MARYLAND STATE RETIREMENT AND PENSION SYSTEM ANNUAL CLIMATE RISK ASSESSMENT

January 1, 2025 – December 31, 2025

State Retirement Agency of Maryland

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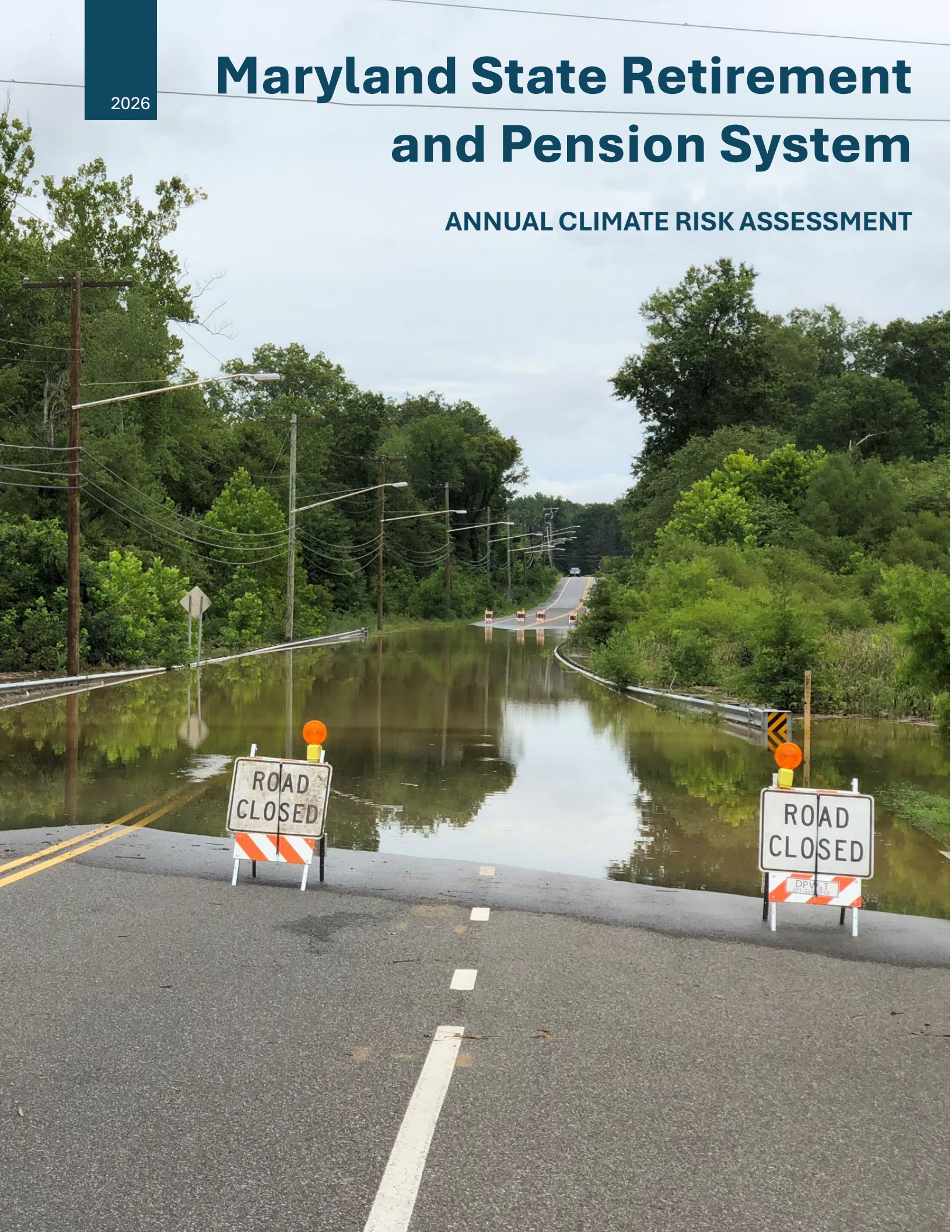
Maryland State Retirement and Pension System

ANNUAL CLIMATE RISK ASSESSMENT



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On the Cover:
Flooding along Floral Park Road, Accokeek, Prince George's County, Maryland
Wikimedia Commons; photographer: Famartin

Solar photovoltaic power plant, Randallstown, Maryland
Maryland Department of the Environment; photographer: John Roche

Introduction

In accordance with the State Personnel and Pensions Article § 21-116.1 enacted into law by chapters 24 and 25 of the acts of 2022, *State Retirement and Pension Systems – Investment Climate Risk – Fiduciary Duties*, the Board of Trustees is submitting an assessment of risk for the several Systems. This report is also responsive to the State Personnel and Pensions Article § 21-116(e), *The Maryland Pension Risk Mitigation Act*.

