep beating fossil fuels on cost[1]



There are nascent clean energy investments in the traditional energy sector. In 2022, the oil and gas industry represented a relatively small percent (1.2%) of total global investments in clean energy. More than 60% of the oil and gas industry investments in clean energy came from four companies: Equinor, TotalEnergies, Shell and BP. Each of these oil and gas majors spent approximately 15-25% of their total budgets on clean energy[1]. From a revenue perspective, TotalEnergies was both one of the largest fossil fuel reserve owners and among the top 200 renewable energy generation companies.

Energy transition investment opportunities beyond the energy and power sectors are becoming more prevalent across asset classes and industries. Investment opportunities range from transportation, such as electric, hybrid and hydrogen powered vehicles; to construction materials such as low carbon steel and concrete, technology developments for energy efficiency in commercial and residential real estate, and agricultural shifts to products that reduce GHG emissions including carbon and methane emissions.

There is an acceleration in the number of companies adopting net zero targets. As of September 2023, 54% of companies in the MSCI ACWI had a Net Zero Target (3% of companies with SBTi verification), which is a +50% increase since July 2022. Additionally, 55% of MSCI ACWI companies had an Interim Target (25% of companies with SBTi-verification), a +25% increase since July 2022. Notably, more than two-thirds of Energy and Utilities companies had targets in place, while financial companies are behind other eligible sectors on setting verified Science-Based targets[1]. Institutional investor engagements have encouraged reductions in carbon emissions and adoption of net zero targets. Divestment may reduce and potentially undermine institutional investor engagement efforts.

[1] IEA November 2023.

Energy Transition Risks

In addition to macroeconomic shifts and geopolitical development, companies throughout the economy face potential risks and opportunities from energy transition policies, climate-related reporting requirements, technology, and potential stranded asset risks.

Clean Energy Policy Developments

The Inflation Reduction Act of 2022 ("IRA") marks the most significant action the US government has taken on clean energy and climate change in US history. The IRA provides incentives for clean-energy manufacturing and production within the US. Estimates of IRA-related spending and private sector investment have increased substantially since its initial announcement. By one estimate, IRA investments are projected over the next 10 years to add an average of 912,000 jobs per year through combined annual public and private investments of an estimated total of $98 billion.[1] Compelling investment opportunities are likely to arise from the IRA's provisions. As of June 30, 2023, there was $213 billion in new clean investment across the economy over the past year—a 37% increase from the previous year and a 165% increase from five years ago[2]. The IRA is been identified as a key factor in this growth..

The EU agreed on new restrictions on methane emissions aimed at Europe's energy sector and oil and gas importers to crack down on this potent source of global greenhouse gases. Oil and gas companies will have to monitor, detect, and repair methane leaks across the EU. The restrictions will also apply to importers of fossil fuels starting in 2027.[3]

The IRA prompted similar stimulus programs and policy changes in some countries. The EU launched a Green Deal Industrial Plan to make subsidizing clean energy projects easier. Canada announced significant clean energy tax credits in its 2023 federal budget.

In contrast to the IRA, several governments have implemented disincentives to emitting carbon. Roughly 40 countries and more than 20 cities, states, and provinces already use carbon pricing mechanisms that cover roughly half of their emissions, translating to about 13% of annual global greenhouse gas emissions.[4] In North America, neither the U.S. nor Canada have federal carbon pricing mechanisms in place. California and Quebec began their carbon cap and trade systems nearly a decade ago, along with the Regional Greenhouse Gas Initiative (RGGI). Washington State more recently launched its Climate Commitment Act (CCA) cap and invest legislation that covers 75% of the state's economy.

Efforts in other geographies are also prompting international discussion for potential adoption. The EU enacted the world's first Carbon Border Tax, which aims to level the emissions playing field between domestic production and imports.[5]

[1] Source: Political Economy Research Institute of UMass Amherst, "Job Creation Estimates Through Proposed Inflation Reduction Act," August 2022.
[2] https://rhg.com/research/clean-investment-monitor/
[3] Source: Financial Times "EU rules on methane leaks to hit oil and gas importers" (https://www.ft.com/content/d69e274f-d3f0-40b2-ac3e-79b4bc6c264c)
[4] Source: World Bank, "Carbon pricing." Carbon pricing mechanisms refers to the dollar pricing of the "real-world" cost of carbon emissions.
[5] Source: European Commission, "Carbon Border Adjustment Mechanism."

Climate-related reporting

Climate-related reporting is evolving rapidly with the release of significant proposals in the EU, the UK, the US, and other countries globally. Mandatory disclosure requirements are on the rise. In the US, the SEC is expected to adopt final rules requiring detailed disclosure by companies of climate risk and opportunities. California signed two new rules into law on Oct 7, 2023. Under the new Climate Corporate Data Accountability Act, US companies with annual revenues of US $1 billion or more will have to report both their direct and indirect greenhouse gas emissions starting in 2026 and 2027. The second law, the Climate-Related Financial Risk Act, requires companies with $500 million or more in revenues to report their financial risk related to climate change and their plans for risk mitigations[1]. Because California is the fifth largest economy in the world the effect of these laws can have a profound impact on companies that have operations in California.

EU's Corporate Sustainability Reporting Directive (CSRD) went into effect in January 2023, requiring comprehensive disclosure on the impact of corporate activities on the environment, society and requires the audit of reported information. It will impact companies that operate in the EU, including US companies with EU subsidiaries.

Due to the growing financial impact of climate-related risks, investors are increasingly calling for more disclosure from companies. Historically, much of the climate-related data came from voluntary efforts based on one or more of the several reporting frameworks developed by non-profit organizations such as the Global Reporting Initiative (GRI), Task Force on Climate-Related Financial Disclosure (TCFD), CDP (previously Carbon Disclosure Reporting), and Sustainability Accounting Standards Board (SASB).

To harmonize the reporting across different frameworks and provide a global baseline for reporting standards, the International Sustainability Standards Board (ISSB) adopted two reporting standards in June 2023, one on climate-related risks and a second on other sustainability related information. Recently, the Taskforce on Nature-related Financial Disclosures (TNFD) developed a set of disclosure recommendations and guidance for organizations to report and act on evolving nature-related dependencies, impacts, risks, and opportunities[2]. This historic framework is designed to enable investors to compare and assess nature related risks and opportunities.

Regulatory and voluntary climate reporting standards are not harmonized globally, although major strides have been made to harmonize disclosure requirements on decision-useful investment disclosures.

US regulatory climate disclosure developments, both in California and the anticipated SEC final climate disclosure rules reflect trends towards greater climate disclosure. Legal challenges are expected to both the SEC and California climate disclosure rules.

[1] https://www.pbs.org/newshour/nation/analysis-the-potential-global-impact-of-californias-new-corporate-climate-disclosure-laws
[2] https://tnfd.global/

Stranded assets risk

Attention to stranded assets from the energy transition has often concentrated on larger fossil fuel energy supply companies that emit the largest amount of absolute GHG emissions. As the transition proceeds, investment research on a broader range of companies is emerging. For example, a leading fixed income credit rating provider, Fitch, found that: "Majors, due to their size, asset mix, and business diversification, are generally in a stronger position to manage the energy transition successfully. However, mid-caps and juniors will face difficulties as they generally do not have the cash and/or scale, and in-house expertise and capacity to develop robust climate strategies, finance decarbonization effects, and shift their business model while ensuring ongoing profitability."[1]

Potentially stranded assets and financial stress that arise from the energy transition may be seen in many sectors, including, for example, the transportation and food sectors, as consumer preferences and regulatory regimes shift to support lower carbon alternatives.

Litigation risk

As the transition evolves, large fossil fuel supply companies may face increasing costs from litigation settlements. In September 2023, California Governor Newsom announced the filing of a lawsuit against five of the largest oil and gas companies in the world – Exxon Mobil, Shell, Chevron, ConocoPhillips, and BP, and the American Petroleum Institution (API) for allegedly engaging in a decades-long companies of deception and creating state-wide climate change-related harms in California. Increasing litigation against fossil fuel companies poses additional potential investment risk to these companies. At the same time, clean energy projects and companies from clean hydrogen to wind energy are not immune to potential increased litigation costs based on potential threats to established communities.

Technology risk

Energy transition risks may occur for low carbon companies and traditional fossil fuel-based companies as new technologies come to commercial fruition. For example, hydrogen is emerging as a key potential opportunity to help shift toward global Net Zero targets. It is being pursued in many industries that are heavy energy users, from transportation to technology. In technology, large companies such as Microsoft are working to move off diesel to support their high energy intensive data centers with hydrogen. Most hydrogen fuel is very carbon intensive to produce. In July 2022, an Australian company, Hysata announced a breakthrough to make green hydrogen cost competitive. This is just one example that may change trends in the types of renewable energies that are produced and used, and potentially raise long- term risks to more established renewable energy technologies and products.

As low carbon alternatives continue to grow but are not yet a broad part of the market, additional transition cost issues and bottlenecks to adoption are becoming evident. For example, in addition to potential mineral shortages, and higher prices, for EV batteries, in 2024, Hertz announced the sale its fleet of 20,000 electric vehicles citing high costs of repair compared to gas-powered vehicles. Because EVs are currently generally newer and smaller-volume models, their repairs require more manufacturer-sourced parts, with fewer less expensive parts available from aftermarket or third-party suppliers, and there are fewer people trained to do such repairs.

[1] Sustainable Fitch, Sustainable Insight | 19 July 2022

Institutional Investor Market Developments

Investment strategies

Institutional investor market developments show significant growth in available investment strategies from early broad divestment approaches to strategies focused more on climate transition in the real economy and increased engagement efforts across asset classes.

Figure 5: Global Climate Fund Assets[1]

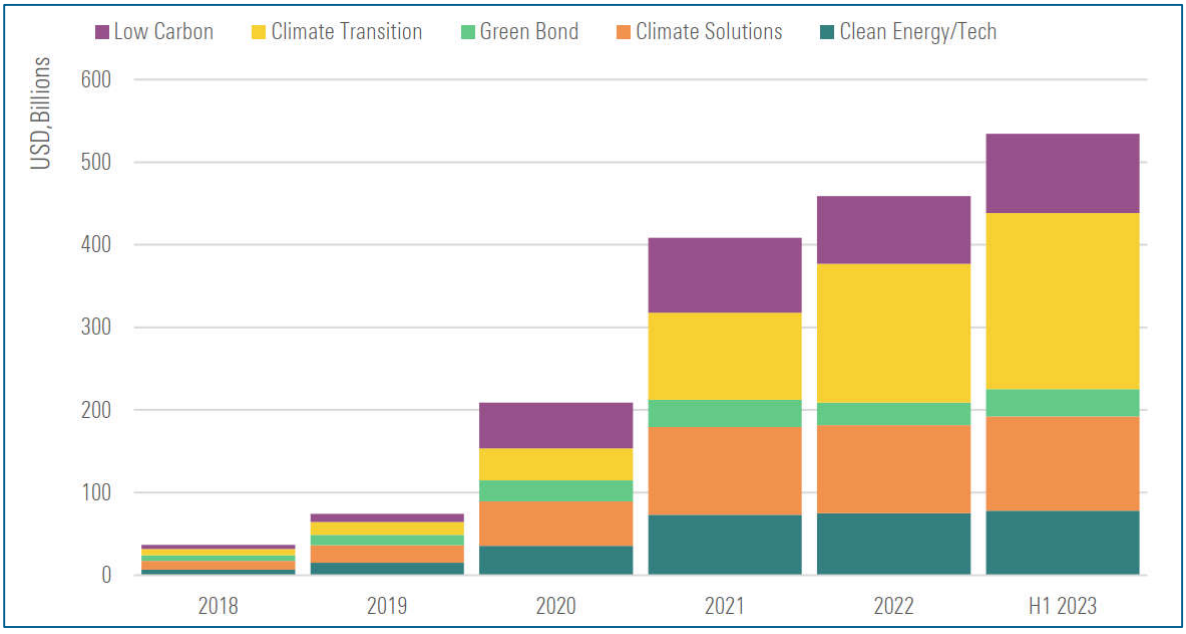
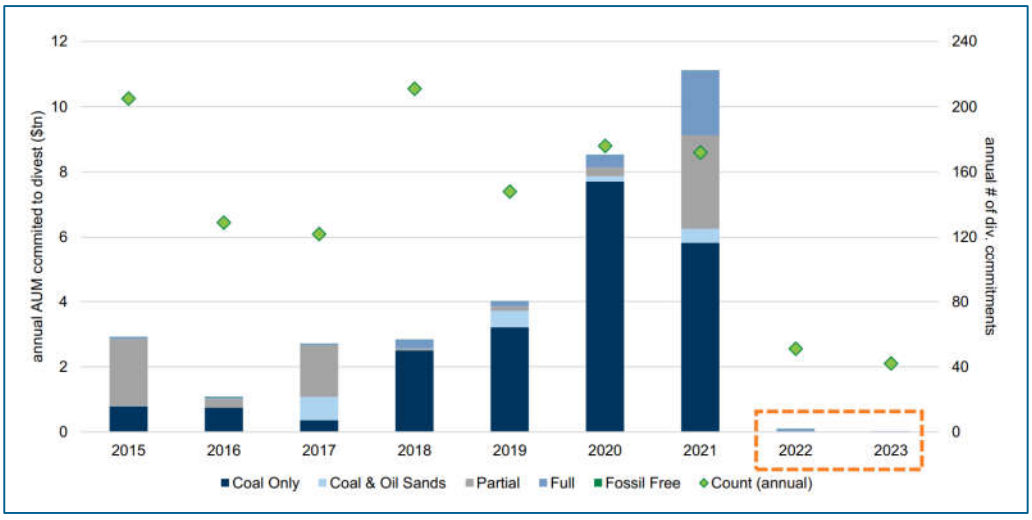


Figure 6: Fossil fuel-related divestment commitments by AUM $ tn (LHS) and count (RHS)[2]



Divestment commitments slowed. Investments in climate transition and solutions have grown.

[1] Source: Morningstar Direct.
[2] Source: Goldman Sachs: Research Unplugged: GS SUSTAIN: Navigating Sustainable Investing Uncertainty & Opportunity in 2024

Figure 7: Gross Trailing MSCI Index Returns as of October 31, 2023[1]

	MSCI ACWI	MSCI ACWI LOW CARBON TARGET	MSCI ACWI EX FOSSIL FUELS	MSCI ACWI CLIMATE CHANGE	MSCI ACWI CLIMATE PARIS ALIGNED
Inception Year	2001	2014	2014	2019	2020
No of securities	2,948	1,418	2,773	2,655	913
Returns (%)					
YTD	7.19	6.88	7.42	11.36	5.74
1 Year	11.06	10.71	11.26	13.85	9.11
3 Years	7.18	6.67	6.08	7.06	5.79
5 Years	8.00	8.02	8.05	8.94	8.03
10 Years	7.36	7.31	7.72	7.98	7.70
Standard Deviation (%)					
YTD	14.05	14.04	14.31	15.28	14.43
1 Year	15.45	15.51	15.70	16.68	15.73
3 Years	17.13	17.19	17.20	17.98	17.56
5 Years	17.82	17.87	17.76	18.22	17.97
10 Years	14.51	14.55	14.43	14.75	14.59
Tracking Error					
YTD	NA	0.39	0.85	3.42	1.32
1 Year	NA	0.38	0.78	3.47	1.20
3 Years	NA	0.36	0.89	2.86	1.69
5 Years	NA	0.36	0.86	2.31	1.42
10 Years	NA	0.39	0.91	1.83	1.29
Sharpe Ratio					
YTD	0.25	0.22	0.27	0.56	0.12
1 Year	0.40	0.37	0.40	0.53	0.27
3 Years	0.31	0.28	0.24	0.28	0.22
5 Years	0.35	0.35	0.35	0.39	0.35
10 Years	0.43	0.42	0.45	0.46	0.45

Green Highlight = outperformed MSCI ACWI

Climate indexes include early ex-fossil fuels, and newer low carbon and transition indexes.

The MSCI ACWI Climate Change index outperformed the MSCI ex-Fossil Fuel Index in all trailing periods. The ex-Fossil fuel index marginally outperformed the parent MSCI ACWI index.

The MSCI ACWI Climate Change index risk-adjusted return outperformed the MSCI ACWI in every trailing period except the trailing three-year period and beat the ex-Fossil Fuel in all periods.

[1] Data Source: MSCI and eVestment. See Appendix I.

Figure 8: Calendar Year MSCI Index Returns and Risks as of October 31, 2022[1]

	ACWI	ACWI LOW CARBON TARGET	ACWI EX FOSSIL FUELS	ACWI CLIMATE CHANGE	ACWI CLIMATE PARIS ALIGNED
Returns (%)					
YTD 2023	7.19	6.88	7.42	**11.36**	5.74
2022	-17.96	-18.66	-19.95	-22.48	-20.47
2021	19.04	18.76	18.53	**20.65**	19.14
2020	16.82	17.5	19.13	**20.77**	19.63
2019	27.3	28.39	28.19	**28.81**	28.88
2018	-8.93	-9.29	-8.92	**-8.68**	-8.23
2017	24.62	24.24	25.45	**26.03**	25.71
2016	8.49	7.89	7.18	**7.32**	9.2
2015	-1.84	-1.29	0.03	**0.1**	-0.07
2014	4.71	4.96	**6.6**	5.66	6.05
Standard Deviation (%)					
YTD 2023	14.05	14.04	14.31	15.28	14.43
2022	21.14	21.19	21.12	21.77	21.51
2021	9.46	9.56	9.61	9.74	9.77
2020	26	25.96	25.33	25.5	25.7
2019	12.6	12.68	12.44	12.51	12.36
2018	13.47	13.35	13.5	13.71	13.28
2017	2.83	3	2.98	2.98	3.06
2016	11.27	11.39	11.38	11.61	11.67
2015	13.85	13.95	13.45	13.48	13.47
2014	8.81	8.77	8.56	8.54	8.82
Sharpe Ratio					
YTD 2023	0.25	0.22	0.27	0.56	0.12
2022	NM	NM	NM	NM	NM
2021	2.01	1.96	1.92	2.12	1.95
2020	0.62	0.65	0.73	0.79	0.74
2019	1.99	2.06	2.08	2.12	2.15
2018	NM	NM	NM	NM	NM
2017	8.41	7.81	8.25	8.46	8.12
2016	0.73	0.67	0.61	0.61	0.76
2015	NM	NM	NM	0.01	NM
2014	0.53	0.56	0.77	0.66	0.68

Green Highlight = outperformed MSCI ACWI

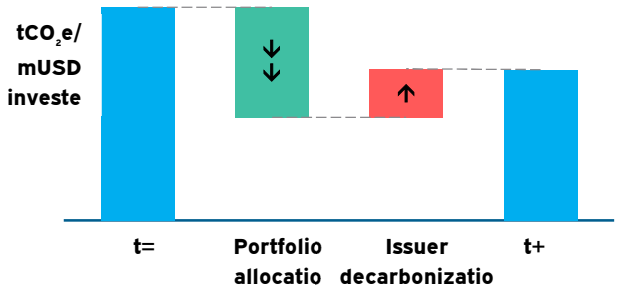
The MSCI ACWI Climate Change index slightly outperformed the ACWI ex-Fossil Fuel index in nine of the 10 periods ending October 2024 and outperformed the MSCI ACWI in 8 of 10 periods.

[1] Data Source: MSCI and eVestment. See Appendix I.
NM (not meaningful) due to negative calendar return and lower than the risk-free rate of return.

Paris Aligned investment approaches, aiming for 2.0°C or below, and Net Zero by 2050 approaches which aim for 1.5°C, often differ from low carbon target approaches by explicitly including forward-looking metrics in portfolio construction.

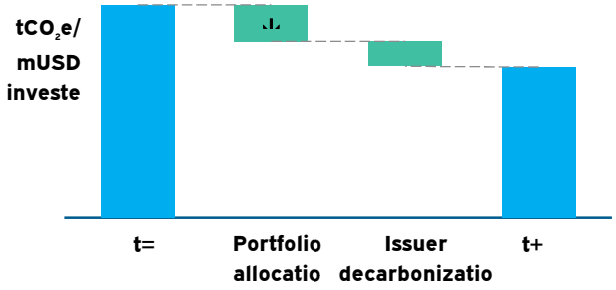
Figure 9: Prioritizing real decarbonization[1]

Divest from High Emitting Sectors and Companies: Link to real decarbonization: WEAK



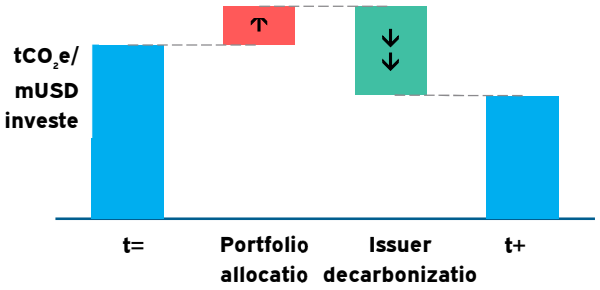
- ✓ Very effective at bringing the portfolio carbon footprint down immediately
- × Ignores real-world changes in emissions; may contain issuers that increase emissions
- × Disincentivizes investments in the sectors that are most critical for the transition

Invest in relative low emitters in late transition phase: Link to real decarbonization: MEDIUM to STRONG



- ✓ Very effective at bringing the portfolio carbon footprint down in the short and medium run
- ✓ Rewards a high willingness to transition
- × Fails to include investments that deliver the largest future decarbonization

Invest in relative high emitters in an early transition phase: Link to real decarbonization: VERY STRONG



- ✓ Maximizes real-world emissions reductions in the portfolio over time
- ✓ Avoids high emitters that refuse to transition
- × Unlikely to deliver immediate reductions in the portfolio carbon footprint

Using forward-looking metrics and active stewardship can result in a higher emissions portfolio than a low carbon target portfolio today, but one that can be more aligned with long-term emissions reduction.

[1] Glasgow Financial Alliance for Net Zero (GFANZ) encompasses NZAM, NZAOA, NZBA, PAOO, NZIA, NZICI and NZFSPA. Its role is to "guide the financial sector to support real-world decarbonization, not the false comfort of portfolio decarbonization" (https://www.gfanzero.com/press/gfanz-releases-guidance-on-credible-net-zero-transition-plans-and-seeks-public-input-to-accelerate-action/)

Engagement

Engagement can be a useful tool to help transition companies toward a net zero economy. A growing body of evidence suggests that engagement can add value to an investment portfolio, although not all engagements are successful.

One research paper ("ESG Shareholder Engagement and Downside Risk") notes that shareholder engagement can lead to lower downside risk, especially when addressing environmental topics (primarily climate change).[1] In this paper, the authors find that "Engagement is most effective in lowering downside risk when addressing environmental topics (primarily climate change). Further, targets with large downside risk reductions exhibit a decrease in environmental incidents after the engagement."

In the paper "Counterproductive Sustainable Investing: The Impact of Elasticity of Brown and Green Firms[2]", authors Kelly Shue and Samuel M. Hartzmark argue that sustainable investing that directs capital away from brown firms and toward green firms does nothing to improve green firms while forcing brown firms to emit more emissions. The paper notes brown firms don't have capital to deploy in new transition processes as they are costlier compared to continuing to increase current production. The report found that oil and gas companies face similar borrowing costs to other industries despite increasing climate and divestment trends. Since 2010, borrowing costs for oil and gas companies in the US and Europe have largely mirrored those for other debt issuers, except for during sharp falls in commodity prices, according to analysis by S&P Global Ratings.[3]

An October 2023 report studied whether green investors could influence corporate greenhouse gas emissions through capital markets, either by divesting their stock and limiting polluters' access to capital or holding polluters' stock and engaging with management. The report focused on US public pension funds, classifying them as green or non-green. The report found evidence that ownership and constructive engagement was more effective than confrontational tactics such as voting or shareholder proposals and that (a) corporate managers respond to the environmental preferences of their investors; (b) divestment in polluting companies may be counterproductive, leading to greater emissions; and (c) private markets may be able to address environmental challenges without explicit government regulation.[4]

Institutional investor engagement efforts were initially concentrated in public equities. Such efforts are broadening to encompass efforts across asset classes and generate new engagement focused investment strategies. For example, large multi-asset class managers, such as Schroders have reorganized their engagement efforts with portfolio companies to include both equity and fixed income portfolio managers in engagements with companies. LGIM launched a new equity strategy in 2023 to engage with underperforming transition companies to reduce emissions and create value[5]. Large

[1] https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2874252
[2] Counterproductive Sustainable Investing: The Impact Elasticity of Brown and Green Firms by Samuel M. Hartzmark, Kelly Shue :: SSRN
[3] https://www.ft.com/content
[4] Divestment and Engagement: The Effect of Green Investors on Corporate Carbon Emissions, October 2023(https://dx.doi.org/10.2139/ssrn.4601201). Summary: Divestment and Engagement: The Effect of Green Investors on Corporate Carbon Emissions (harvard.edu);
[5] LGIM

private market managers, such as Apollo, Blackstone, Carlyle and KKR are taking steps to engage with portfolio companies to reduce emissions over time. Institutional asset owners are also beginning to engage on energy transition risks based on their debt exposures to companies.

US foundations and endowments typically have more leeway to undertake mission driven investing than US public plans or pensions covered by ERISA. Some US foundations that were early leaders in fossil fuel divestment are pivoting to emphasize engagement and investing and engaging in transitioning companies. For example, the Rockefeller Foundation, established in 1913 by Standard Oil tycoon John D. Rockefeller, announced in November 2023 that it aims to make its $6 billion endowment net zero emissions by 2050. That makes it the largest private foundation in the US with a net zero by 2050 target. The foundation's evolving strategy centers on engagement with asset managers and others on data, disclosures, and decarbonization plans; investment in climate solutions and other climate-focused strategies; and influence by leading convenings and advancing collaboration, standards, best practices, and shared learning. This new policy expands beyond the 2020 commitment to divest its endowment from existing fossil fuel interests while refraining from all future fossil fuel investments to emphasize engagement and investing in transitioning companies.

Institutional investors, including VPIC, are engaging companies directly on near and long-term science-based greenhouse gas reduction targets aligned with the Paris Agreement's ambitions to better plan and track progress toward net zero pledges. By requesting that companies publish transition plans to achieve science-based targets across their full supply chain, shareholders can benchmark companies against their industry peers. It also allows companies to adjust their transition plan as economic conditions warrant, informed by near-term targets, and ensure they can mitigate climate-related risks efficiently over time. Companies can leverage advisory groups such as Science Based Targets initiative (SBTi) to verify their targets and mirror criteria recommended by groups like the Task Force for Climate-Related Financial Disclosures (TCFD), CDP, and the Transition Plan Taskforce to institute best practices and be comparable over time.

VPIC actively engages with companies and developed VPIC guidelines for proxy voting and engagement. VPIC reviews the guidelines annually with Segal Marco, who registers votes on behalf of VPIC. Below are some examples where VPIC led successful engagements on several topics.

→ Coterra on Direct Methane Measurement. The proposal received 74% support from shareholders at the AGM. VPIC had two engagement meetings in Feb and April with the company Coterra joined the Oil and Gas Methane Partnership 2.0 (OGMP 2.0), which was one of engagement asks.

→ APA engagement on Direct Methane Measurement: VPIC met with them in January before withdrawal and continued to engage the company on their efforts and progress going forward. APA joined OGMP 2.0, which was one of the engagement asks.

→ VPIC also engaged with Devon on Climate Aligned Lobbying, which received a withdrawal after it reached an agreement on their reporting for 2024.

VPIC currently works with multiple institutional investor organizations on both climate and social investment risks and opportunities: PRI, Ceres, CA100+, Majority Action, CII, Northeast Investors' Diversity Initiative, Human Capital Management Coalition, and the Investor Alliance for Human Rights

In a November 2023 report, the UN Convened Net Zero Asset Owner Alliance (NZAOA) called for 'smarter not more' engagement. Instead of engaging with thousands of companies, the NZAOA, representing asset owners with a combined $9.5 trillion in AUM urged asset owners to be more targeted and more strategic in their engagements as they called for the need to transition the entire economy. This entails a move away from focusing solely on single companies and engaging across the value chain of companies with policymakers and asset managers[1].

Collective engagement can be more efficient and effective in achieving sustainability goals than institutional investors engagements. Recently, anti-ESG advocates have alleged antitrust violations by financial institution coalitions such as the Global Financial Alliance for Net Zero (GFANZ), Climate Action 100+, Ceres, and others. No lawsuits have been brought to date. Concomitant with these political developments, some major asset managers and insurers have withdrawn from climate alliances. At the same time, competition authorities in Europe, the UK, China, Japan, and elsewhere have taken steps to "green" antitrust law and enforcement, in some cases by inserting exemptions into the law or guidelines for sustainability-related collaborations[2].

Asset owner engagement efforts are evolving to focus on:

- → **Increased climate-related reporting and disclosure;**
- → **transitioning companies from brown to green operations and products; and**
- → **working with asset managers to increase transition efforts in public and private markets.**

VPIC is an active leader in engagement efforts.

[1] https://www.environmental-finance.com/content/news/$95trn-group-of-asset-owners-calls-for-smarter-not-more-engagement-on-climate.html
[2] Antitrust-Sustainability-Landscape-Analysis.pdf (columbia.edu)

Metrics

Investor tools to analyze climate risks and opportunities are rapidly evolving. Today, many companies provide reported data for public markets such as Scope 1, 2, and 3 greenhouse gas emissions, green revenue share, and environmental info disclosure. We expect continued growth in reported data, particularly in geographies where policy regulators require such data.

Increased disclosure and data availability have resulted in evolving and renewed metrics. Some managers use more holistic investment frameworks to assess company transition plans. Such frameworks leverage a range of qualitative and quantitative indicators to access companies in transition instead of looking at metrics, such as, carbon intensity, targets, etc., in isolation[1]. Market trends suggest that investors focus more on forward-looking energy transition metrics such as green revenue share and green capital expenditures, climate-related management incentives/accountability, related targets climate-linked incentives, and science-based targets to understand the opportunities to invest in decarbonization.

Alternative forms of data collection are emerging, such as satellite imagery paired with AI and geospatial data to supplement the estimated Scope 3 data. For example, Climate Trace uses machine learning, satellites, and other technology to detect and track greenhouse gas emissions. That information is then bundled up into a public inventory. The database covers more than 350 million sources of greenhouse gas pollution such as individual power plants, steel mills and mining operations. That level of specificity allows companies to build a low-emissions supply chain rather than relying on suppliers' self-reported emissions data[2].

Decision-useful climate investment metrics are becoming more widely available and evolving to include both backward-looking emissions data and forward-looking metrics such as:

- → **Changes in green revenue share**
- → **Green capital expenditures**
- → **Indicators of corporate governance efforts to transition toward net zero emissions.**

[1] GS SUSTAIN Net Zero Guide Climate Transition Tool 2.0 Bridging gaps, enhancing sectoral scope, highlighting performance links (goldmansachs.com)
[2] https://climatetrace.org/news. December 2, 2023.

II. VPIC Exposure to Carbon Emissions, Fossil Fuel and Renewable Energy[1]

Figure 10: Total Portfolio Estimated Scope 1 and Scope 2 Emissions Exposure as of December 31, 2022

Asset Class	Total No of Funds	Total VPIC AUM ($M)	% of Total Portfolio AUM	% of Total Sector AUM	No of funds with Emissions Data	Funds with Emissions Data AUM (%)	Emissions Exposure (Scope 1+2)[2] tCO_2e	% of Broad Asset Class AUM	% of Broad Asset Class Exposure
Total Portfolio	51	5,421	100	-	18	62	228,872	-	-
Total Public Markets[3]	12	4,179	77	100	10	56	164,767	-	-
Total Public Equity	7	2,459	45	7	7	45	134,143	100	100
Domestic Equity	2	402	7	10	2	7	15,774	16	12
Active	*1*	*174*	*3*	*4*	*1*	*3*	*1,063*	*7*	*1*
Passive	*1*	*228*	*4*	*5*	*1*	*4*	*14,711*	*9*	*11*
Global Equity	3	1944	36	47	3	36	102,404	79	76
*Active**	*2*	*456*	*8*	*11*	*2*	*8*	*9,656*	*19*	*7*
Passive	*1*	*1,488*	*27*	*36*	*1*	*27*	*92,748*	*61*	*69*
International[4]	2	113	2	3	2	2	15,965	5	12
*Active**	*2*	*113*	*2*	*3*	*2*	*2*	*15,965*	*5*	*12*
Fixed Income	4	1472	27	35	3	10	30,624	100	100
*Active**	*2*	*442*	*8*	*11*	*2*	*3*	*17,648*	*30*	*58*
Passive	*2*	*1,030*	*19*	*25*	*1*	*7*	*12,976*	*70*	*42*
Public Real Assets*	1	248	5	6	NA	NA	NA	100	NA
Total Private Markets	39	1242	23	100	8	6	64,105	100	100
Private Equity	25	545	10	44	5	2	40,173	44	63
Private Credit	9	500	9	40	1	1	1,785	40	3
Real Assets/ Real Estate[5]	5	197	4	16	2	3	22,147	16	35

**Commingled Funds: Artisan Global (Global Equity), Acadian ACWI EX-US (International equity), Wellington EMD (Fixed Income), and UBS Property (Public Real Estate)*

No emissions data is available for 38% of the VPIC portfolio AUM, primarily private markets. An additional 9% of the portfolio emissions are estimated, not reported.

Fixed income govt debt reduces FI corporate emissions percentages compared to public equity. Most Equity Scope 1+2 emissions are in passive Global Equity, VPIC's largest sub-asset class by AUM.

[1] Includes exploration, extraction, and production of fossil fuel. Market value numbers may not sum due to rounding.
[2] Public market Position Market Value ($)/EVIC * Position Scope 1&2 GHG emissions (tCO_2e)
[2] Private market: Portfolio company Scope 1&2 GHG emissions (tCO_2e) * fund % ownership of company*VPIC portfolio weight
[4] Mondrian Int'l equity holdings, valued at $2 million at the end of December 31, 2022, were included in the calculation.
[5] Excludes BlueVista direct real estate strategy as the survey doesn't apply to direct property investment.

Carbon emissions data challenges include disclosure, scarcity, completeness, and consistency. For this report, Figure 10 above focuses on a measure that we could get the broadest coverage across VPIC public and private markets: Scope 1+2 emissions weighted by the percentage of VPIC AUM exposure to underlying issuer emissions. Since there is a lack of standardization for calculation across asset classes, there is a difference in methodology between public and private markets owned emissions calculation, as noted in the footnotes to Figure 10 above.

For VPIC public markets, we summarize below the findings for measures including Scope 1,2 and 3 emissions, carbon footprint, and carbon intensity. Measuring the carbon footprint can be important because of the need to reduce overall emissions. Emissions intensity indicates the emissions efficiency of a company compared to revenues. The summary data can be found in Appendix III.

Reported Scope 1, 2, and 3 Emissions (Appendix III, Figure A.5)

→ Scope 1, 2, and 3 emissions categorize the sources of the greenhouse gas ("GHG") emissions from companies. Scope 1 is the direct emissions from a company's core functions. Scope 2 is the indirect emissions from purchasing energy. Scope 3 emissions refer to the indirect emissions generated by a company's suppliers, and customers' use of its products and services. Scope 3 emissions are much harder to measure than Scope 1 and 2. The estimated Scope 3 data from third-party providers is complex. The majority rely on simple averages by sector, number of employees or revenue. By their very nature, they can be imprecise and sometimes just wrong[1]. Appendix III reports additional carbon emissions metric results for VPIC public markets

→ The majority (53%) of VPIC public market portfolio companies (5,029 of 9,524 companies), representing over two-thirds of the VPIC'S public markets AUM (68%), reported Scope 1+2 emissions as of December 31, 2022.

→ Companies representing 38% of the VPIC public markets AUM (1,424 of 9,524 firms) reported Scope 3 emissions as of December 31, 2022.

Over two-thirds of VPIC public markets AUM was invested in companies that report Scope 1 and 2 emissions, compared to 38% that reported Scope 3 emissions.

[1] https://www.environmental-finance.com/content/analysis/scope-3-data-imprecise-and-sometimes-plain-wrong.html

II. VPIC Exposure to Carbon Emissions, Fossil Fuel and Renewable Energy

Carbon Footprint
(Appendix III, Figure A.6)

→ The carbon footprint is expressed in tons of emissions per year. This metric is calculated by summing the value of each investment per adjusted enterprise value multiplied by emissions ("tCO_2e") and then dividing by the portfolio's total market value (per million). Enterprise value is a measure of a company's value, including debt.

→ VPIC's Scope 1+2 and Scope 1+2+3 carbon footprint for the overall public portfolio was lower than the VPIC benchmark carbon footprint.

→ The carbon footprints for Global Equity and Fixed Income asset classes were lower than their respective benchmarks, while the International Equity carbon footprint was higher than its benchmark.

→ The carbon footprints for International Equity were higher than the benchmark due to a somewhat higher allocation to a few companies with higher emissions. For example, Shell Plc, Mitsubishi Electric Corp, and Heidelberg Materials have a portfolio weight of 3.0%, 2.0%, and 1.6% versus the benchmark weight of 1.4%, 0.3%, and 0.1%, respectively. International Equity accounts for 3.0% of the total public portfolio.