Highlights of the System's activities described in this year's report include:

1. *Thematic Investments*. The System's exposure to investment opportunities that should benefit from the transition to a lower carbon economy continues to grow. In addition to holdings within the private infrastructure portfolio, this report describes three investments in the Opportunistic portfolio led by the thematic investment team.

2. *Climate Advisory Panel*. In December 2024, the Board of Trustees established the Climate Advisory Panel, a five-member committee of external experts. The Panel's mandate is to advise the System's Board, its committees, and Investment Division on climate-related investment risks and opportunities, guided by current science and consistent with fiduciary duty and the System's long-term sustainability objectives. The Panel has met regularly to define priorities and establish collaboration frameworks, advancing the System's multi-year effort to align investment governance with the physical and transition impacts of climate change on its investment portfolio.
3. *Climate RFI*. In October 2025 the System issued an RFI to engage the marketplace and identify best-in-class climate risk analysis and data solutions that enhance the System's ability to robustly integrate physical and transition climate risk considerations across its multi-asset investment portfolio, and that enable the system to capitalize on investment opportunities tied to the transition to a low-carbon economy. Through the RFI, the System seeks climate solution sets that are comprehensive in coverage, methodologically robust, data-rich, insight-dense, and that produce decision-useful analytics at both the total portfolio and individual asset levels.

Exposure to high impact sectors and carbon footprint

The System has exposure to high-impact sectors – defined as those segments of the economy where emissions intensity is relatively high – across its portfolio of investments. Table 1 shows the System's directly held public equity and corporate fixed income exposure to high-impact sectors as of June 30, 2025. The underlying securities are held in separate accounts overseen by internal and external portfolio managers – including passive and active mandates – held at the System's custodial bank. While the System also has exposure to high-impact sectors through commingled funds that invest in public and private markets as well, the directly held securities afford the greatest potential for engagement.

Consistent with a rising equity market overall, directly held investments in high-impact sectors have risen over the last year. The financials and industrials sectors account for most of the increase primarily due to increased assets under management in internally-managed passive equity strategies in the international developed markets portfolio.

Sector	Exposure as of 6/30/2025 ($ million)	Exposure as of 6/30/2024 ($ million)	Change ($ million)
Energy	$2,127.5	$1,959.8	$167.7
Utilities	$1,329.5	$1,123.3	$206.2
Industrials	$2,863.6	$2,367.3	$496.3
Food, Beverage, and Tobacco	$539.1	$471.6	$67.5
Real Estate	$584.8	$521.6	$63.2
Financials	$3,381.5	$2,484.6	$896.9
Total	$10,826.0	$8,928.2	$1,897.8
SPX	6204.95	5460.48	

Table 1

In addition to dollar exposure, the System measures the carbon footprint of the portfolio using emissions intensity data from Refinitiv covering Scope 1&2 emissions. As described in prior versions of this report, carbon footprint data has several shortcomings due to self-reporting, inconsistent regulatory application across jurisdictions, limited coverage, and backward-looking perspective. Nonetheless, emissions intensity measurement serves as a useful starting point for analysis, and Investment Division staff will continue to search for better ways to measure the carbon footprint of its portfolio including incorporating Scope 3 emissions.

Table 2 shows emissions intensity has fallen in four of the six high-impact sectors over the last year. The lower carbon footprint of these holdings can result from several factors including asset allocation, manager selection, and security selection. In addition, the underlying companies may be introducing changes at the business level to improve their emissions profile.