VPIC's public markets carbon footprint was slightly lower than the benchmark footprint for both Scope 1+2 emissions and for Scope 1+2+3 emissions.

Carbon Intensity
(Appendix III, Figure A.7)

- → Emissions intensity measures the carbon emissions of each issuer per million USD of revenues. This metric offers a proxy for the carbon efficiency per unit output, a measure endorsed by the Task Force on Climate related Financial Disclosures ("TCFD").
- → VPIC's total public markets Scope 1+2 and Scope 1+2+3 weighted average emissions intensity was lower than the total public markets benchmark.
- → Domestic equity weighted average emissions for Scope 1+2 and Scope 1+2+3 were slightly higher than the Russell 3000 Index while lower than the benchmark for the Fixed Income portfolio.
- → VPIC's global equity AUM had a higher Scope 1+2+3 emissions intensity than the benchmark.
- → VPIC's public markets portfolio and its benchmark show an investment weighted average emissions intensity that was lower than the unweighted average emissions intensity of the portfolio companies. This indicates that the benchmark and portfolio were tilted toward low emissions intensity companies.

VPIC's total public markets Scope 1+2 and Scope 1+2+3 weighted average emissions intensity was lower than the total public markets benchmark carbon emissions intensity.

II. VPIC Exposure to Carbon Emissions, Fossil Fuel and Renewable Energy

Figure 11: Total Portfolio Fossil Fuel Exposure as of December 31, 2022[1]

Asset Class	Total No of Funds	Total VPIC AUM ($M)	% of Total Portfolio AUM	% of Total Sector AUM	# of funds with Fossil Fuel Exposure	Total Fund Exposure FF (% AUM)	Total Fund Exposure FF ($M)	MSCI Fossil Fuel Exclusion List Companies	Total FF Company Exposure (% AUM)	Total FF Company Exposure ($M)	% of Total Portfolio FF Company Exposure
Total Portfolio	**51**	**5,421**	**100%**	**NA**	**27**	**73**	**3,960**	**149**	**2.49**	**135**	**100%**
Total Public Markets[2]	**12**	**4,179**	**77**	**100**	**9**	**64**	**3,447**	**149**	**2.47**	**134**	**99**
Domestic Equity	**2**	**402**	**7**	**10**	**2**	**7**	**402**	**21**	**0.20**	**11**	**8**
Active	*1*	*174*	*3*	*4*	*1*	*3*	*174*	*1*	*0.02*	*1*	*1*
Passive	*1*	*228*	*4*	*5*	*1*	*4*	*228*	*20*	*0.18*	*10*	*7*
Global Equity	**3**	**1944**	**36**	**47**	**2**	**31**	**1,670**	**149**	**1.83**	**99**	**73**
Active	*2*	*456*	*8*	*11*	*1*	*3*	*182*	*25*	*0.16*	*8*	*6*
Passive	*1*	*1,488*	*27*	*36*	*1*	*27*	*1488*	*149*	*1.67*	*91*	*67*
International[3]	**2**	**113**	**2**	**3**	**2**	**2**	**113**	**10**	**0.24**	**13**	**10**
Active	*2*	*113*	*2*	*3*	*2**	*2*	*113*	*10*	*0.24*	*13*	*10*
Fixed Income	**4**	**1472**	**27**	**35**	**3**	**23**	**1,262**	**22**	**0.20**	**11**	**8**
Active	*2*	*442*	*8*	*11*	*2**	*8*	*442*	*3*	*0.12*	*6*	*5*
Passive	*2*	*1,030*	*19*	*25*	*1*	*15*	*820*	*21*	*0.08*	*5*	*3*
Public Real Assets	**1**	**248**	**5**	**6**	0	**0**	0	**NA**	**NA**	**NA**	**NA**
Total Private Markets	**39**	**1242**	**23**	**100**	**18**	**9**	**513**	**NA**	**0.02**	**1.0**	**1**
Private Equity	**25**	**545**	**10**	**44**	**17**	**8**	**419**	**NA**	**0.01**	**0.7**	**1**
Private Credit	**9**	**500**	**9**	**40**	**1**	**2**	**94**	**NA**	**0.01**	**0.3**	**0.3**
Real Assets/ Real Estate[1]	**5**	**197**	**4**	**16**	**0**	**0**	**0**	**NA**	**0**	**0**	**0**

**Commingled Funds: Acadian ACWI EX-US $2 million (International equity), Wellington EMD $178 million (Fixed Income)*

VPIC exposure to fossil fuel companies was approximately 2.5% of the Total portfolio AUM.

The greatest share to total portfolio AUM invested in fossil fuels was in passive global equity.

VPIC's $1.2 billion private market investments included just $1 million in fossil fuel investments.

[1] Public Market Fossil Fuel Exposure uses the 4th quarter MSCI Fossil Fuel Exclusion List as of Nov 2022. MSCI provides the exclusion list on a quarterly basis. 170 companies in the Index Review Criteria Reports were excluded from the MSCI Fossil Fuel Free Index as of Nov 2022. Private Market Fossil Fuel Exposure data gathered through manager survey and included exploration, extraction, and production of fossil fuel. Market value numbers may not sum due to rounding.

[2] Private market: Portfolio company Scope 1&2 GHG emissions (tCO_2e) * fund % ownership of company*VPIC portfolio weight

[3] Mondrian Int'l equity holdings, valued at $2 million at the end of December 31, 2022, were included in the calculation.

II. VPIC Exposure to Carbon Emissions, Fossil Fuel and Renewable Energy

The data for the VPIC portfolio fossil fuel exposure includes public markets data from ISS and private markets data based on the climate survey of VPIC managers.

The data for public markets fossil fuel exposure is based on the 4th Quarter, 2022, MSCI Fossil Fuel Free Index Exclusion list. The list includes the top companies with proved and probable coal reserves and/or oil and natural gas reserves used for energy purposes. As of November 2022, there were 170 companies on the list. We include similar tables showing the VPIC exposure to the Fossil Fuel Underground Top 200 list of companies in Appendix II.

For private markets, survey responses indicated there were 18 funds, represented by two managers in private equity (17 funds) and private credit (one fund), that have exposure to companies involved in exploration, extraction, and production of fossil fuel. The exposure was minimal, valued at ~$1 million, or 0.1% of the total private market's assets as of December 31, 2022.

The above fossil fuel exposure table (Figure 11) includes funds that own of fossil fuel reserves. From the manager survey, we found that some of the VPIC private market funds have exposure to midstream and downstream activities. Two private credit funds have exposure to distribution, refining, and utilities. As of December 31, 2022, the exposure was valued at ~$4.2 million, or 0.3% of the total private market assets.

VPIC recently committed to an infrastructure fund that may invest in oil and gas related infrastructure. The manager has a formalized revenue threshold precluding it from investing in assets that are too heavily reliant on coal. They will not invest in new assets that derive more than 20% of their revenues from the production or transport of thermal coal, or its use in electricity or heat generation. The manager is seeking to transition all assets in their portfolio to zero revenue exposure to thermal coal by 2030. The manager believes that under current accepted pathways, such as those put forward by the Science Based Targets initiative (SBTi) or International Energy Agency (IEA), it is expected that oil and gas will continue to play a role in the economy beyond 2030, and in limited cases through to 2050. As such, the fund will continue to consider investments in oil- and gas-related infrastructure such as pipelines, LNG facilities, and gas-fired generation They anticipate investing in lower emitting downstream activities and do not anticipate making investments in infrastructure that would facilitate material new upstream extraction of oil and gas. Firmwide, the manager has adopted a net zero by 2050 target.

For VPIC public market managers, fossil fuel company data reflects the MSCI Fossil Fuel Free Exclusion list as of November 2022.

For VPIC private market funds, fossil fuel exposure data was only available through the climate survey of managers.

Figure 12: Top Fossil Fuel Reserves Companies[1] and Energy Transition Indicators by Asset Class

					MSCI Fossil Fuel Exclusion List Companies and Private Market Manager Survey Estimates			MSCI Fossil Fuel Exclusion List Companies and Top 200 Renewable Energy Generators		
Asset Class	No of Funds	Total VPIC AUM ($M)	% of Total Portfolio AUM	% of Total Sector AUM	# of funds	MSCI Fossil Fuel Exclusion List Companies	Fossil Fuel Company (% of Total Portfolio AUM)	# of funds	# Of Issuers	Fossil Fuel Renewable Leaders (% of Total Portfolio AUM)
Total Portfolio	51	5,421	100	-	27	149	2.49	5	23	0.42
Total Public Markets	12	4179	77	100	9	149	2.47	5	23	0.42
Domestic Equity	2	402	7	10	2	21	0.20	1	2	0.02
Active	*1*	*174*	*3*	*4*	*1*	*1*	*0.02*	*0*	*0*	*0*
Passive	*1*	*228*	*4*	*5*	*1*	*20*	*0.18*	*1*	*2*	*0.02*
Global Equity	3	1944	36	47	2	149	1.83	2	23	0.38
Active	*2*	*456*	*8*	*11*	*1*	*25*	*0.16*	*1*	*5*	*0.04*
Passive	*1*	*1,488*	*27*	*36*	*1*	*149*	*1.67*	*1*	*23*	*0.34*
International	2	113	2	3	2	10	0.24	0	0	0
Active	*2*	*113*	*2*	*3*	*2*	*10*	*0.24*	*0*	*0*	*0*
Fixed Income	4	1472	27	35	3	22	0.20	2	3	0.03
Active	*2*	*442*	*8*	*11*	*2*	*3*	*0.10*	*1*	*1*	*0.02*
Passive	*2*	*1,030*	*19*	*25*	*1*	*21*	*0.08*	*1*	*3*	*0.01*
Public Real Assets	1	248	5	6	0	NA	NA	NA	NA	NA
Total Private Markets	39	1242	23	100	18	NA	0.02	NA	NA	NA
Private Equity	25	545	10	44	17	NA	0.01	NA	NA	NA
Private Credit	9	500	9	40	1	NA	0.01	NA	NA	NA
Real Assets/ Real Estate[1]	5	197	4	16	0	NA	NA	NA	NA	NA

VPIC held 2.5% of its total portfolio AUM in 149 of the Top public fossil fuel companies (defined by the MSCI Fossil Fuel Free Exclusion list), most in passive Global Equity.

The energy transition includes fossil fuel leaders that are also renewable energy leaders.

VPIC's public market exposure to 149 of the Top Fossil Fuel companies, included 23 companies that were also among the top 200 global renewable energy generation companies. Integrated Oil and Gas major Total Energies was among the 23.

Broad fossil fuel divestment can also divest low carbon leaders and transitioning firms.

[1] Using the 4th quarter MSCI Fossil Fuel Exclusion List as of Nov 2022. MSCI provides the exclusion list on a quarterly basis. 170 companies in the Index Review Criteria Reports were excluded from the MSCI Fossil Fuel Free Index as of Nov 2022. Market value numbers may not sum due to rounding.

Figure 13: VPIC Public Markets MSCI Fossil Fuel Exclusion List Companies Exposure[1]

	Total Portfolio MSCI Fossil Fuel Exclusion List Companies[2]	Total Portfolio AUM ($M)	Total Portfolio (% of AUM)
Coal	12	0.85	0.02
Active Funds	*0*	*0*	*0*
Passive Funds	*12*	*0.85*	*0.02*
Oil and Gas	54	89.4	1.65
Active Funds	*22*	*20.7*	*0.38*
Passive Funds	*54*	*68.7*	*1.27*
Others[3]	83	43.4	0.80
Total	149	134	2.47

[1] Using the 4th quarter MSCI Fossil Fuel Exclusion List as of Nov 2022. MSCI provides the exclusion list on a quarterly basis. 170 companies in the Index Review Criteria Reports were excluded from the MSCI Fossil Fuel Free Index as of Nov 2022. Market value numbers may not sum due to rounding.
[2] Companies are classified based on GICS sub-industry. Source MSCI
[3] Some other industries included Utilities (19 companies), Industrial Conglomerates (13 companies), and Metals and Mining (9 companies).

III. VPIC Public Market Climate Opportunity Metrics

Climate risks and opportunities can represent material financial risks and opportunities for investors. Some metrics may be more critical than others, depending on the industry. The metrics and analytic tools available for investors to analyze climate risks and opportunities are rapidly evolving.

Today, for public markets, a growing number of companies provide reported data such as Scope 1, 2, and 3 greenhouse gas emissions discussed above. To identify climate opportunities in the VPIC portfolio, we include metrics that indicate a company's exposure to climate opportunities and ability to succeed during the energy transition away from fossil fuels. These include information such as Board oversight of Climate Risks, GHG targets approved by the Science Based Target initiative (SBTi), and green revenue share.

Green Revenue Share and Board Oversight of Climate Risks (Appendix III, Figure A.9)

→ Green revenue share is the percentage of sales (reported or estimated) generated by a company's products/services that benefit the environment by contributing to mitigating climate change.

→ VPIC's public markets funds held 592 portfolio companies with greater than 5% green revenue share, representing 10% of the VPIC public market portfolio market value. This is closely aligned to the 594 companies (11% of market value) held in the VPIC total public markets benchmark.

→ Over half of the VPIC's public market asset value, representing 26% of the total 9,524 portfolio companies, indicated that they have Board oversight of climate risks.

VPIC public market holdings included 10% of the total public market AUM (592 companies) with greater than 5% green revenue share.

26% of VPIC's total public market AUM (2,448 companies) responded that their Board has oversight of climate risks.

Approved Science Based Targets (Appendix III, Figure A.10)

→ The Science Based Targets initiative ("SBTi") shows companies how much and how quickly they need to reduce their GHG emissions to prevent the worst effects of climate change. Reduction targets are "science-based" if they align with the reduction target set by the 2015 Paris Agreement.

→ The Science Based Targets Initiatives ("SBTi") sets out criteria by industry and company size for companies to set targets across: 1.5°C, well below 2°C, 2°C classifications. In addition to setting criteria for science based long-term targets, such as net zero by 2050, the SBTi includes requirements for interim targets, such as certain percent reductions within five years.

→ VPIC's total public markets investments include 33% of public markets AUM (1,529 issuers) with an approved near-term science-based target and 16% of public markets AUM (707 issuers) with approved net zero science-based targets.

→ VPIC had a slightly higher number of issuers with SBTi approved targets than its public markets benchmark (near term targets – 1,529 VPIC vs 1,470 benchmark issuers); and long-term targets (707 VPIC vs. 680 benchmark issuers).

→ The disclosure of the approach to reduce energy from non-renewable resources and the amount of energy from renewable resources was slightly higher for the VPIC's total public portfolio market value than the benchmark.

More VPIC public market companies had approved science-based net zero targets than those in the benchmark.

Disclosure of Renewable and non-Renewable Energy Consumption (Appendix III, Figure A.11)

→ For the VPIC public markets portfolio, 1,126 companies, representing 31% of the VPIC public market AUM disclose their approach to reduce energy from non-renewable resources, roughly in line with benchmark disclosures.

→ A smaller number of VPIC public markets portfolio, 693 companies, representing 18% of the VPIC public market AUM, disclose the amount of energy used by their company from renewable resources., roughly in line with benchmark disclosures.

VPIC public market company disclosure of approaches to reducing energy from non-renewable resources, and disclosing the amount of energy used from renewable resources were both roughly in line with benchmark disclosure levels.

Carbon Budget Analysis (Appendix III, Figure A.12)

→ Carbon budgets define how much carbon can be combusted in a sector to remain within the given scenario. For most sectors, this analysis is based on direct and indirect emission intensity per revenue. For certain sectors, such as utilities and fossil fuel producers, sector specific approaches are implemented looking at company outputs, tons of carbon dioxide emissions per gigawatt hour (tCO2e/GWh) and units of energy produced. The result of carbon budget analyses indicates if the investment portfolio is aligned with the Sustainable Development Scenario 2022 budget that provided by the International Energy Agency (IEA).

→ In the portfolio level analysis, all the holdings' carbon budgets are consolidated into one budget. Similarly, the projected emissions from the respective holdings are summed across the portfolio. The alignment is then assessed based on the emissions generated by the holdings compared to the portfolio's carbon budget. This type of analysis can be an illustrative way to get an overview of the overall portfolio alignment to economywide emission reduction targets. It does not provide information on the alignment of individual assets.[1]

→ The VPIC's total public market portfolio and benchmark were aligned with the IEA SDS 2022 carbon budget, showing slightly lower total portfolio estimated carbon emissions than the Sustainable Development Scenario 2022 carbon budget.

Carbon budget analyses offers another tool to assess how VPICs investments are currently aligned with the sustainable development goals carbon budget for the aggregated portfolio.

VPICs public market portfolio estimated carbon emissions were slightly lower than portfolio estimated carbon budget.

[1] ISS ESG Climate Scenario Alignment Analysis Methodology April 2022.

IV. VPIC Asset Managers Climate Management, Engagement and Monitoring[1]

This section presents summary results of Meketa's 2023 survey of VPIC's asset managers on their approaches to managing climate risks and opportunities. The survey asked about general climate risks and opportunities and focuses on energy transition. The Figures in Appendix IV present the quantitative summary of results.

All managers (seven public and 13 private), representing 50 strategies responded to the survey (Appendix IV, Figure A.13).

2023 Climate Survey of VPIC Managers: Considering Climate Risks and Opportunities (Appendix IV, Figure A.14)

→ Most VPIC's public and private markets investment funds (43 out of 50 funds), representing 51% of VPIC total portfolio AUM, indicated that they consider climate change material risks and 19 out of 50 funds, representing 6% of VPIC total portfolio AUM, consider low carbon economy opportunities.

- VPIC's smaller share of AUM that consider climate risks and opportunities than their respective percent of VPIC funds because VPIC invests significantly through passive strategies in liquid public markets. More than half (~52%) of VPIC total portfolio AUM are invested in passive market cap strategies that by design do not consider climate risk and opportunities in security selection. Passive index investing is a cost-effective way to get broad market exposure.

→ Most VPIC public fund active managers use an integrated approach to ESG, which embeds key ESG risks and opportunities in the overall investment process. Among the private market managers who consider material climate risks, we found that many integrate material climate factors during the investment process. Some require deal sponsors and/or portfolio company management to provide details on several climate-change related items. One credit manager explained that their focus is on the downside risk that may result in default rather than the opportunities due to the limited upside potential of their credit instruments.

→ Two VPIC funds are implementing a Net Zero pledge: one public and one private real estate manager. Two private managers responded that they are currently exploring setting net-zero fund level targets. Some private market managers indicate that they are still collecting sustainability data across portfolios prior to making any commitment.

Nearly 90% of VPIC managers consider climate change material risks and 38% consider material climate opportunities.

Passively managed assets do not include any active factors, including climate factors.

Two real estate funds– made a net zero pledge for the fund in which VPIC is invested.

[1] Throughout this report, the reported AUM is as of December 31, 2022. The survey result excludes BlueVista direct real estate strategy, as the survey doesn't apply to direct property investment and Mondrian Int'l equity as the manager was terminated in December 2022.

2023 Climate Survey of VPIC Managers: Signatories to Climate Related Investment Groups (Appendix IV Figure A.15 and A.16)

Manager attention to climate issues can be reflected in their participation in institutional investor organizations that focus on investor climate risks and opportunities. Firms that manage publicly listed assets for the VPIC are taking advantage of collaborative efforts as they seek best practices and education to mitigate investment climate change risks and increase climate opportunities that can affect their long-term investment performance.

→ In VPIC's public market investments, 100% of the funds reported their firm being a signatory to at least one climate-related institutional investor organization.

→ Almost two-thirds (73%) of the VPIC's public markets funds report that their firm is a member of NZAM, representing 84% of the VPIC's public markets AUM, which includes managers of the VPIC's passively managed funds.

→ Managers of the VPIC's passive equities, that, by design do not account for climate change in their investment mandate, are more frequently making important contributions to long-term stable energy transitions through their proxy voting and engagement. The largest managers, such as BlackRock, SSGA, and Vanguard, are the largest global investors in many publicly listed companies.

→ **Managers of 73% of the VPIC's public markets funds, representing 89% of VPIC public markets AUM, are members of Climate Action 100+, an organization that focuses on climate proxy voting and engagement with the largest corporate emitters of greenhouse gases.**

Some widely supported institutional investor organizations, such as Climate Action 100+, focus primarily on publicly listed companies. For investors, decision-useful, reliable, comparable data is a critical component to managing risks and opportunities. For private markets managers, recent developments directly address private markets managers and companies, such as the ESG Data Convergence Initiative (EDCI). The EDCI was launched in 2021 to provide a vehicle for common sustainability reporting among private equity GPs and LPs, in the absence of regulated disclosures. A similar project called ESG Integrated Disclosure Project (IDP) for private credit launched in November 2022 to provide a template for ESG disclosure across all credit markets.

→ Five VPIC private markets funds, from three different managers (representing 22% of private markets AUM), reported that their firms are a member of the NZAM.

→ The ESG Data Convergence Initiative (EDCI), launched in October 2021 to aggregate ESG metrics using comparable data across private equity funds, already has five different firms as signatories that manage 24 VPIC funds. The 24 funds represented 64% of VPIC's private market assets from the survey.

→ The ESG Integrated Data Project (ESG IDP) was launched in November 2022 to harmonize ESG reporting to address the key challenges facing private credit and syndicated loan managers. Three VPIC managers, managing four funds with 16% AUM, are part of this collaboration.

All VPIC managers are members of at least one climate-related investment organization.

2023 Climate Survey of VPIC Managers: Portfolio Company Monitoring and Engagement (Appendix IV, Figure A.17 and A.18)

Investment manager monitoring of climate is growing. Institutional investors such as VPIC request better information and disclosure on how managers are addressing climate risks and opportunities. Monitoring of climate metrics is more prevalent in VPIC public market than private market funds.

→ Five VPIC public equity, funds monitor climate risks of their portfolio companies, while eight funds measure GHG emissions. Two non-US active funds measure both renewable energy consumption and green revenue share.

→ Just 2 of 39 private markets funds monitor the climate risks of their portfolio companies. The fund of funds manager assesses the climate risks at the GP level. They are working with industry peers to achieve a consistent way of communicating decarbonization activity at the portfolio level. In terms of the co-investment, the manager has an active role in the investment due diligence phase, but they generally rely on the lead private equity firm to monitor the climate risks during the life of the investment.

→ In private markets, 11 funds measure GHG emissions, four funds measure renewable energy consumption, and one fund measures green revenue shares, reflecting the lack of standardized measurement of green revenues. Over time, we expect private markets data to become more widely available.

→ The percentage of private markets AUM of VPIC funds measuring Scope 1 or Scope 2 emissions (40%) is smaller than in public markets (53%). Managers cited the gap in the Partnership for Carbon Accounting Financials (PCAF) carbon accounting methodologies for many types of investment in alternative credit, co-investment, and secondaries markets. A few funds are in the process of finalizing partnership with several carbon account platforms that utilize PCAF methodology.

→ Survey results indicate that some managers in each sub-asset class track climate metrics despite the newness and current constraints on climate data availability.

Manager engagement with portfolio companies on climate risks and opportunities can be an essential element to managing transition risks and enhancing transition opportunities.

→ Fewer VPIC funds engage portfolio companies than monitor climate metrics.

→ More VPIC funds (6 funds) engage portfolio companies on carbon emissions than on climate opportunity metrics such as renewable energy use (2 funds) or green revenue share (1 fund).

More VPIC public than private market managers monitor climate metrics.

Few VPIC managers engage their portfolio companies on climate risks and opportunities, which presents a potential opportunity for VPIC to more effectively engage its managers.

V. Climate Policy Approaches Discussion

Growing investor attention to climate change physical and transition risks includes consideration of multiple different investment tools and implementation strategies. Passive equity strategies exemplify this trend as they have evolved from early broad divest fossil fuel suppliers, to economy-wide low carbon emissions efforts, and more recently to Paris Aligned economy-wide top-down strategies and increased investing in companies transitioning from brown to green and climate solutions companies. Energy transition investment strategies are becoming more common across asset classes, rather than being concentrated in public market equities.

As investors concerned about climate risk seek ways to implement decarbonization and net zero investment strategies, differences between decarbonizing an investment portfolio and contributing to decarbonizing the economy have gained attention.

No best practices, with shifts toward investing in climate solutions; increased engagement.

→ There is a wide range of approaches by plans to address climate risks and opportunities. Plans of all sizes, and widely varying experience in addressing climate, continue to evolve their approaches and use of different investment tools.

→ Decarbonizing an investment portfolio and helping move the market beta toward Net Zero are not equal.

Investment tools are varied that address investment exposures and reductions in underlying risks in the real economy. They include:

→ active bilateral and collective engagement with managers and underlying portfolio companies across the portfolio;

→ proxy voting in public equities;

→ investing in climate solutions and in companies transitioning to low carbon;

→ adjusting overall investment exposures for long-term emissions reduction;

→ divesting broadly, divesting selectively, reweighting portfolios for transition factors, low carbon factors, or fossil fuel factors; and

→ policy advocacy on energy transition and physical climate risk issues that already affect institutional investors.

Climate change investment issues are complex.

→ Climate change and the transition towards renewable energy are systemic.

→ Because climate risks and opportunities are systemic, changes in the real economy will continue to affect investment portfolios.

→ The global energy transition is no longer nascent and marginal.

→ The global economy's dependence on fossil fuels will likely decline but remain significant through at least the mid-21st century.

→ It is highly likely that the energy transition will progress through disjointed and disruptive developments.

→ Physical climate risks are already materially affecting companies, governments and investment portfolios and are highly likely to escalate significantly even by 2030.

Climate Policy Approaches

As VPIC considers how to further develop its investment strategy to reduce climate risks and improve climate investment opportunities in ways that seek to support VPIC's ability to uphold its fiduciary duty, meet the needs of the pension liabilities, and align with the Paris Agreement goals, Meketa offers four broad policy approaches. We find no consensus in the institutional investment community on best practices. We find increasing attention to transitioning the real economy through engagement and investment in climate solutions and transitioning companies and industries. The approaches are not mutually exclusive. There are many variations within each approach.

Figure 14: Climate Investment Policy Approaches

Approach	Implementation	Pros	Cons
Climate Aware (Current)	Maintain existing approach to investment climate risks and opportunities.	No additional time or resources required	Low-to-medium expected contribution to lowering real economy climate risks and increasing risk-adjusted return of investment portfolio.
Energy Supply Exclusion (Broad FF Exclusion)	Exclude fossil fuel suppliers; maintain rest of existing approach to climate risks and opportunities.	Minimal to medium implementation costs and resources, depending on approach to private markets and immediate versus long-term approach.	Low expected contribution to lowering real economy climate risks and expected low contribution to improving risk-adjusted return of investment portfolio over the next 10-20 years. Reduces investment options in asset classes such as private credit and infrastructure. Would constrain VPIC engagement efforts, while a 2% allowance for engagement would increase complexity and monitoring and reduce engagement to a nominal amount.
Portfolio-wide Net Zero Goal	Adopt a portfolio-wide net zero goal of, for example, 7% annual reduction in emissions employing investment shifts to reduce portfolio emissions, increase investment in climate solutions and engagement.	Expected long- term contribution to lowering real economy climate risks and to potentially improving risk-adjusted return of the investment portfolio.	Systematic annual reduction in portfolio emissions may be misaligned with economy emissions. Most time and resource intensive. Implementation would likely evolve as conditions change.
Portfolio-Wide Real Economy Net Zero Approach	Take greater advantage of opportunities and attention to material risks by increasing investment in climate solutions and engagement; using backward-looking and forward-looking metrics to monitor engagement and investment strategies.	Expected greatest long-term contribution to lowering real economy energy transition risks and to potentially improving risk-adjusted return of the investment portfolio	Expected to require more internal (a full-time investment staff person) and outsourced (regular monitoring of climate metrics for portfolio, managers, and underlying companies) to amplify VPIC engagement and climate solutions investment efforts. Foregoes big picture direction that a Net Zero pledge can bring.

Each of these four broad climate policy options may overlap, and each bring pros and cons.

Option 1: Maintain Existing Climate Aware Investment Policy Approach

VPIC recognizes and addresses climate investment and decarbonization risks and opportunities in its current approach.

Climate Investment Policy: The VPIC Carbon Reduction and Mitigation Policy, adopted April 26, 2022 (Appendix VI), explicitly recognizes the significance of the global climate crisis and that the transition to a low carbon economy will present opportunities and risks across all market sectors and geographies. The policy upholds VPIC's fiduciary responsibilities and identifies active and direct engagement as the best way to address risks in the portfolio, and divestment as an option of last resort that can be employed as appropriate when engagement efforts over time fail.

Resources: **Staff**: The Fund has in total three investment staff. Currently, VPIC's Deputy CIO devotes 35-50% of her time to climate and other sustainability efforts. primarily proxy voting, engagement, and annual manager monitoring. **Proxy Voting and engagement consultant:** The plan's proxy voting guidelines on climate issues are explicit and voted through proxy voting provider, Segal Marco. Segal-Marco also provides company engagement support. **Collaboration:** VPIC collaborates with other institutional investors as a signatory to PRI; and as a member of Ceres, CA 100+, and CDP.

Climate efforts: Engagement with companies: VPIC staff leads roughly five to seven proxy proposals, and co-leads roughly three to five proxy proposals each year. **Engagement with managers**: VPIC conducts an annual ESG survey of all managers. Staff has observed a progression of greater integration of climate considerations into manager investment processes. **Investing**: VPIC invests in a public equity energy transition fund, and in an infrastructure fund that includes energy transition opportunities. VPIC avoids investing in private market funds that are solely invested in fossil fuel related energy, and across the portfolio minimizes investments in coal companies, with the majority of VPIC coal investments in the global equity passive fund. **Metrics:** Results of annual ESG survey and carbon intensity measure for BlackRock equity transition fund.

Pros: No additional time or resources required. VPIC implements significant climate actions in its proxy voting and engagement efforts; by investing in some climate solutions; minimizing coal exposure in public and private markets, with the greatest exposure in passive global equity; and avoiding traditional fossil fuel energy funds in private markets.

Cons: Low-to-medium expected contribution to lowering economy climate risks and increasing risk-adjusted return of VPIC investment portfolio. Lacks overarching portfolio-wide goals and resources to guide climate investment strategy. Lacks portfolio wide climate data. Has minimal active climate/decarbonization engagement with managers. Lacks significant investment in climate solutions and in companies actively decarbonizing.

VPIC's existing climate-related investment approach focuses on public equity proxy voting and engagement, investing in a public equity climate transition fund, and making some private market climate solution investments, while minimizing exposure to coal in public and private markets and avoiding exposure to private market fossil fuel energy funds.

Option 2: Energy Supply Exclusion (Broad Fossil Fuel Divestment)

Climate Investment Policy: A broad fossil fuel exclusion approach contrasts with VPIC existing Carbon Reduction and Mitigation Policy that identifies engagement with companies as the best way to address risks in the portfolio and divestment of select securities as an option of last resort.

Resources: **Staff**: This approach is expected to require no additional staff or collaborative efforts, and minimal additional time to identify and monitor ongoing exposure to fossil fuel companies. **Divestment Costs: immediate divestment:** If divestment were to be pursued immediately, and across both public and private markets, VPIC could incur additional fees to switch to a separately managed fixed income account to allow for exclusions. Both the public equity and fixed income accounts would incur some transition costs relative to the number of exclusions, and. direct costs of an estimated 25% loss on the 18 private market funds with fossil fuel holdings. This totals approximately $128 million in market value losses to exit the $0.99 million in fossil fuel exposure. **Divestment Costs: public markets by 2030 and private markets by 2040**: If fossil fuel divestment were pursued over time to allow for all private market funds to mature, these costs would be avoided. **Metrics**: fossil fuel company exposure.

Climate efforts: Engagement with companies: Broad divestment would eliminate VPICs standing and rights as a shareowner and foreclose further engagement opportunities. Retaining two percent of fossil fuel companies for engagement purposes adds complexity in monitoring and reduces any engagement to a nominal role. **Investing**: Broad fossil fuel divestment would limit VPIC's ability to enhance investment performance by investing in fossil fuel companies that are transitioning to reduce emissions in operations, supply chains and/or products. In private markets, where the dispersion of returns among investment funds is wide, broad divestment may limit VPIC's ability to invest in top performing funds.

Pros: Minimal to medium additional implementation costs and resources, depending on immediate or long-term approach to private markets exclusions.

Cons: Low expected contribution to lowering real economy climate risks and expected low contribution to improving risk-adjusted return of investment portfolio over next 10-20 years. Would constrain VPIC's contribution to engagements in hard-to-abate sectors and companies. Maintaining two percent of fossil fuel suppliers to be excluded for engagement purposes increases monitoring costs and reduces engagement to nominal presence. Broad divestment increases the potential opportunity cost of reduced diversification and access to top quartile private market funds, where the distribution of returns is wide between the top and bottom quartile performing funds.

Broad fossil fuel divestment can reduce some portfolio emissions but would have limited and possibly negative effects on real economy emission reduction as it constricts VPIC engagement and blocks VPIC from benefiting from investments and engagement in companies that are transitioning away from fossil fuel energy.

Divestment of private market fossil fuel companies by 2040 avoids significant losses from immediate exit of existing closed end funds. Ongoing blanket fossil fuel exclusions may limit VPIC private market investment fund opportunities.

Option 3: Adopt a net zero by 2050 goal

Climate Investment Policy: Adopting a net zero by 2050 goal, consistent with broad industry net zero ambitions, would require a revision to VPIC's existing Carbon Reduction and Mitigation Policy, which does not include portfolio wide emission reduction targets.

Among US public plans that have adopted a Net Zero investment aspiration, such commitments have been adopted within existing Investment Beliefs and Investment Policy Statements that already identify climate risks and opportunities. These include CalPERS, CalSTRS, NYSCRF, and SFERS. Some plans also become members of net zero alliances, while others pursue their net zero pledge without explicit membership in a net zero institutional investor organization. This approach begins with VPIC deciding what net zero pledge it seeks to adopt, and then following the public pledge with actions to first develop and investment climate action plan and develop the resources to proceed to implement the plan over time, consistent with global campaigns under the umbrella of the United Nations.

1. **Pledge:** Commit to a net zero investment portfolio [by 2050 or before];
2. **Plan:** Develop a Net Zero Investment Action Plan that will establish a baseline and milestones for managing emissions-related risks; expand investments in low-carbon solutions, and drive ongoing engagement with companies in the VPIC portfolio to promote a responsible net zero transition;
3. **Proceed:** Establish actions for the next year to ensure clear internal governance structures; appropriate methodologies, and frameworks to support net zero commitments; portfolio emissions measurement; interim goals; and
4. **Publish:** Provide and encourage regular reporting on progress toward net zero investments.

Resources: Adopting and implementing a net zero goal at this juncture would require the greatest additional staff and external resources, compared to other climate policy approaches. Potential new coalition membership: Net Zero Asset Owner Alliance ("NZAOA"), Paris Aligned Investor Initiative ("PAII") **Metrics**: at least carbon emissions and carbon intensity.

Pros: Provides an overarching portfolio-wide goal to guide investment strategy around climate.

Cons: Adopts a Net Zero goal prior to understanding the different potential avenues to achieving net zero, and prior to building out the analysis, staff, consulting, and data resources to support a given implementation of a net zero, or Paris aligned goal. If implemented as a systematic annual reduction in portfolio carbon emissions, such as 7% per year, over time, a focus on portfolio emission reductions may be misaligned with global economy emissions (see Appendix VI, figure A.26 – CalSTRS 2023 Prototype of Transition Tracker), and require a material reduction in portfolio diversification, or a change in climate policy. Would require significant staff and external resources. May benefit from joining institutional investor net zero coalitions, depending on costs/benefits.

A net zero goal climate policy approach starts with the VPIC making a public net zero pledge and following up with planning and building capacity and an investment strategy to achieve its pledge.

Option 4: Portfolio-wide Real Economy Net Zero Approach

This approach could enhance VPICs current climate strategy to concentrate on supporting emissions reductions in the economy through increased investments in climate solutions and in companies in hard to abate sectors that are transitioning; and increase engagement efforts with target portfolio companies, managers, and government regulators and policy makers.

Climate Investment Policy: This approach could be implemented within VPIC's existing Carbon Reduction and Mitigation Policy. For transparency, the existing policy might benefit from additional specification of investment and engagement actions.

Resources: Expected to require more resources than current approach including internal (an additional full-time investment staff person and outsourced regular monitoring of climate metrics. VPIC might consider joining/supporting additional investor coalitions such as the ESD Data Convergence Initiative (EDCI) for private equity, the ESG Integrated Data Project (ESD IDP) for private debt and other private market asset classes; discussing with NZAOA and PAII potential collective asset owner engagement with managers; keeping abreast of organizations that may support VPIC's engagement themes, such as the OGMP2 VPIC that works with on methane emissions, and others such as the First Movers Coalition that focuses on seven of the hardest to abate industries. **Metrics** might include emissions and emissions intensity, forward-looking metrics such as green revenue share, green capex, and measures of corporate management of climate issues for portfolio, managers, and underlying companies. Tracking VPIC's the total investments allocated to the energy transition and climate solutions can provide information on a factor that is fully controlled by VPIC.