Sector	Emissions Intensity as of 6/30/2025 (Scope 1&2 CO2 equiv. to Revenue $ million)	Emissions Intensity as of 6/30/2024 (Scope 1&2 CO2 equiv. to Revenue $ million)	Change (Scope 1&2 CO2 equiv. to Revenue $ million)
Energy	884.5	781.5	103.0
Utilities	846.3	1,009.0	-162.7
Industrials	99.8	102.2	-2.4
Food, Beverage, and Tobacco	52.2	62.0	-9.8
Real Estate	77.7	210.6	-132.9
Financials	28.0	8.3	19.8

Table 2

At the time of writing, staff is conducting a procurement process for climate risk and climate transition opportunities analytics. Staff believes these tools, once implemented, will enhance the System's carbon footprint and emissions intensity reporting going forward[1].

Investments in emerging technologies in renewable energy and transitioning, reducing, and eliminating carbon-emitting technology

Thematic Investment Team

The Chief Investment Officer created a thematic investment team in response to the State Personnel and Pensions Article § 21-116.1 enacted into law by chapters 24 and 25 of the acts of 2022, *State Retirement and Pension Systems – Investment Climate Risk – Fiduciary Duties*. This law, in part, states, "the Chief Investment Officer shall identify environmentally sustainable investment opportunities to support a low-carbon economy." The team is comprised of members from all the asset class teams to give it a broad experience base to draw from and began meeting with managers looking to capitalize on the opportunities created by the energy transition as well as other emerging investment themes.

Through these discussions, the team found many compelling investment opportunities that the System was previously unable to invest in due to structural impediments (e.g., asset class ambiguity, fund size, lack of sufficient track record due to new strategy, etc.). To attempt to address these structural issues, the Board authorized the creation of an Opportunistic allocation during the 2025 strategic asset allocation process.

The Opportunistic allocation seeks to identify and invest in long-term thematic drivers such as technological innovation, demographic evolution, and climate/energy transition, that are expected to have significant and lasting impacts on global markets. The portfolio aims to capitalize on structural changes these themes create, offering the System a mechanism to explore investment ideas outside the traditional asset classes defined in the current strategic asset allocation framework. Additionally, the portfolio will serve as a platform to

[1] For a detailed explanation of a peer state pension plan's process to measure its baseline portfolio emissions, please see: https://www.oregon.gov/treasury/invested-for-oregon/Documents/Invested-for-OR-47OIC-Agenda-and-Minutes/2024/2-06-2024-Public-Book-1.pdf

incubate new strategies, allowing the System to test and evaluate novel or non-traditional investment approaches on a smaller scale before making larger, permanent allocations.

The portfolio has three initial investments related to the theme of decarbonization. The first investment is in the carbon credits of a regional cap and trade system. The second investment is in a fund that aims to decarbonize real estate assets and has linked a portion of its incentive compensation to achieving that goal. The third investment is in a private equity fund that will invest in companies that contribute to decarbonization.

Private Infrastructure Portfolio

Staff continues to build out the System's private infrastructure portfolio. As of June 30, 2025, the portfolio was valued at $798.9 million or approximately 1.1% of total System assets. Table 3 below presents a sampling of investments that should benefit from the transition to a lower carbon economy. The aggregate market value of these holdings is $340.9 million, or approximately 43% of the private infrastructure portfolio. In last year's edition of this report, the comparable aggregate market value of this part of the System's portfolio was $52.5 million. The strategic asset allocation calls for a 4% allocation to private infrastructure, suggesting even further growth ahead as staff carries out capital deployment plans.

Sector	Geography	Exposure ($ million)	Update
Digital	US	$81.5	Has operated its facilities with Net Zero scope 2 emissions since 2016
Utilities	Spain, Mexico, Chile	$76.2	Developing 20 biomethane projects in Spain, brought its first Australian hybrid solar/battery storage facility online
Marine Terminals	Europe, Singapore	$33.8	Owner/operator of liquid and natural gas fuels storage terminals as well as biogas and hydrogen projects
Renewable Power	US	$20.1	Assets currently include a wind project in Texas and three solar projects in Texas, Mississippi, and Illinois
Toll Roads	US, France, Germany	$19.6	Emissions reduction plans are ahead of schedule
Energy Transition	Western Europe, US	$13.3	Targets deals in renewable power, energy storage, electricity transmission, and carbon capture
District Energy	Canada	$11.6	One of the largest thermal energy system operators in North America
Midstream	US	$10.4	Has reduced GHG emissions by over 58% since 2023 by focusing on leak detection and blow-down events
Power	Global	$9.2	Has invested significantly in solar, energy storage, and lower emission generators