Pros: Within context of VPIC target expected returns, can identify a prudent plan and the resources required (staff, consulting, and data services) to incorporate a Paris-aligned focus on changes in the real economy into the VPIC investment strategy prior to setting a specific decarbonization goal. Can avoid potential disconnect between portfolio decarbonization without meaningful real economy decarbonization. Expected greatest long-term contribution to lowering real economy energy transition risks and to potentially improving VPIC portfolio long-term risk-adjusted return.

Cons: Expected to require more resources than current approach including internal (an additional full-time investment staff person) and outsourced (regular monitoring of climate metrics for portfolio, managers, and underlying companies) to amplify VPIC engagement and climate solutions investment efforts. Foregoes the big picture direction that a Net Zero pledge may bring.

This approach allows the VPIC to accelerate decarbonization through increased investments in climate solutions and in transitioning companies with expanded engagements across companies, managers, and government entities prior to making a specific net zero pledge.

Conclusions

A growing number of public pension plans have adopted Net Zero or Paris-aligned investment strategies. The relatively recent growth in Net Zero pledges is indicative of the rapid increase in attention to climate investment issues. With this attention to climate, plans of all sizes, and widely varying experience in addressing climate risks and opportunities, continue to evolve their approach.

As the VPIC considers how best to evolve its approach to investment climate risks and opportunities, Meketa offers four distinct, broad approaches. There is no consensus in the investment community on best practices. We find increasing attention to supporting the energy transition in the real economy through engagement and investment in climate solutions and in companies and industries that are transitioning. These four approaches are not mutually exclusive, and there are many variations within each of these three broad approaches. Seeking to reduce the carbon emissions of the VPIC's portfolio is not equivalent to seeking to reduce the real economy systemic climate risks throughout the portfolio. For example, neither broad exclusion of fossil fuel producers, nor hedging the portfolio to become 'carbon neutral', directly address reducing the climate risks in the real economy. The four approaches summarized above each carry pros and cons, and each can be implemented in a variety of ways.

In our opinion, the policy approach 3 that aims to adopt and implement a VPIC portfolio-wide net zero goal and approach 4 to adopt a portfolio-wide real economy net zero approach will both likely require greater effort and resources than the VPIC's current approach and may also yield the strongest results for the long-term benefit of the plan and reductions in real economy emissions. We believe the VPIC's current operations have a flexible structure that can be built upon to integrate a climate-related investment action plan consistent with Paris aligned or net zero ambitions. In our opinion, policy option 2 that concentrates on a broad fossil fuel exclusion across the portfolio, if implemented with private markets exclusions by 2040, would be expected to have minimal direct implementation costs, bring opportunity costs of reduction in VPIC engagement efforts and reduced investment options in asset classes such as private credit and infrastructure, and have a low expected contribution to reducing real economy climate risks and improving the VPIC long-term risk-adjusted return. Policy approach 1 is expected to have no additional costs and generate low-to-medium contributions to lowering real economy climate risks and increasing the long-term risk-adjusted return to the VPIC investment portfolio.

As science and markets continue to provide more and better information from which policymakers can rely, there will be a need to reflect those developments in VPIC's investment policy. We anticipate new metrics and analytic tools, an expanding range of investment opportunities in climate solutions and in companies transitioning to a low carbon economy, and evolutions in engagement strategies. This continual evolution is consistent with existing VPIC practices of regular and timely review of all aspects of the investment portfolio and in our opinion is a best practice.

Appendix I: MSCI Indices Methodologies[1]

Figure A.1: MSCI Indices Methodologies

	ACWI LOW CARBON TARGET	ACWI EX FOSSIL FUELS	ACWI CLIMATE CHANGE	ACWI CLIMATE PARIS ALIGNED
Objective	Mitigate stranded asset risk, reduce carbon footprint, maintain market index like financial characteristics.	Eliminates fossil fuels reserves exposure to mitigate climate change concerns and reputational risk.	Designed to re-weigh securities based upon the opportunities and risks associated with the transition by exceeding the requirement of the EU Climate Transition Benchmark.	Designed to support net-zero strategies in a holistic way by aligning with a 1.5-degree scenario, TCFD recommendations, and exceeding the EU Paris Aligned Benchmarks minimum requirements.
Construction	Minimum ESG Exclusions· Minimize the carbon exposure with a Tracking Error target of 50 bps· Scope of emissions: Scope 1, Scope 2 and Scope 3· Turnover constraint*: < 10% semi-annual· Sector constraints: < 2% under- or over-weight· Country constraints: < 2% under- or over-weight· Securities with extremely low weight post optimization are deleted.	Leverages MSCI ESG Climate Change Metrics to identify and exclude constituents with fossil fuel reserves.	Utilizes the MSCI Low Carbon Transition (LCT) score and category to reweight constituents of a parent index· 30% minimum reduction in current and potential weighted average carbon emissions intensity (WACI)· Minimum 7% reduction of WACI per annum· 0% Active weight in High Climate Impact Sector· Achieve higher allocation to companies that set carbon reduction targets.	Utilizes a range of MSCI Climate Metrics focusing on the management of climate related risks and opportunities· 50% minimum reduction in current and potential weighted average carbon emissions intensity (WACI)· Minimum 10% reduction of WACI per annum· 0% Active weight in High Climate Impact Sector· 20% higher allocation to companies that set carbon reduction targets· 10% increase in Low Carbon Transition Score· 50% minimum reduction in weighted average extreme weather Climate Value-at-risk.

[1] Source: MSCI

	ACWI LOW CARBON TARGET	ACWI EX FOSSIL FUELS	ACWI CLIMATE CHANGE	ACWI CLIMATE PARIS ALIGNED
Weighting Scheme	Optimized	Market Capitalization	Re-weighted free-float market capitalization	Optimized
Exclusions	Controversial Weapons· Companies with ESG Controversy Score of 0 **(Very Severe)** · Thermal Coal Mining· Oil Sands	Companies with proved & probable coal reserves and/or oil and natural gas reserves used for energy purposes.	Min MSCI ESG Controversy Score: **0 (Very Severe)** · Min MSCI Environmental Controversies Score: **1**· **Weapons**: Controversial Weapons· **Environmental**: Thermal Coal Mining· **Others:** Tobacco	Min MSCI ESG Controversy Score: **0 (Very Severe)** · **Weapons**: Controversial Weapons· **Environmental**: Thermal Coal Mining, Oil & Gas, Thermal Coal, liquid fuel, and natural gas-based power generation· **Others:** Tobacco

[1] Source: MSCI

Appendix II: Top 200 Fossil Fuel Underground List Exposure

Figure A.2: Total Portfolio Fossil Fuel Exposure as of December 31, 2022[1]

Asset Class	Total No of Funds	Total VPIC AUM ($M)	% of Total Portfolio AUM	% of Total Sector AUM	# of funds with Fossil Fuel Exposure	Total Fund Exposure FF (% AUM)	Total Fund Exposure FF ($M)	Top 200 FF Companies	Total FF Company Exposure (% AUM)	Total FF Company Exposure ($M)	% of Total Portfolio FF company Exposure
Total Portfolio	**51**	**5,421**	**100%**	**NA**	**26**	**70%**	**3,786**	**149**	**2.01**	**109**	**100%**
Total Public Markets[2]	**12**	**4,179**	**77**	**100**	**8**	**60**	**3273**	**149**	**2.00**	**108**	**99**
Domestic Equity	**2**	**402**	**7**	**10**	**1**	**4**	**228**	**14**	**0.13**	**6.8**	**6**
Active	*1*	*174*	*3*	*4*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Passive	*1*	*228*	*4*	*5*	*1*	*4*	*228*	*14*	*0.13*	*6.8*	*5*
Global Equity	**3**	**1944**	**36**	**47**	**2**	**31**	**1670**	**146**	**1.44**	**78.3**	**72**
Active	*2*	*456*	*8*	*11*	*1*	*3*	*182*	*20*	*0.13*	*7.2*	*7*
Passive	*1*	*1,488*	*27*	*36*	*1*	*27*	*1488*	*146*	*1.31*	*71.1*	*65*
International[3]	**2**	**113**	**2**	**3**	**2**	**2**	**113**	**8**	**0.15**	**7.9**	**7**
Active	*2*	*113*	*2*	*3*	*2**	*2*	*113*	*8*	*0.15*	*7.9*	*7*
Fixed Income	**4**	**1472**	**27**	**35**	**3**	**23**	**1262**	**30**	**0.27**	**14.3**	**13**
Active	*2*	*442*	*8*	*11*	*2**	*8*	*442*	*6*	*0.15*	*7.9*	*7*
Passive	*2*	*1,030*	*19*	*25*	*1*	*15*	*820*	*27*	*0.12*	*6.3*	*6*
Public Real Assets	**1**	**248**	**5**	**6**	0	**0**	0	**NA**	**NA**	**NA**	**NA**
Total Private Markets	**39**	**1242**	**23**	**100**	**18**	**9**	**513**	**NA**	**0.02**	**1.0**	**1**
Private Equity	**25**	**545**	**10**	**44**	**17**	**8**	**419**	**NA**	**0.01**	**0.7**	**1**
Private Credit	**9**	**500**	**9**	**40**	**1**	**2**	**94**	**NA**	**0.01**	**0.3**	**0.3**
Real Assets/ Real Estate[1]	**5**	**197**	**4**	**16**	**0**	**0**	**0**	**NA**	**0**	**0**	**0**

**Commingled Funds: Acadian ACWI EX-US $2 million (International equity), Wellington EMD $178 million (Fixed Income)*

VPIC exposure to fossil fuel companies was approximately 2.0% of the Total portfolio AUM.

The greatest share to total portfolio AUM invested in fossil fuels was in passive global equity.

VPIC's $1.2 billion private market investments included just $1 million in fossil fuel investments.

[1] Public Market Fossil Fuel Exposure to Top 200 Fossil Free List. Private Market Fossil Fuel Exposure data gathered through manager survey and includes exploration, extraction, and production of fossil fuel. Market value numbers may not sum due to rounding.

[2] Private market: Portfolio company Scope 1&2 GHG emissions (tCO_2e) * fund % ownership of company*VPIC portfolio weight

[3] Mondrian Int'l equity holdings, valued at $2 million at the end of December 31, 2022, were included in the calculation.

Figure A.3: Top 200 Fossil Fuel Reserves Companies and Energy Transition Indicators by Asset Class

					Top 200 Public Market Fossil Fuel Companies and Private Market Manager Survey Estimates			Public Market Top 200 Fossil Fuel Companies and Top 200 Renewable Energy Generators		
Asset Class	No of Funds	Total VPIC AUM ($M)	% of Total Portfolio AUM	% of Total Sector AUM	# of funds	# of Top 200 FF Companies	Fossil Fuel Company (% of Total Portfolio AUM)	# of funds	# Of Issuers	Fossil Fuel Renewable Leaders (% of Total Portfolio AUM)
Total Portfolio	51	5,421	100	-	26	149	2.01	3	10	0.155
Total Public Markets	12	4179	77	100	8	149	2.00	3	10	0.155
Domestic Equity	2	402	7	10	1	14	0.13	0	0	0
Active	*1*	*174*	*3*	*4*	*0*	*0*	*0.00*	*0*	*0*	*0*
Passive	*1*	*228*	*4*	*5*	*1*	*14*	*0.13*	*0*	*0*	*0*
Global Equity	3	1944	36	47	2	146	1.44	2	10	0.146
Active	*2*	*456*	*8*	*11*	*1*	*20*	*0.13*	*1*	*1*	*0.132*
Passive	*1*	*1,488*	*27*	*36*	*1*	*146*	*1.31*	*1*	*10*	*0.015*
International	2	113	2	3	2	8	0.15	0	0	0
Active	*2*	*113*	*2*	*3*	*2*	*8*	*0.15*	*0*	*0*	*0*
Fixed Income	4	1472	27	35	3	30	0.27	1	1	0.01
Active	*2*	*442*	*8*	*11*	*2*	*6*	*0.15*	*0*	*0*	*0*
Passive	*2*	*1,030*	*19*	*25*	*1*	*27*	*0.12*	*1*	*1*	*0.01*
Public Real Assets	1	248	5	6	0	NA	NA	NA	NA	NA
Total Private Markets	39	1242	23	100	18	NA	0.02	NA	NA	NA
Private Equity	25	545	10	44	17	NA	0.01	NA	NA	NA
Private Credit	9	500	9	40	1	NA	0.01	NA	NA	NA
Real Assets/ Real Estate[1]	5	197	4	16	0	NA	NA	NA	NA	NA

VPIC held 2.0% of its total portfolio AUM in 149 of the Top 200 public fossil fuel companies, most in passive Global Equity.

The energy transition includes fossil fuel leaders that are also renewable energy leaders.

VPIC's public market exposure to 149 of the Top 200 Fossil Fuel companies, included 10 companies that were also among the top 200 global renewable energy generation companies. Integrated Oil and Gas major Total Energies was among the 10.

Broad fossil fuel divestment can also divest low carbon leaders and transitioning firms.

Figure A.4: VPIC Public Markets Top 200 Fossil Fuel Exposure

	Total Portfolio No of Top 200 Public Fossil Fuel Companies	Total Portfolio AUM ($M)	Total Portfolio (% of AUM)
Coal	59	17.4	0.32
Active Funds	*6*	*2.4*	*0.04*
Passive Funds	*59*	*15.1*	*0.28*
Oil and Gas	90	90.1	1.67
Active Funds	*23*	*21.08*	*0.39*
Passive Funds	*88*	*68.88*	*1.27*
Total	149	107.5	2.00

VPIC had minimal exposure to public Top 200 fossil fuel companies in its actively managed funds, and 0.00% of its total portfolio AUM in Top 100 coal companies.

VPIC holdings in 149 of the Top 200 fossil fuel companies were predominantly oil and gas companies, where 90 companies accounted for 1.67% of VPIC's total portfolio AUM.

In contrast, VPIC held just 59 of the top coal companies, which combined accounted for 0.32% of the VPIC total portfolio AUM.

VPIC's Carbon Reduction and Mitigation Policy allows for but does not explicitly include the minimizing of coal company exposure from actively managed funds.

Appendix III: Public Markets Climate Factor Exposures

Figure A.5: VPIC Public Markets: Reported Scope 1, 2 and 3 Emissions

			Scope 1+2 Reported		Scope 3 Reported	
	# Of Total Issuers[1]	AUM ($M)[2]	# Of Issuers Collected	AUM (%)	# Of Issuers Collected	AUM (%)
Total Portfolio	**9,524**	**3,589**	**5,029**	**68**	**1,424**	**38**
Total Portfolio Benchmark[3]	*9,675*		*4,924*	*68*	*1,388*	*39*
Domestic Equity	**588**	**395**	**490**	**75**	**224**	**29**
Russell 3000 Index	*2,938*		*1,094*	*90*	*316*	*56*
Global Equity	**9,034**	**1,906**	**4,940**	**92**	**1,408**	**55**
MSCI ACW IMI Index	*8,887*		*4,833*	*89*	*1,368*	*50*
International Equity	**476**	**113**	**331**	**99.8**	**156**	**74**
MSCI EAFE Index	*779*		*738*	*98*	*420*	*67*
Fixed Income[4]	**1,050**	**1,174**	**658**	**25**	**301**	**12**
Bloomberg US Agg Bond Index	*974*		*621*	*33*	*293*	*17*

Over two-thirds of VPIC public markets AUM are invested in companies that report Scope 1 and 2 emissions, compared to 38% that reported Scope 3 emissions.

[1] Represent securities mapped to the Issuers by ISS. Securities such as trust, and loan instruments not mapped.
[2] Represent the market value of the total issuers that were mapped.
[3] The Total Portfolio benchmark weights each sub-portfolio's benchmark (Domestic Equity, Global Equity, International equity, and Fixed Income) by the Market Values shown herein for each sub-portfolio.
[4] BlackRock TIPS was excluded from the analysis as there are no climate data on Treasuries.

Figure A.6: Carbon Footprint Scope 1, 2 and 3 by asset class

	# Of Total Issuers[1]	AUM ($M)[2]	Coverage Ratio[3]	# Of Issuers Collected	Carbon Footprint Scope 1+2 (tCO2e)	Carbon Footprint Scope 1+2+3 (tCO2e)
Total Portfolio	9,524	3,589	83%	9,034	55	510
Total Portfolio Benchmark[4]	*9,675*		*75%*	*9,110*	*60*	*538*
Domestic Equity	588	395	100%	588	40	426
Russell 3000 Index	*2,938*		*84%*	*2,596*	*40*	*409*
Global Equity	9,034	1,906	100%	8,852	54	555
MSCI ACW IMI Index	*8,887*		*98%*	*8,618*	*63*	*569*
International Equity	476	113	100%	470	141	1,054
MSCI EAFE Index	*779*		*100%*	*777*	*74*	*788*
Fixed Income[5]	1,050	1,174	48%	758	52	312
Bloomberg US Agg Bond Index	*974*		*37%*	*729*	*61*	*422*

VPIC's public markets carbon footprint was slightly lower than the benchmark footprint for both Scope 1+2 and Scope 1+2+3 emissions.

[1] Represent securities mapped to the Issuers by ISS. Securities such as trust, and loan instruments not mapped.
[2] Represent the market value of the total issuers that were mapped.
[3] Securities with data available for emissions and adjusted enterprise value.
[4] The Total Portfolio benchmark weights each sub-portfolio's benchmark (Domestic Equity, Global Equity, International equity, and Fixed Income) by the Market Values shown herein for each sub-portfolio.
[5] BlackRock TIPS was excluded from the analysis as there are no climate data on Treasuries.