Sector	Geography	Exposure ($ million)	Update
Energy Transition	North America	$7.9	Focused on decarbonizing heavy-duty trucking through renewable natural gas and compressed natural gas
Renewable Power	Europe	$7.1	Maintains a pipeline of over 20GW of capacity, including batteries, flexible generation, pumped storage, hydropower, and electrolysers for hydrogen production
Transport	Europe	$6.0	Intends to invest over €1B to electrify bus fleet, detailed plans for achieving low or Net Zero emission fleets
Renewable Power	US	$6.0	Integrated developer and operator with 6GW capacity across 17 states and 13GW in the pipeline
Digital	Mexico	$5.4	Secured 100% renewable energy in 2024 power purchase agreement
Renewable Power	UK	$5.2	One of the largest offshore wind portfolios globally with 3.5GW of total capacity
Power	Global	$4.8	Has integrated ESG principles into each division to align with international sustainability standards
Environmental	UK and Ireland	$4.8	Processes waste with resource recovery and recycling to support the circular economy
Renewable Power	US	$4.4	Has committed to reducing scope 1 and 2 emissions by 42% and scope 3 emissions by 51.6% by 2030
Renewable Power	Europe, Australia	$3.9	Operates in ten markets in Europe and Australia as one of the largest onshore wind developers in Europe
Renewable Power	Europe	$2.8	Operates 229MW, with 147MW of onshore wind, 17MW of solar, and 65MW of solar collocated with agriculture
Environmental	South Korea	$2.7	Operates 7 recyclable waste sorting sites, 5 processing sites, 2 municipal sourced waste facilities, and 2 waste-to-energy facilities
Renewable Power	Asia	$1.6	Maintains 4.6GW of renewable capacity in the development pipeline with a further 3.1GW of battery storage projects
Environmental	Europe, Australia	$1.2	Transforming organic waste into high quality soil health products, seeking 100% renewable energy sources for most of its sites
Power	Brazil	$1.2	Has established new GHG management system and implementation plans for environmental goals
Power	US	$0.3	Partners with data centers and utilities to decrease overall emissions by replacing coal plants with natural gas plants integrated with carbon capture technology
Renewable Power	North America	$0.0	Recently exited portfolio company owning and operating green hydrogen assets

Table 3

Bayside homes in Bowleys Quarters, Md., following Hurricane Isabel, September 19, 2003.
Wikimedia Commons; photographer: Crystal Payton

Regular assessment of the potential systemic risk of climate change

The following sections describe how the System regularly incorporates climate risk into top-down assessments of its portfolio. As described below, climate risk factors are integrated into the strategic asset allocation decision-making process, and Investments division staff works with external managers on climate risk analysis. While model complexity presents certain challenges, these top-down portfolio evaluations complement the bottom-up insights presented elsewhere in this report.

Climate Scenario Analysis in Strategic Asset Allocation

For several years, staff has worked with Meketa Investment Group, the System's general investment consultant, to incorporate climate analysis into the strategic asset allocation process. For 2025, Meketa assessed the Current Policy as well as the policy mix adopted at the Board of Trustees in March 2025[2].

Meketa's climate scenarios use a top-down, multifactor framework to assess long-term trends and scenarios. Meketa specifies broad, economically linked factors and projects future behaviors based on underlying historical relationships. Meketa's macroeconomic model can contextualize past environmental changes (e.g., mean global temperature rise over the pre-industrial baseline) alongside economic and financial factors and projects various climate scenarios going forward over a long timeframe. Their approach is dependent on the continuation of historical trends.

Meketa's macroeconomic model generates many simulations describing how different asset classes and macroeconomic factors could potentially behave over a forecast period given what is known about past behavior. Beginning with the most recent 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 has been 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), the methodology draws conclusions about the paths of asset classes and factors that are consistent with the topic of investigation.

For this analysis, Meketa 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 the end of 2024. Meketa investigated several different types of climate scenarios and focused on four relatively broad situations which examine subsets of the 5,000 climate simulations generated.

In addition, this report also includes a selection of scenarios from the Network for Greening the Financial System ("NGFS"). The NGFS is an international organization made up of 121 financial supervisory authorities and central banks. The group has worked since 2017 to develop best practices for environmental and climate risk management in the financial

[2] The Board of Trustees has postponed implementation of the new strategic policy until after the new Chief Investment Officer joins the Investments division in 2026.

sector. The NGFS uses a suite of integrated assessment models to better link forecast climate data, including physical climate impacts, to macroeconomic impacts in specific, standardized scenarios. Although the NGFS' scenarios do not reflect all possible climate tipping points or runaway catastrophic effects, they provide a set of both climate and associated economic inputs that better reflect potential physical damages and more detailed public policy behavior while aiding comparability among users of the scenarios. This report includes six "Phase 3" NGFS scenarios[3] which incorporate forecasted data among the simulations.

The climate scenarios are dependent on the following assumptions:

- 1.5 Degree Scenario: Simulations where the global average temperature anomaly above preindustrial average is constrained to 1.5 Degrees (+/- 0.25 degrees).
- 3.0 Degree Scenario: Simulations where the global average temperature anomaly above preindustrial average is constrained to 3.0 Degrees (+/- 0.25 degrees).
- Technology Scenario: Simulations where there is a 3% annual reduction in carbon intensity of electricity production over the next 10 years.
- Policy Scenario: Simulations with rises in oil and natural gas prices consistent with the carbon taxation of $\$100/tCO_2e$ where fossil fuel reserve owners do not have increasing profits over the next 10 years.

[3] While NGFS has released subsequent models, Meketa has retained Phase 3 to aid comparability of outputs. Meketa anticipates updating its assessments in future reports as improvements are made to the NGFS models and scenarios based on feedback from the scientific community and financial authorities.

The NGFS scenarios describe the following conditions in Table 4 below.

Scenario Name	Temperature Target (°C)	Description
Net Zero 2050	1.4	Immediate and smooth climate policies implemented, gradually becoming more stringent to limit warming to 1.5 Degrees. Subdued physical and transition risk.
Below 2°C	1.6	Gradual increase of more stringent climate policies leading to 67% chance of limiting warming to below 2 degrees. Subdued physical and transition risk.
Divergent Net Zero	1.4	Achieves Net Zero around 2050 with high cost driven by fractured policies across sectors. Minimal physical risk and high transition risk.
Delayed Transition	1.6	Assumes annual emissions do not decrease until 2030 and then move to rapid decline strict policies. Minimal physical risk and high transition risk.
National Determined Contribution	2.6	All pledged climate and emission targets by countries are achieved. Moderately high physical risk and low transition risk.
Current Policies	3.0+	Currently implemented climate and emission policies are preserved. High physical risk and low transition risk.

Table 4

In all cases the models implicitly assume past asset behavior indicates future asset behavior aside from NGFS scenarios with variable provided by NGFS.

Figure 1 shows the return assumptions produced by the scenario simulations as well as the baseline using Meketa's 2025 capital markets assumptions. In general, 20-year return expectations are higher than 2024 across scenarios although the difference of each scenario versus baseline (i.e., assuming no impacts from climate change) has decreased. Among the Meketa Scenarios, the policy scenario continues to produce the lowest return expectations due to the assumed taxation impact.