Figure A.7: Scope 1, 2 and 3 Emissions Intensity by asset class

	# Of Total Issuers[1]	AUM ($M)[2]	Coverage Ratio[3]	# Of Issuers Collected	Scope 1+2 tCO_2e/Revenue Avg	Scope 1+2 tCO_2e/Revenue WAVG	Scope 1+2+3 tCO_2e/Revenue Avg	Scope 1+2+3 tCO_2e/Revenue WAVG
Total portfolio	**9,524**	**3,589**	**83%**	**8,946**	**237**	**150**	**1,310**	**1,208**
Total Portfolio Benchmark[4]	9,675		*75%*	9,110	*282*	*163*	1,645	1,222
Domestic Equity	**588**	**395**	**100%**	**588**	**182**	**138**	**1,394**	**1,250**
Russell 3000 Index	*2,938*		*84%*	*2,807*	*163*	*136*	*1,680*	*1,175*
Global Equity	**9,034**	**1,906**	**100%**	**8,746**	**267**	**147**	**1,742**	**1,331**
MSCI ACW IMI Index	*8,887*		*98%*	*8,615*	*264*	*153*	*1,742*	*1,200*
International Equity	**476**	**113**	**100%**	**470**	**83**	**167**	**1,134**	**1,049**
MSCI EAFE Index	*779*		*100%*	*777*	*140*	*114*	*1,142*	*1,236*
Fixed Income[5]	**1,050**	**1,174**	**48%**	**766**	**225**	**163**	**999**	**835**
Bloomberg US Agg Bond Index	*974*		*37%*	*731*	*356*	*212*	*1,555*	*1,169*

VPIC's total public markets Scope 1+2 and Scope 1+2+3 weighted average emissions intensity was lower than the total public markets benchmark carbon emissions intensity.

[1] Represent securities mapped to the Issuers by ISS. Securities such as trust, and loan instruments not mapped.
[2] Represent the market value of the total issuers that were mapped.
[3] Securities with data available for emissions and adjusted enterprise value
[4] The Total Portfolio benchmark weights each sub-portfolio's benchmark (Domestic Equity, Global Equity, International equity, and Fixed Income) by the Market Values shown herein for each sub-portfolio.
[5] BlackRock TIPS was excluded from the analysis as there are no climate data on Treasuries.

Figure A.8: Top Fossil Fuel Companies[1] Exposure by Asset Class

			MSCI Fossil Fuel Exclusion List Companies		MSCI Fossil Fuel Exclusion List Companies and Top 200 Renewable Energy Generators	
	# Of Total Issuers[2]	AUM ($M)[3]	# Of Issuers Collected	AUM (%)	# Of Issuers Collected	AUM (%)
Total Portfolio	**9,524**	**3,589**	**149**	**4**	**23**	**0.6**
Total Portfolio Benchmark[4]	*9,675*		*161*	*4*	*24*	*0.8*
Domestic Equity	**588**	**395**	**21**	**3**	**2**	**0.24**
Russell 3000 Index	*2,938*		*45*	*4*	*2*	*1.6*
Global Equity	**9,034**	**1,906**	**149**	**5**	**23**	**1**
MSCI ACW IMI Index	*8,887*		*159*	*5*	*24*	*1*
International Equity	**476**	**113**	**10**	**11**	**0**	**0**
MSCI EAFE Index	*779*		*36*	*8*	*7*	*2*
Fixed Income[5]	**1,050**	**1,174**	**22**	**1**	**3**	**0.1**
Bloomberg US Agg Bond Index	*974*		*22*	*1*	*3*	*.01*

VPIC's total public markets had fewer top fossil fuel companies than the benchmark. In contrast, the number of fossil fuel companies in the top renewable energy generators was similar.

[1] Public Market Fossil Fuel Exposure uses the 4th quarter MSCI Fossil Fuel Exclusion List as of Nov 2022. MSCI provides the exclusion list on a quarterly basis. 170 companies in the Index Review Criteria Reports were excluded from the MSCI Fossil Fuel Free Index as of Nov 2022.
[2] Represent securities mapped to the Issuers by ISS. Securities such as trust, and loan instruments not mapped.
[3] Represent the market value of the total issuers that were mapped.
[4] The Total Portfolio benchmark weights each sub-portfolio's benchmark (Domestic Equity, Global Equity, International equity, and Fixed Income) by the Market Values shown herein for each sub-portfolio.
[5] BlackRock TIPS was excluded from the analysis as there are no climate data on Treasuries.

Figure A.9: Green Revenue Share and Board Oversight of Climate Risks

			Green Revenue Share >5%		Board Oversight of Climate Risks	
	# Of Total Issuers[1]	AUM ($M)[2]	# Of Issuers Collected	AUM (%)	# Of Issuers Collected	AUM (%)
Total Portfolio	**9,524**	**3,589**	**592**	**10**	**2,448**	**58**
Total Portfolio Benchmark[3]	*9,675*		*594*	*11*	*2,391*	*49*
Domestic Equity	**588**	**395**	**57**	**8**	**452**	**70**
Russell 3000 Index	*2,938*		*169*	*16*	*1,156*	*79*
Global Equity	**9,034**	**1,906**	**571**	**14**	**2,440**	**71**
MSCI ACW IMI Index	*8,887*		*562*	*14*	*2,341*	*65*
International Equity	**476**	**113**	**45**	**18**	**132**	**64**
MSCI EAFE Index	*779*		*106*	*13*	*426*	*71*
Fixed Income[4]	**1,050**	**1,174**	**69**	**3**	**440**	**35**
Bloomberg US Agg Bond Index	*974*		*70*	*6*	*439*	*22*

VPIC public market holdings included 10% of the total public market AUM (592 companies) with greater than 5% green revenue share.

26% of VPIC's total public market AUM (2,448 companies) responded that their Board has oversight of climate risks.

[1] Represent securities mapped to the Issuers by ISS. Securities such as trust, and loan instruments not mapped.
[2] Represent the market value of the total issuers that were mapped.
[3] The Total Portfolio benchmark weights each sub-portfolio's benchmark (Domestic Equity, Global Equity, International equity, and Fixed Income) by the Market Values shown herein for each sub-portfolio.
[4] BlackRock TIPS was excluded from the analysis as there are no climate data on Treasuries.

Figure A.10: Approved Science Based Targets by Asset Class

			Approved Near-term Science Based Target		Approved Net-zero Science Based Target	
	# Of Total Issuers[1]	AUM ($M)[2]	# Of Issuers Collected	AUM (%)	# Of Issuers Collected	AUM (%)
Total portfolio	**9,524**	**3,589**	**1,529**	**33**	**707**	**16**
Total Portfolio Benchmark[3]	9,675		1,470	32	680	16
Domestic Equity	**588**	**395**	**214**	**32**	**88**	**13**
Russell 3000 Index	*2,938*		*352*	*49*	*143*	*24*
Global Equity	**9,034**	**1,906**	**1,510**	**50**	**700**	**25**
MSCI ACW IMI Index	*8,887*		*1,468*	*44*	*683*	*23*
International Equity	**476**	**113**	**160**	**58**	**79**	**37**
MSCI EAFE Index	*779*		*398*	*59*	*195*	*34*
Fixed Income[4]	**1,050**	**1,174**	**197**	**6**	**84**	**2**
Bloomberg US Agg Bond Index	*974*		*192*	*9*	*82*	*4*

More VPIC public market companies had approved science based net zero targets than those in the benchmark.

[1] Represent securities mapped to the Issuers by ISS. Securities such as trust, and loan instruments not mapped.
[2] Represent the market value of the total issuers that were mapped.
[3] The Total Portfolio benchmark weights each sub-portfolio's benchmark (Domestic Equity, Global Equity, International equity, and Fixed Income) by the Market Values shown herein for each sub-portfolio.
[4] BlackRock TIPS was excluded from the analysis as there are no climate data on Treasuries.

Figure A.11: Disclosure of Energy Consumption by Asset Class

			Disclosure of approach to reduce energy from non-renewable resources		Disclosure of amount of energy from renewable resources	
	# Of Total Issuers[1]	AUM ($M)[2]	# Of Issuers Collected	AUM (%)	# Of Issuers Collected	AUM (%)
Total Portfolio	**9,524**	**3,589**	**1,126**	**31**	**693**	**18**
Total Portfolio Benchmark[3]	9,675		1,136	30	668	17
Domestic Equity	**588**	**395**	**197**	**31**	**140**	**24**
Russel 3000 Index	*2,938*		*415*	*48*	*262*	*27*
Global Equity	**9,034**	**1,906**	**1,124**	**44**	**690**	**26**
MSCI ACW IMI Index	*8,887*		*1,082*	*39*	*654*	*23*
International Equity	**476**	**113**	**83**	**44**	**64**	**23**
MSCI EAFE Index	*779*		*286*	*48*	*183*	*34*
Fixed Income[4]	**1,050**	**1,174**	**194**	**8**	**137**	**3**
Bloomberg US Agg Bond Index	*974*		*208*	*12*	*132*	*6*

VPIC public market company disclosure of approaches to reducing energy from non-renewable resources, and disclosing the amount of energy used from renewable resources were both roughly in line with benchmark disclosure levels.

[1] Represent securities mapped to the Issuers by ISS. Securities such as trust, and loan instruments not mapped.
[2] Represent the market value of the total issuers that were mapped.
[3] The Total Portfolio benchmark weights each sub-portfolio's benchmark (Domestic Equity, Global Equity, International equity, and Fixed Income) by the Market Values shown herein for each sub-portfolio.
[4] BlackRock TIPS was excluded from the analysis as there are no climate data on Treasuries.

Figure A.12: IEA Sustainable Development Scenario (SDS) 2022 Budget

	Positive=Overshoot[1]	Weighted Average Carbon Intensity (Scope 1+2) tCO_2e/Revenue	Coverage Ratio
Total portfolio	**-6%**	**150**	**83%**
Total benchmark	*-6%*	163	75%
Domestic Equity	**10%**	**138**	**100%**
Russell 3000 Index	*10%*	136	84%
Global Equity	**-8%**	**147**	**100%**
MSCI ACW IMI Index	*-6%*	153	98%
International Equity	**24%**	**167**	**100%**
MSCI EAFE Index	*-9%*	114	100%
Fixed Income[2]	**12%**	**163**	**48%**
Bloomberg US Agg Bond Index	*-1%*	212	37%

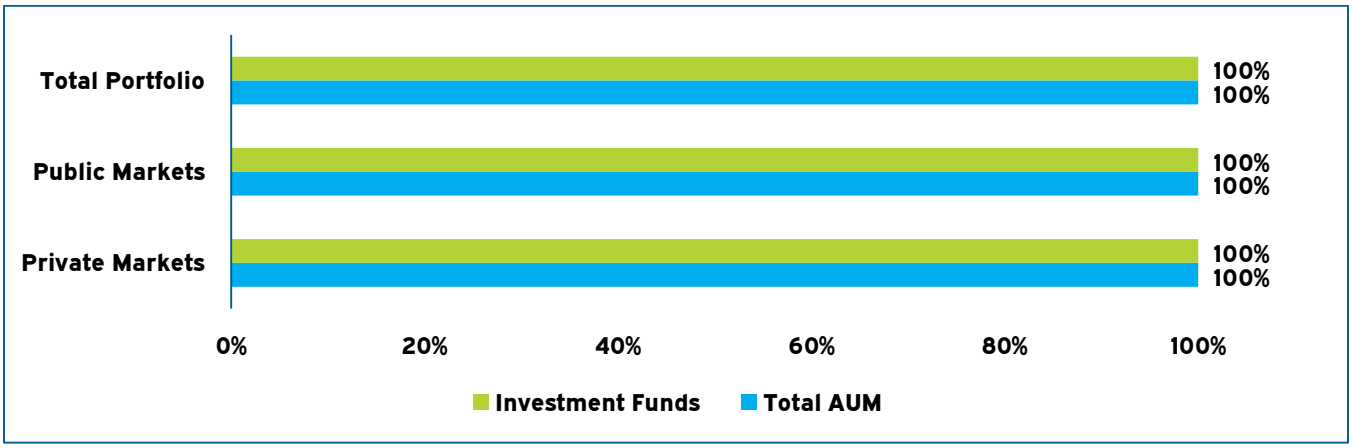
Carbon budget analyses offers another tool to assess how VPICs investments are currently aligned with the sustainable development goals carbon budget for the aggregated portfolio.

VPICs public market portfolio estimated carbon emissions were slightly lower than portfolio estimated carbon budget.

[1] Difference between Projected Emission 2022 vs. the carbon budget
[2] BlackRock TIPS was excluded from the analysis as there are no climate data on Treasuries.

Appendix IV: VPIC Asset Manager Climate Survey Results

Figure A.13: 2023 Climate Risk Survey of VPIC Investments Funds that Responded[1]



All VPIC managers responded to the 2023 Climate Survey.

[1] Throughout this report, the reported AUM is as of December 31, 2022. The survey result excludes BlueVista direct real estate strategy, as the survey doesn't apply to direct property investment and Mondrian Int'l equity as the manager was terminated in December 2022.

Figure A.14: 2023 Climate Survey Results from all VPIC Funds by Asset Category[1]

			Funds that responded YES to:					
			Consider climate change material risks?		Consider low carbon economy opportunities?		Net Zero Pledge	
Asset Class	No of Funds	Total VPIC AUM of responses ($M)	No of funds	Total AUM (%)	No of funds	Total AUM (%)	No of funds	Total AUM (%)
Total Portfolio	50	5,310	43	51	19	32	2	6
Total Public Markets	11	4,068	7	32	6	29	1	6
Domestic Equity	2	402	1	4	0	0	0	0
Active	*1*	*174*	*1*	*4*	*0*	*0*	*0*	*0*
Passive	*1*	*228*	*0*	*0*	*0*	*0*	*0*	*0*
Global Equity	3	1,944	2	11	2	11	0	0
Active	*2*	*456*	*2*	*11*	*2*	*11*	*0*	*0*
Passive	*1*	*1,488*	*0*	*0*	*0*	*0*	*0*	*0*
International	1	2	1	6	1	6	0	0
Active	*1*	*2*	*1*	*6*	*1*	*6*	*0*	*0*
Fixed Income	4	1,472	2	4	2	4	0	0
Active	*2*	*442*	*2*	*4*	*2*	*4*	*0*	*0*
Passive	*2*	*1,030*	*0*	*0*	*0*	*0*	*0*	*0*
Public Real Assets	1	248	1	6	1	6	1	6
Total Private Markets	39	1,242	36	99	13	42	1	7
Private Equity	25	545	22	43	4	6	0	0
Private Credit	9	500	9	41	4	21	0	0
Real Assets/ Real Estate	5	197	5	15	5	16	1	7

Nearly 90% of VPIC managers consider climate change material risks and 38% consider material climate opportunities.

Passively managed assets do not include any active factors, including climate factors.

Two real estate funds– made a net zero pledge for the fund in which VPIC is invested.

Figure A.15: VPIC Public Markets Funds that are Signatories to Climate-Related Investment Organizations

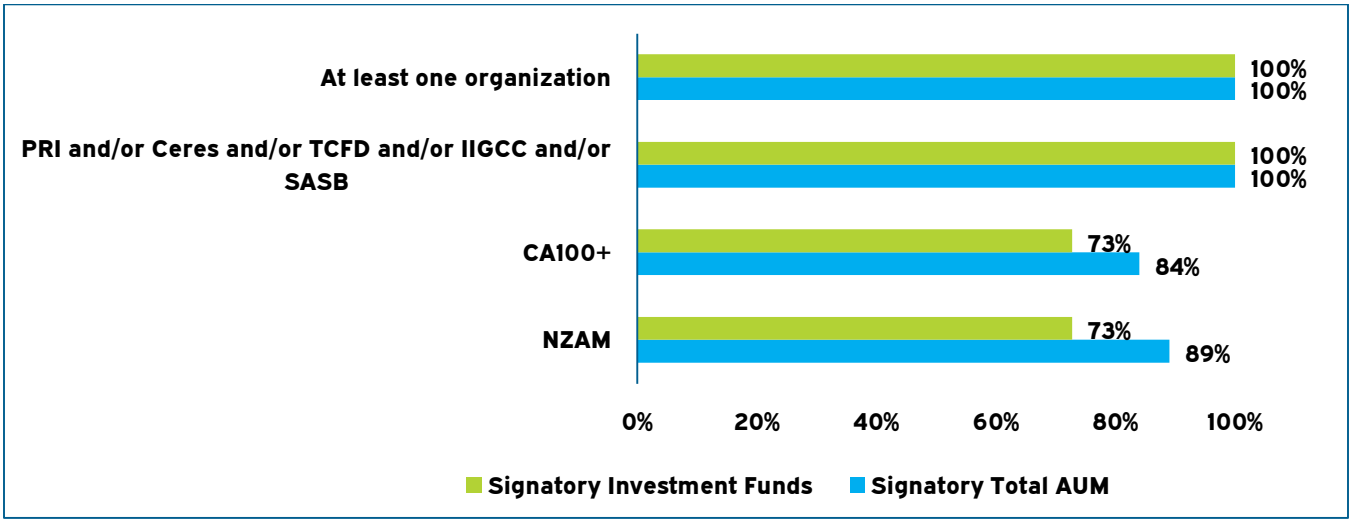
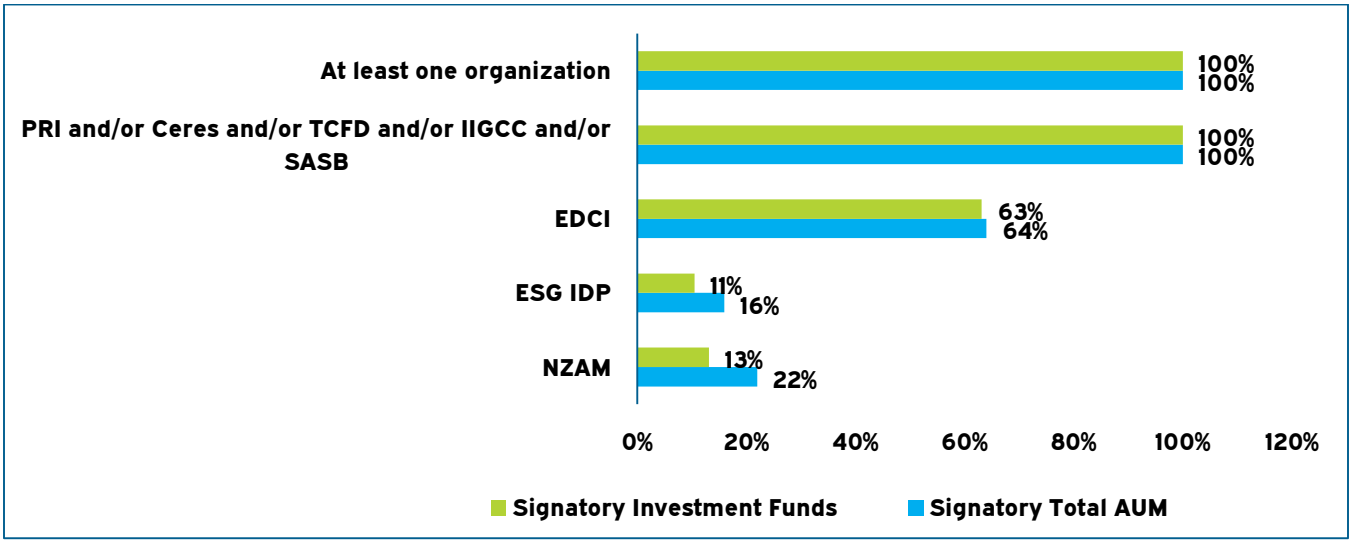


Figure A.16: VPIC Active Private Markets Funds that are Signatories to Climate-Related Investment Organizations



All VPIC managers are members of at least one climate-related investment organization.