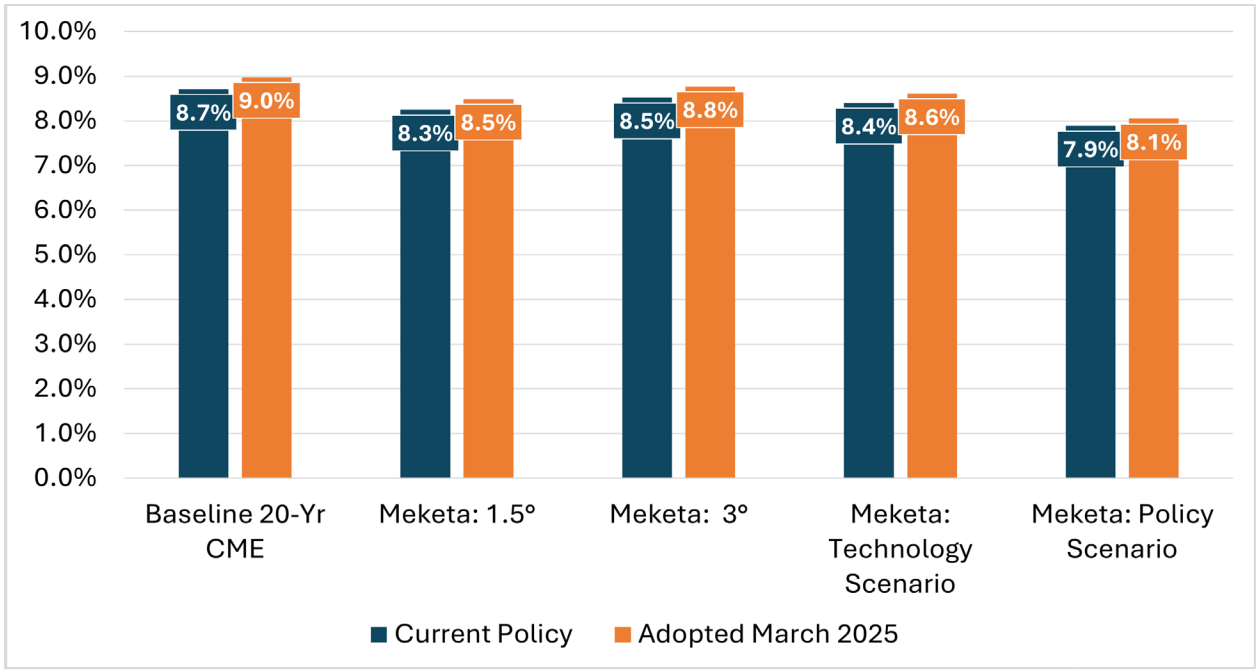

Figure 1

By contrast, among the NGFS scenarios in Figure 2, the "Divergent Net Zero" scenario has the lowest expected return, as it reflects the costs of implementing climate change mitigation measures but in an inefficient fashion.

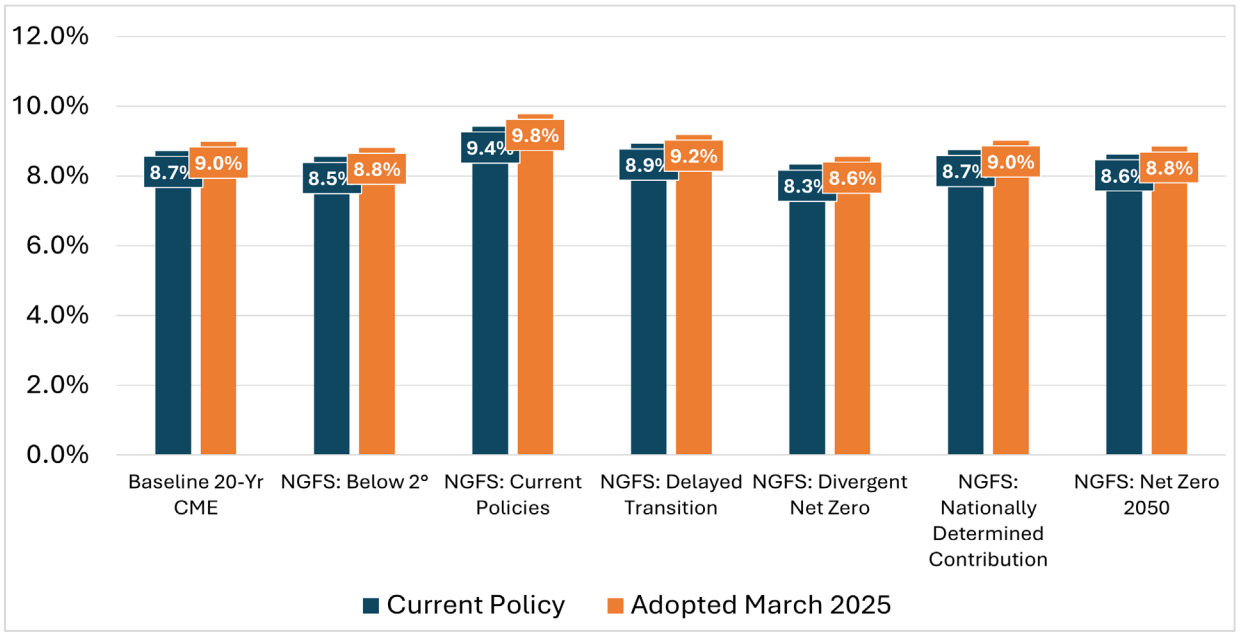

Figure 2

The policy mix is expected to outpace its actuarial target in the base case and each of the climate scenarios.