Figure A17: 2023 Climate Survey Funds Monitoring Results by Asset Category[1]

			Funds that responded YES to:							
			Monitor climate change material risks?		Measures Scope 1, and/or Scope 2, and/or Scope 3 gas emissions?		Measures Renewable Energy Consumption?		Measures the Shares of Green Revenues Generated?	
Asset Class	No of Funds	Total VPIC AUM of responses ($M)	No of funds	Total AUM (%)	No of funds	Total AUM (%)	No of funds	Total AUM (%)	No of funds	Total AUM (%)
Total Portfolio	50	5,310	7	20%	19	50%	8	32%	3	9%
Total Public Markets	11	4,068	5	23%	8	53%	4	36%	2	11%
Domestic Equity	2	402	0	0%	0	0	0	0	0	0%
Active	*1*	*174*	*0*	*0%*	*0*	*0%*	*0*	*0%*	*0*	*0%*
Passive	*1*	*228*	*0*	*0%*	*0*	*0%*	*0*	*0%*	*0*	*0%*
Global Equity	3	1,944	2	11%	2	0.11	1	5%	1	5%
Active	*2*	*456*	*2*	*11%*	*2*	*11%*	*1*	*5%*	*1*	*5%*
Passive	*1*	*1,488*	*0*	*0%*	*0*	*0%*	*0*	*0%*	*0*	*0%*
International	1	2	1	6%	1	0.063	1	6%	1	6%
Active	*1*	*2*	*1*	*6%*	*1*	*6%*	*1*	*6%*	*1*	*6%*
Fixed Income	4	1,472	1	0%	4	30%	2	25%	0	0%
Active	*2*	*442*	*1*	*0.4%*	*2*	*5%*	*0*	*0%*	*0*	*0%*
Passive	*2*	*1,030*	*0*	*0%*	*2*	*25%*	*2*	*25%*	*0*	*0%*
Public Real Assets	1	248	1	6%	1	6%	0	0%	0	0%
Total Private Markets	39	1,242	2	8%	11	40%	4	20%	1	1%
Private Equity	25	545	1	1%	6	10%	1	1%	1	1%
Private Credit	9	500	0	0%	3	16%	2	12%	0	0%
Real Assets/ Real Estate	5	197	1	7%	2	14%	1	7%	0	0%

More VPIC public than private market managers monitor climate metrics.

Figure A.18: 2023 Climate Survey Results from all VPIC Funds by Asset Category[1]

			Funds that responded YES to:					
			Engage on Scope 1, and/or Scope 2, and/or Scope 3 gas emissions?		Engage on Renewable Energy Consumption?		Engage on the Shares of Green Revenues Generated?	
Asset Class	No of Funds	Total VPIC AUM of responses ($M)	No of funds	Total AUM (%)	No of funds	Total AUM (%)	No of funds	Total AUM (%)
Total Portfolio	50	5,310	6	17	2	2	1	0.24
Total Public Markets	11	4,068	4	0.21	0	0	0	0
Domestic Equity	2	402	0	0	0	0	0	0
Active	*1*	*174*	*0*	*0*	*0*	*0*	*0*	*0*
Passive	*1*	*228*	*0*	*0*	*0*	*0*	*0*	*0*
Global Equity	3	1,944	2	0.11	0	0	0	0
Active	*2*	*456*	*2*	*11*	*0*	*0*	*0*	*0*
Passive	*1*	*1,488*	*0*	*0*	*0*	*0*	*0*	*0*
International	1	2	0	0	0	0	0	0
Active	*1*	*2*	*0*	*0*	*0*	*0*	*0*	*0*
Fixed Income	4	1,472	1	0.04	0	0	0	0
Active	*2*	*442*	*1*	*4*	*0*	*0*	*0*	*0*
Passive	*2*	*1,030*	*0*	*0*	*0*	*0*	*0*	*0*
Public Real Assets	1	248	1	6	0	0	0	0
Total Private Markets	39	1,242	2	0.05	2	8	1	1
Private Equity	25	545	1	1	1	1	0	0
Private Credit	9	500	1	4	0	0	0	0
Real Assets/ Real Estate	5	197	0	0	1	7	1	1

Very few VPIC managers engage their portfolio companies on climate risks and opportunities.

Appendix V: Climate Scenario Analysis

Systemic climate risks that affect large institutional investors cannot be easily avoided. Different climate scenarios result in very different requirements to align an investment portfolio today with a given global temperature rise.

Figure A.19: How Different Climate Scenarios Might Impact Equity Investment Opportunities[1]

Alignment Target	Temperature	Societal Actional Required	Portfolio Construction Challenge
Business as usual	4.0°C	None	100% — No portfolio rebalancing needed to align to a business-as-usual scenario.
Commitments made by countries already (NDC aligned)	3.0°C	Policies currently proposed in Paris Agreement	85% — Possible to reweight a market portfolio away from heavy emitters using climate-related data, shrinking the investible universe by ~15%.
2°C	2.0°C	Net zero before end of the century, much deeper reductions than NDC pledges	40% — Large proportion of companies would need to be excluded in portfolio construction, shrinking the investible universe by ~60%.
1.5°C	1.5°C	Net zero by 2050, -15% CO2 reduction/year	10% — Limited universe of listed companies leading to a very concentrated portfolio, shrinking the investible universe by ~90%.

MSCI estimated that an investor would need to limit its investment universe to 10% of the MSCI ACWI to be completely aligned with a 1.5° C scenario today.

Climate scenario analyses provide additional forward-looking information on how an investment portfolio might be expected to perform under difference climate scenarios.

[1] This calculation is based on a hypothetical portfolio comprising companies of the MSCI ACWI Investable Markets Index (IMI), representing over 8,300 large-, mid-, and small-cap companies with available climate-change data across developed and emerging markets, as of Nov. 30, 2020. The data for the warming pathways is provided by Climate Action Tracker's Global Emissions Time Series dataset. Source: Climate Analytics, NewClimate Institute, MSCI ESG Research.

Introduction to Climate Scenario Modeling

The challenges presented by climate change are numerous, multifaceted, and hard to forecast with precision. Global temperatures have been rising along with various industrial greenhouse gas emissions, most notably (but not limited to) carbon dioxide (CO2) and creating significant increases in material physical climate risks.

Determining physical impacts – including but not limited to changes in local weather patterns, precipitation patterns, storm intensity and frequency, among others – presents one set of difficulties. Modeling issues compound the difficulties for asset owners seeking to understand their climate risk exposure. Physical impacts have uncertain influences on real economic activity (i.e., the people and companies that create and transport physical goods or perform physical services) which itself has a varying impact on financial results for portfolios.

Untangling these effects is complex enough without considering the multi-decade timeframes many owners plan around and recognizing that societal behavior is variable and can change in unpredictable ways in response to new circumstances or new information. The risk attributable to changing social, economic, and policy behavior in the face of climate change, "transition risk", is itself a major category of concern for investors in addition to physical climate change risk. Approaches to climate scenario modeling tends to fall into two groups: "top-down" or "bottom-up" analyses.

Climate Scenario Analyses for investors fall in two broad categories: 'top down' (macro) and 'bottom-up' – aggregating from company and industry level up.

Bottom-Up Climate Scenario Models

Historically, climate change modeling within asset owner portfolios focused on "bottom-up" methods. Bottom-up models generally take detailed information about individual companies and industries, and then apply and aggregate that data across an entire portfolio. Starting with the outputs of climate models, investors determine what linkages between climate variables and traditional financial valuation and risk variables seem plausible. These linkages can integrate climate considerations into traditional investment processes to provide climate-aware insights. Additionally, the impact of potential climate mitigation policies can be incorporated, allowing the measurement of both physical and transition risks. The ability to integrate climate risks into existing approaches, measure risk, or assess underlying security performance, is a key benefit of a bottom-up approach.

While bottom-up-focused methods are very granular, they provide insights about current (as opposed to future) practices and exposures. Thus, they can yield results that do not necessarily easily translate to long-term, strategic decision making. Though climate models can provide long-term forecasts of environmental and associated variables, the linkages between this data and financial variables, and asset-level and sector-specific models, are not necessarily built to forecast future values over long time periods. Aggregation can reduce the usefulness of a bottom-up analysis. A bottom-up analysis that forecasts different shifts within asset classes but little change in returns among asset classes would have limited usefulness for strategic asset allocation.

Fiduciaries typically consider investment decisions, particularly strategic asset allocation and liability management, across longer, multi-decade timespans. Companies, business practices, and consumers' tastes all change over time. Though analysts can make assumptions about trends going forward, any long-term analysis will be dependent on the accuracy of those assumptions. If an analysis is particularly sensitive to a few key assumptions which turn out to be mistaken or inaccurate, the results may be significantly impacted.

Bottom-up climate scenarios can be less useful for overall strategic asset allocation.

Top down scenarios can offer more stable relationships over the long term, and are less useful for sector or asset class specific forecasts of a portion of an investment portfolio.

Top-Down Climate Scenario Analyses

Top-down models generally begin with climate model outputs and climate scenario considerations, and then attempt to link these outputs with forecast changes in macroeconomic and broad financial trends over an extended time. These broader variables typically integrate well with whole-portfolio measures of risk exposure and asset class risk and return forecasting. Top-down climate scenario analysis is less useful than bottom-up analyses for forecasting performance for portions of an investor's portfolio.

To the extent that climate models are incorrect versus reality or that the estimated linkages between climate data and targeted macro variables vary, the top-down estimate will necessarily suffer. Though broader macroeconomic variables can have more stable relationships over time than company-specific measures of valuation, they can still change and would potentially become less stable in more extreme climate scenarios.

Top-down models generally attempt to link these climate model outputs with forecast changes in macroeconomic and broad financial trends over an extended time.

Meketa Climate Scenario Modeling – A Top-Down Approach

To avoid becoming overly dependent on current conditions and future assumptions, Meketa uses a top down, multifactor framework to assess long-term trends and scenarios. We specify broad, economically linked factors and project their future behaviors based on underlying historical relationships. Not specifically a climate model, our macroeconomic model can contextualize past environmental changes (e.g., mean global temperature rise over the pre-industrial baseline) alongside economic and financial factors and project various climate scenarios going forward over a long timeframe. Our approach is somewhat more dependent on the continuation of historical trends than bottom-up models and lacks their granularity but offers a broader range of potential situations for consideration. As time horizons lengthen to capture the long-term nature of climate change and the energy transition, it becomes increasingly difficult for any climate change model to estimate the impact of climate on companies, reflecting increasing uncertainty with longer-time horizons.

At a high level, Meketa's macroeconomic model generates many simulations describing how different asset classes and macroeconomic factors could potentially behave over a particular forecast period given what we know about their past behavior. Beginning with the last available actual data, possible future values are projected by randomly selecting values consistent with the factor's past distribution of returns. Additionally, historical relationships among and between factors are also considered in each iteration of projected values. This process repeats to generate a sufficiently long simulation period.

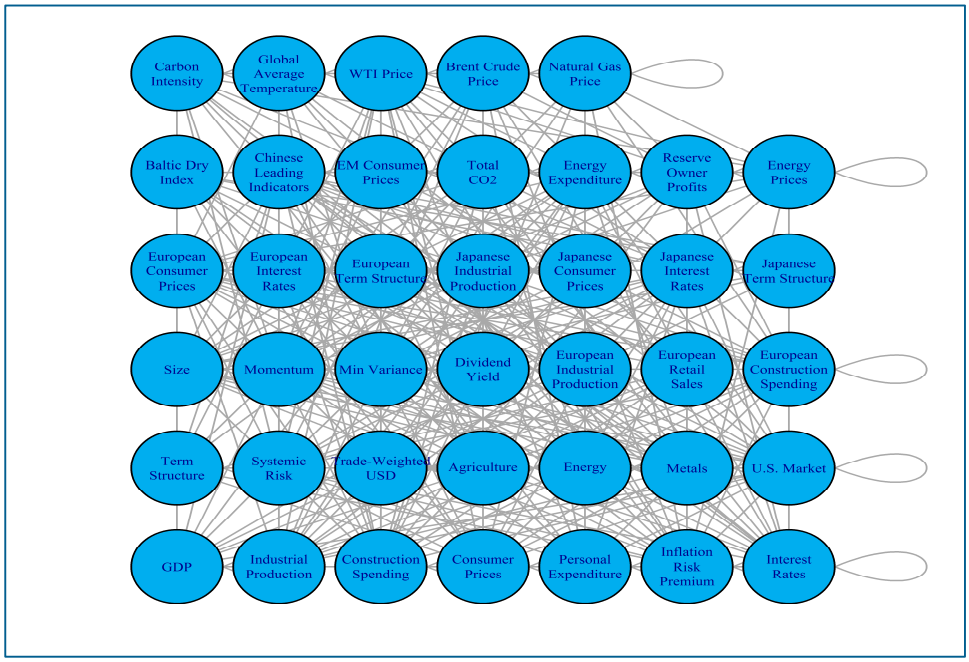
These simulations can be thought of as different plausible ways the world could look in the future based on what we have seen in the past. By examining groups of simulations that display characteristics being investigated (e.g., examining all simulations where global temperature rises by a given amount), we can draw conclusions about the paths of asset classes and factors that are consistent with the topic of investigation.

At a high level, Meketa's macroeconomic model generates many simulations that describe how different asset classes and macroeconomic factors could potentially behave over a particular forecast period given what we know about their past behavior.

Modeling Method for VPIC

For this analysis, we iteratively generated monthly return data beginning with the latest available actual returns for 47 different economic, financial, and climate factors. The starting point for the analysis is December 31, 2022. We investigated several different types of climate scenarios and focused on three relatively broad situations which examine subsets of the 5,000 climate simulations generated (see Appendix V for additional detail).

Figure A.20: The Meketa Climate Scenario Analysis Model



1. **1.5°C Global Mean Temperature**: Simulations where the global mean temperature is constrained to a 1.5°C or lower rise above the preindustrial baseline. Staying within this level of temperature rise is consistent with relatively aggressive climate change mitigation efforts.
2. **2.0°C Global Mean Temperature:** Simulations where the global mean temperature is consistent with a 3.0°C temperature rise by 2100. Staying within this level of temperature rise is consistent with moderate climate change mitigation efforts.

After calculating asset class returns over the 20-year period, we applied the Plan's current target asset allocation mapped to Meketa asset classes to generate simulated portfolio performance in the three simulations.

Meketa's climate scenario analysis used 47 different factors to look at simulations under a 1.5°C, a 3.0°C and a $100/tCO₂ tax on carbon.

After calculating asset class returns over the 20-year period, we applied the Plan's current target asset allocation mapped to Meketa asset classes to generate simulated portfolio performance in the three simulations.

Figure A.21: Assumed Asset Class Mapping

Mapped Asset Class	Weight (%)
Total	**100**
Global Equity	29
Large Cap US Equity	4
SMID Cap US Equity	3
Intl. Equities	7
Private Equity	10
EM Debt	4
Private and Alternative Credit	10
Non-Core Real Estate	4
Core Fixed Income	19
Core Real Estate	3
TIPS	3
Infrastructure	2
Farmland	2

Meketa's climate scenarios presented here use the VPIC target asset allocations.

Climate Scenario factors that may affect results.

Although we believe our approach is a reasonable method to examine a complicated set of interrelated issues, we note there are several factors which may impact the results.

→ **Starting Point of Analysis**: Our analysis begins December 31, 2022, a period immediately after a sharp equity downturn and sharp increase in US inflation and interest rates following a substantially turbulent economic environment consistent with the depths of the COVID-19 pandemic. Our modeling incorporates 1) extrapolation of recent trends and 2) reversion to mean expected long-term returns when generating simulations for analysis and consequently is sensitive to initial market conditions If the starting point of the analysis were shifted, it is possible the relationship between the mean expected returns of the base and climate scenario portfolios would differ.

→ **End Point of Analysis**: The analysis of financial impacts stretches over 20 years. While physical impacts of climate change are likely to increase in severity, potential transition risks are likely to be more pronounced more quickly.

→ **Indirect Incorporation of Physical Risk:** The outcomes of our traditional model reflect physical climate impacts only indirectly as a byproduct of measuring the effects of global temperature on the portfolios.

→ **Point versus Range Estimates**: While we present average 20-year expected returns as a starting point for discussion, it is important to recognize that these figures merely represent a range of potential outcomes. As with traditional asset allocation analysis, the forecast represents an entire distribution of returns.

Meketa's forward-looking analyses are sensitive to the starting point (December 31, 2022), end point, only indirectly incorporate physical climate risk.

The average 20-year return results represent an entire distribution of returns, similar to traditional asset allocation analysis.

Results and Discussion

For the current target asset allocation, Meketa analyzed the impact of the three climate scenarios versus a "base case" traditional set of capital market expectations created without regard to climate change or potential climate transition risk.