Somerset Wind Farm, Somerset, Pennsylvania
Wikimedia Commons; photographer: Jeff Kubina from Columbia, Maryland

Climate-Aware Stress Testing

For the second year, staff is working with one of its managers on climate-aware stress testing. There are three modeling updates in the current iteration of this analysis. First, the manager is using NGFS Phase V climate scenarios[4] which were released in November 2024 and include new economic and climate data, policy commitments, and model versions. Figure 3 presents the NGFS Phase V scenarios along physical and transition risk dimensions. The manager also updated its proprietary bottom-up abatement cost curve that is part of the transition risk model. Compared to the last model iteration, scalable technologies (e.g., solar, batteries) are now cheaper and hard-to-abate technologies (e.g., hydrogen, green steel) are more expensive. Lastly, the macro starting point features higher central bank policy rates and significantly lower inflation relative to 2022. Consistent with

[4] https://www.ngfs.net/en/publications-and-statistics/publications/ngfs-climate-scenarios-central-banks-and-supervisors-phase-v

last year's exercise, the manager utilizes its strategic partner, a leading climate analytics vendor for risk physical assumptions.

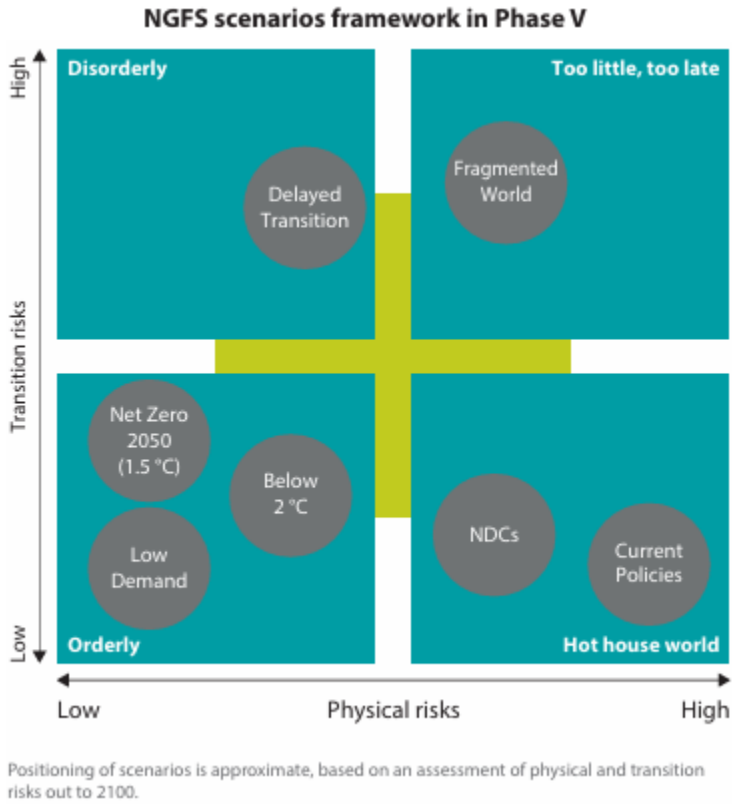

Figure 3

The manager applied its climate-aware stress testing methodology to the System's current strategic asset allocation policy. Figure 4 shows total returns decomposed into risk-free rate and excess returns over a ten-year horizon. During this period, transition risks dominate physical risk on asset return. Hence, it is expected that Current Policies, Delayed Transition, and Fragmented World show similar results. Impact on excess return is limited during the first 10 years of transition but could become more significant further out in time as negative consequences from physical risk impact rise. Under the most aggressive transition scenario, Net Zero 2050, the model suggests higher policy rate from an inflationary environment driven by higher energy prices and therefore lower growth in rate hiking cycle. The model implies greater risk of losses (i.e., lower excess return) under such aggressive transition scenarios. Similar outcomes are observed under the Nationally Determined Contributions ("NDCs") scenario, albeit at a slower pace than Net Zero 2050. NDCs scenario assumes all countries meet pledged targets where developed countries have very ambitious targets. The Below 2-degree scenario suggests a relatively smoother transition without too much cost pressure on the economy as benefits from green capital investment outweigh inflation impact on GDP growth.