Figure A.22: VPIC Plan Results

Climate Scenario Analysis: VPIC Target Portfolio (As of December 31, 2022)	Base (%)	1.5-Degree (%)	2.0-Degree (%)
20-Year Expected Return (annualized)			
Target Portfolio	8.6	8.2	8.4
Standard Deviation			
Target Portfolio	12.8	13.9	13.5
Sharpe Ratio			
Target Portfolio	0.44	0.38	0.41

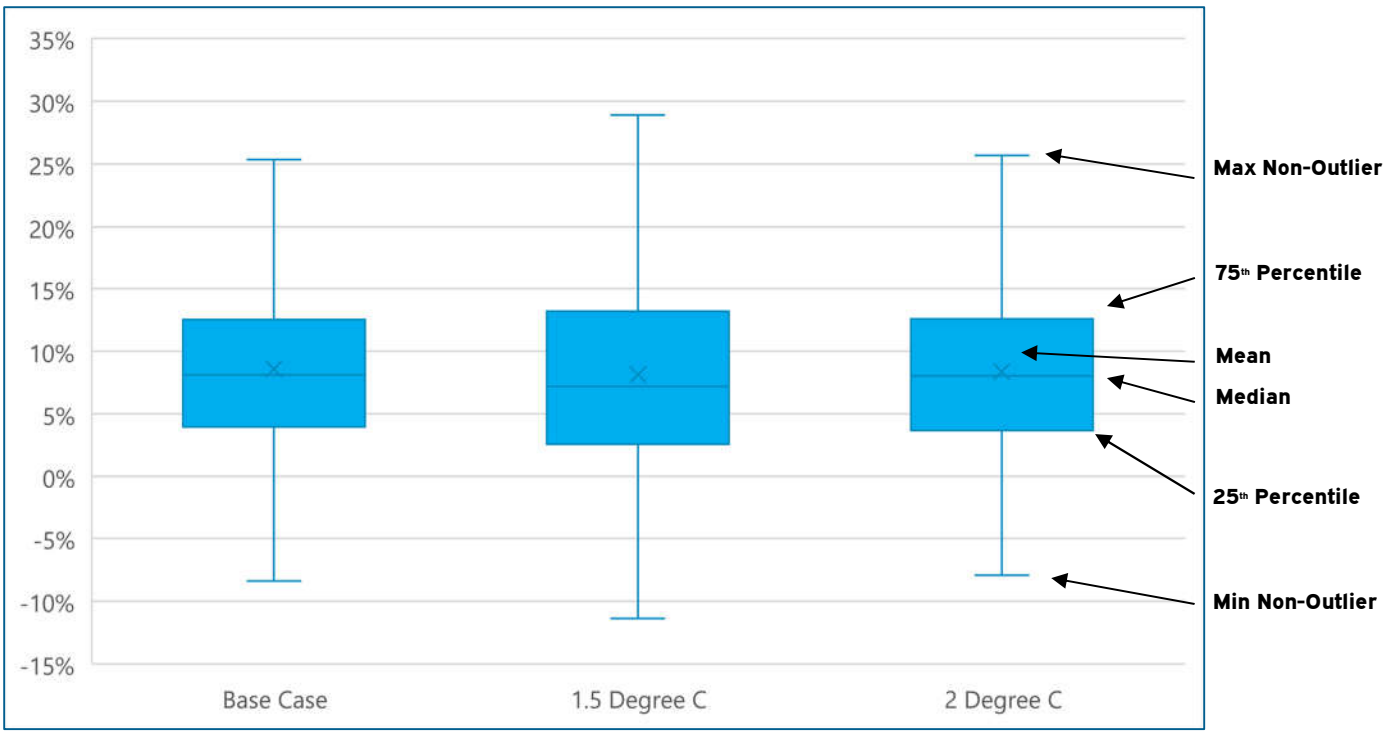
The base scenario does not attempt to incorporate climate change. The base scenario has the highest mean return at 8.6% per year on average relative to all scenarios with climate change assumptions. This result is not unusual in our experience, as the base case avoids climate transition risks and does not reflect any higher assumed physical costs. The lower long-term return expectations for scenarios with climate included presumably reflect the greater societal efforts to curtail carbon emissions and incentivize climate-friendly economic initiatives.

The relative mean returns of each scenario appear to vary based on exposure to transition risk. The most moderate transition scenario, the +2.0°C scenario has the lowest drop off relative to the baseline (-0.21%) while a more aggressive +1.5°C scenario shows the most substantial decline (-0.44%). Standard deviation statistics also reflect this same behavior, with the most transition-sensitive portfolio having the highest volatility (13.9%) and least-transitions sensitive portfolio the lowest (13.5%). Understandably, risk efficiency as represented by the expected Sharpe ratio is notably higher (0.41 versus 0.38) in the +2.0°C scenario.

Looking only at averages it appears that more aggressive climate change mitigation efforts will weigh on portfolio returns. However, reviewing the distribution of portfolio returns presents a more nuanced view of the potential future outcomes.

Climate change is expected to reduce long-term investment returns and increase risk.

Figure A.23: Distribution of Portfolio Returns



For example, while the +2.0°C return has the higher average return relative to the base case, its range of outcomes is also the tighter, with the most likely 50% of outcomes (i.e., the length of the blue boxes in Figure A.23) smaller than the other scenario. The highest plausible return for the +1.5°C scenario (represented by the height of the top of each blue rectangle in Figure A.23) is higher for the other scenario. In other words, although the average expected return is lower in a +1.5°C scenario with a large degree of climate change mitigation, there is still potential for higher returns.

Distributions of portfolio returns indicate that the portfolio relative return rankings could vary significantly from what the average returns indicate.

One basic but key observation looking at the distribution of portfolio returns is that the range of likely outcomes for all scenarios overlap greatly.

Climate Scenario Analysis Summary

→ **Climate change is expected to reduce long-term expected returns and increase expected risk.** When climate is added to a traditional asset allocation framework, the VPIC target asset allocation portfolio 20-year expected returns drop and the expected standard deviation rises compared to a base-case that does not account for climate risks.

→ **Climate change is expected to widen the distribution of the aggregate portfolio returns** compared to a base case scenario that does not include climate change.

→ **Distribution of asset class returns for** all three climate scenarios show wider distributions of returns in each asset class than in the base case that does not consider climate.

Meketa Simulation Analysis Approach with and without physical risk forecasts

Our clients are often seeking to mitigate risks across their entire investment portfolio over 20 to 30-year periods. As a result, we use a top-down, statistical approach to give asset allocators a "big picture" estimation of potential impacts to returns and risk that could confront them in fundamentally uncertain situations where the magnitude, direction, and timing of economic shocks and investment risks can vary substantially.

All our simulation models iteratively generate monthly return data beginning with the latest available actual returns for 47 different economic, financial, and climate factors prior to the analysis period. Using any available historical data to estimate relationships among these variables, we assume a randomized movement of each factor consistent with its historical behavior. The impact of all other relevant factors is added to derive a forecasted monthly return for each factor. In some cases, external forecast of factor returns can be incorporated by substituting the externally forecasted factor return for randomly generated ones. We repeat this process for each month in the forecast period to generate a simulated return stream stretching across the entire period (a "simulation"). We then repeat this process to create multiple simulations. The relationships of 104 asset classes to these factors are estimated based on historical data and then applied to the simulated pathways, generating asset class returns for each simulation. The number of required simulation and process to gather results differs slightly depending on whether externally provided assumptions for factor returns were used in generating the simulations.

Fully Randomized Simulations (Temperature Scenarios – 5,000 simulations)

A set of randomly generated simulations will often include a significant number of that do not exhibit returns that are of interest for a particular analysis. As a result, we examine only a subset of simulations that conform to the required conditions. In this case, we present outcomes from two temperature-based scenarios has to meet the following quantitative thresholds for inclusion:

Global Temperature Increase Above Pre-Industrial Baseline by 2100 + / - 0.25 degrees of temperature consistent with target temperature rise by 2100.

Using these simulation samples, we calculate relevant statistics and compare them to a "baseline" set of capital markets expectations compiled using traditional methods.

External Forecast (NGFS Climate Scenarios – 1,000 Simulations)

→ concerted effort ("Current Policies"). Because little mitigation policy is being implemented, transition risks are low but higher physical risk is realistically unavoidable.

Similar to fully randomized simulations, we calculate relevant statistics and compare them to a "baseline" set of capital markets expectations compiled using traditional methods.

Appendix VI: Climate Policy Approach Information

VPIC Carbon Reduction and Mitigation Policy (*Adopted April 26, 2022*)

The VPIC recognizes the significance of the global climate crisis. The transition to a low carbon economy will present opportunities and risks across all market sectors and geographies. The Commission employs a multidimensional approach to climate change considerations within the portfolio to maximize the total return on investments, within acceptable levels of risk for a public retirement system per Section 523 of the Vermont Pension Investment Commission's enabling statute.

This policy guides VPIC's response to external or internal initiatives to achieve carbon reduction goals. VPIC opposes any investment or divestment effort that would either implicitly or explicitly attempt to direct or influence the Commission to engage in investment activities that violate and breach the Commissioners' fiduciary responsibility. Consistent with its fiduciary responsibility and the concepts of diversification and passive index investment, the Commission does not and will not systemically exclude or include any investments in companies, industries, countries, or geographic areas, except in cases where it creates an economic risk to the fund or a potential for materials loss of revenue in line with the Commission's fiduciary duty.

VPIC firmly believes that active and direct engagement is the best way to address risks in the portfolio. Meetings with regulators, shareowners, and company leadership are essential to bring about change in a corporation or industry. Divestment is an option of last resort that can be employed as appropriate. Efforts at engagement include, but are not limited to, shareholder proposals and proxy votes against board members, regulatory outreach, media campaigns and other efforts.

VPIC's commitment to engaging companies rather than divesting is based on several considerations:

→ divestment would eliminate VPIC's standing and rights as a shareowner and foreclose further engagement.

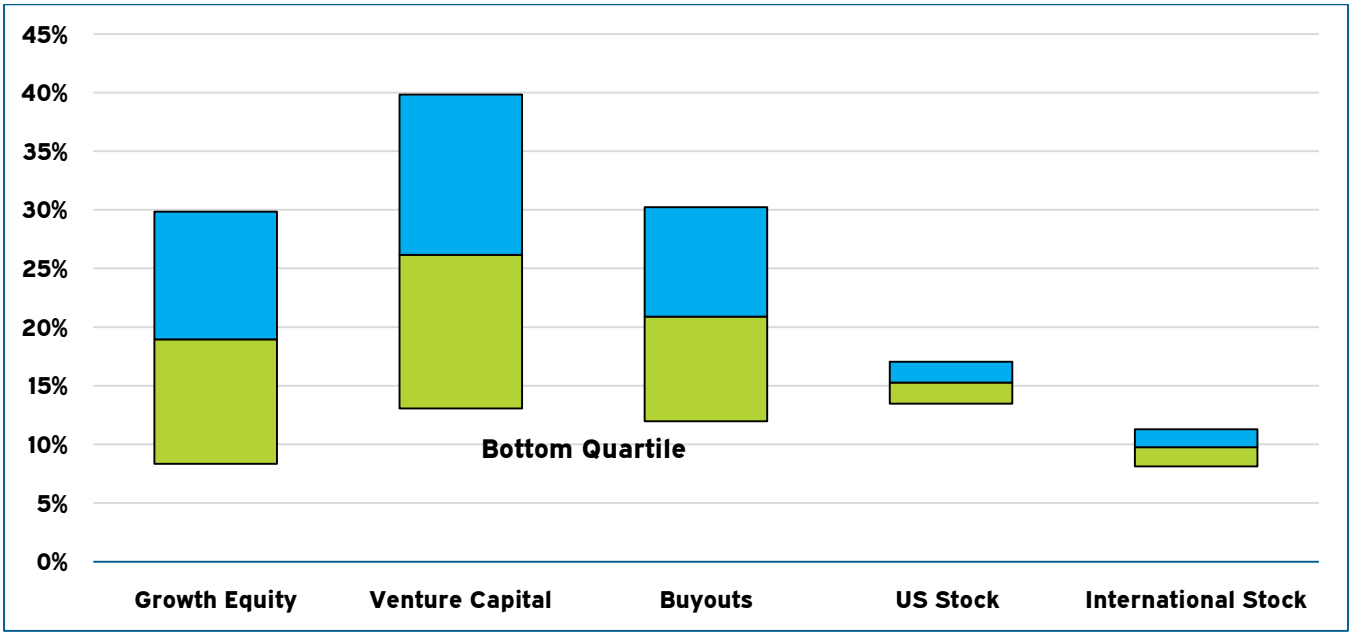
→ divestment would be likely to have negligible impact on the portfolio or the market.

→ divestment could result in increased costs and short-term losses;

→ divestment could compromise VPIC's investment strategies and negatively impact investment performance, further increasing unfunded liabilities and funding requirements.

If engagement fails to resolve the risk factor sufficiently, the CIO will bring the issue before the Commission for consideration of divestment from the applicable securities, or other prudent action. The Commission will receive input from its investment staff, investment managers, investment consultants, and other experts in the particular field or issue. If the Commission determines that the making or holding of an investment or continuing to hold a security is imprudent and inconsistent with its fiduciary duty, it will instruct investment staff to eliminate the unacceptable level of risk.

Figure A.24: Quartile Returns Across Asset Classes, Last 10 Years[1]



Private equity funds historically have shown a much wider distribution of returns than for public markets, indicating added importance in of seeking to invest in top quartile funds in private markets.

[1] Data sourced from Cambridge Associates via IHS Markit and eVestment. Data for PE funds raised from 2012 through December 2021 and public equity managers for the trailing 10 years, as of December 2021. All data sourced in August 2022.

Figure A.25: Summary Descriptions of Institutional Investor Organizations with a Climate Focus

Year Founded	Organization Name	Abbreviation	About
1985	Council of Institutional Investors https://www.cii.org/	CII	CII is a nonprofit association of US public, corporate and union employee benefit funds, other employee benefit plans, state and local entities charged with investing public assets and foundations and endowments with combined assets under management of approximately $4 trillion.
1989	Ceres https://www.ceres.org/homepage	Ceres	Ceres is a nonprofit organization transforming the economy to build a just and sustainable future for people and the planet. Through powerful networks and global collaborations of investors, companies and nonprofits, Ceres drives action and inspires equitable market-based and policy solutions throughout the economy.
2000	Carbon Disclosure Project https://www.cdp.net/en	CDP	CDP is a not-for-profit charity that runs the global disclosure system for investors, companies, cities, states, and regions to manage their environmental impacts. The world's economy looks to CDP as the gold standard of environmental reporting with the richest and most comprehensive dataset on corporate and city action.
2005	Principles for Responsible Investing https://www.unpri.org/	PRI	The PRI is the world's leading proponent of responsible investment. It works to understand the investment implications of environment, social and governance ("ESG") factors and to support its international network of investor signatories in incorporating these factors into their investment and ownership decisions

Year Founded	Organization Name	Abbreviation	About
2009	Global Real Estate Sustainability Benchmark https://www.gresb.com/	GRESB	GRESB is the global ESG benchmark for financial markets, composed of an independent foundation and a benefit corporation. Working together as one, the GRESB Foundation focuses on the development, approval, and management of the GRESB Standards while GRESB BV performs ESG assessments and provides related services to GRESB Members.
2011	Sustainability Accounting Standards Board https://sasb.org/	SASB	SASB Standards guide the disclosure of financially material sustainability information by companies to their investors. Available for 77 industries, the Standards identify the subset of ESG issues most relevant to financial performance in each industry.
2015	The Task Force on Climate-related Financial Disclosures https://www.fsb-tcfd.org/	TCFD	Created by the Financial Stability Board, the TCFD has set out its series of recommendations to establish a framework for businesses to manage climate risks; both transition and physical, and benefit from the related opportunities
2017	Climate Action 100+ https://www.climateaction100.org/	CA100+	Climate Action 100+ is an investor-led initiative to ensure the world's largest corporate greenhouse gas emitters take necessary action on climate change.
2017	Transition Pathway Initiative https://www.transitionpathwayinitiative.org/	TPI	The Transition Pathway Initiative ("TPI") is a global, asset-owner led initiative which assesses companies' preparedness for the transition to a low carbon economy.
2017	The Institutional Investors Group on Climate Change https://www.iigcc.org	IIGCC	IIGCC is the European membership body for investor collaboration on climate change.

Year Founded	Organization Name	Abbreviation	About
2019	Net Zero Asset Owner Alliance https://www.unepfi.org/net-zero-alliance	NZAOA	Institutional investors transitioning their portfolio to Net Zero GHG emissions by 2050.
2019	Paris Aligned Investment Initiative and Paris Aligned Asset Owners https://www.parisalignedassetowners.org	PAII	The Paris Aligned Asset Owners is an outgrowth of the Paris Aligned Investment Initiative is a collaborative investor-led global forum enabling investors to align their portfolios and activities to the goals of the Paris Agreement. The Paris Aligned Investment Initiative ("PAII") was established in May 2019 by the Institutional Investors Group on Climate Change ("IIGCC").
2021	ESG Data Convergence Initiative https://www.esgdc.org	EDCI	The EDCI's objective is to streamline the private investment industry's historically fragmented approach to collecting and reporting ESG data in order to create a critical mass of meaningful, performance-based, comparable ESG data from private companies. This allows GPs and portfolio companies to benchmark their current position and generate progress toward ESG improvements while enabling greater transparency and more comparable portfolio information for LPs.
2022	ESG Integrated Disclosure project https://www.esgidp.org	ESG IDP	ESG IDP provides borrowers with a harmonized and standardized means to report ESG information to their lenders in order to enhance ESG transparency and accountability in Private Credit. It is led by a group of leading alternative asset managers and industry bodies in the private and broadly syndicated credit markets.

Year Founded	Organization Name	Abbreviation	About
2023	Taskforce on Nature-related Financial Disclosures https://tnfd.global/	TNFD	The TNFD has developed a set of disclosure recommendations and guidance for organizations to report and act on evolving nature-related dependencies, impacts, risks, and opportunities.

Figure A.26: CalSTRS 2023 Prototype of Transition Tracker

CalSTRS Transition Tracker					
Physical Risk Indicators					
	2019	2020	2021	2022	Signal
Global Surface Temperature (versus 20th century average temp)[1]	0.97°C	1.01°C	0.86°C	0.91°C	
Globally insured losses from natural disasters (in 2022 $ billions)[2]	$ 89	$ 120	$ 146	$ 132	
Status					↓
[1] Global Time Series | Climate at a Glance | National Centers for Environmental Information (NCEI) (noaa.gov)					
[2] 2023 Weather, Climate and Catastrophe Insight (aon.com)					
Transition Risk - Policy Indicators					
	2019	2020	2021	2022	Signal
Share of global GHG covered by national net zero pledges[3]	18%	58%	74%	na	
2100 Warming Projections - Policies and Action[4]	3.00°C	2.90°C	2.90°C	2.75°C	
Status					↔
[3] Net Zero by 2050 - A Roadmap for the Global Energy Sector (windows.net)					
[4] Temperatures | Climate Action Tracker					
Transition Risk - Technology Indicators					
	2019	2020	2021	2022	Signal
Global solar electricity generation (TWh)[5]	704	846	1,033	na	
Global wind electricity generation (TWh)[5]	1,421	1,596	1,862	na	
Global passenger EV sales (millions)[6]	2.1	3.2	6.6	10.7	
Status					↑
[5] Statistical Review of World Energy | Energy economics | Home (bp.com)					
[6] BloombergNEF (bnef.com)					
Emissions Indicators					
	2019	2020	2021	2022	Signal
Global GHG emissions (gigatonnes CO_2e)[7]	59.1	55.8	59.6	60.4	
MSCI ACWI IMI Scope 1 emissions (gigatonnes CO_2e)[7]	11.4	10.1	10.8	10.9	
MSCI ACWI IMI companies with a net zero target[7]	2,154	2,730	2,897	3,152	
Status					↔
[7] MSCI Net-Zero Tracker October 2022					
Color Key			Strong Momentum ↑	Limited Progress ↔	Off Course ↓

Source: CalSTRS

CalSTRS, a global investor, is developing the Transition Tracker to monitor their efforts to meet their total portfolio net zero pledge compared to global emissions.

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