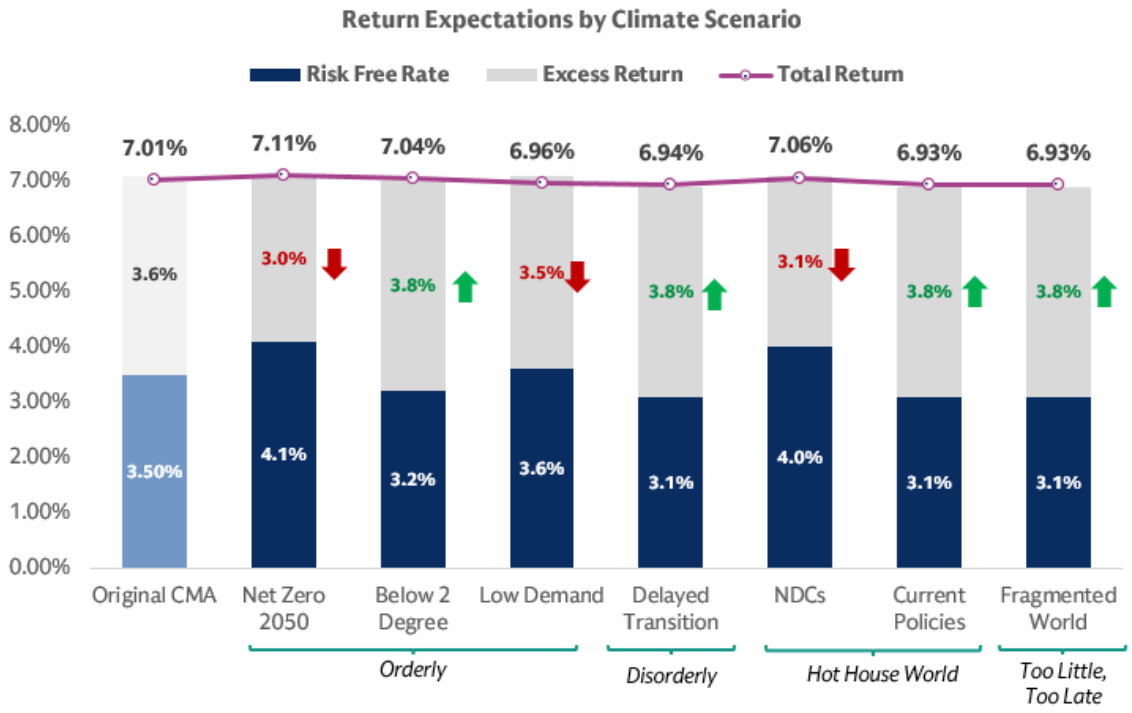

Figure 4

Figure 5 provides total return expectations for a select set of asset classes across two distinct climate scenarios, Net Zero 2050 and Current Policies, as compared to the manager's baseline capital market assumptions ("Original CMAs"). Staff have selected these two scenarios because they are on opposite ends of the spectrum. Net Zero 2050 assumes an ambitious and fast path to decarbonization with average global temperatures peaking at 1.4 degrees above pre-industrial levels. On the other hand, the Current Policies scenario assumes temperatures rise 2.9 degrees amid slow technological change and no incremental policy action.

Under Net Zero 2050, risk free rates are higher as central banks respond to higher inflation from green capex and higher energy prices in the early stages of the transition. Tighter monetary policies coupled with slightly lower GDP growth create a headwind for public equities. Long duration US government bonds are expected to produce lower returns as well due to the inflation drag. Private credit, which tends to feature floating-rate structures, and natural resource equities, with its embedded metals exposure and inflation sensitivity, are expected to benefit in the first ten years of the Net Zero 2050 scenario.

Inflation dynamics are different in the Current Policies scenario with related knock-on effects across asset classes. With central banks in easing mode and a lesser tax on economic growth, equities and US government bonds are afforded a tailwind over the next decade.

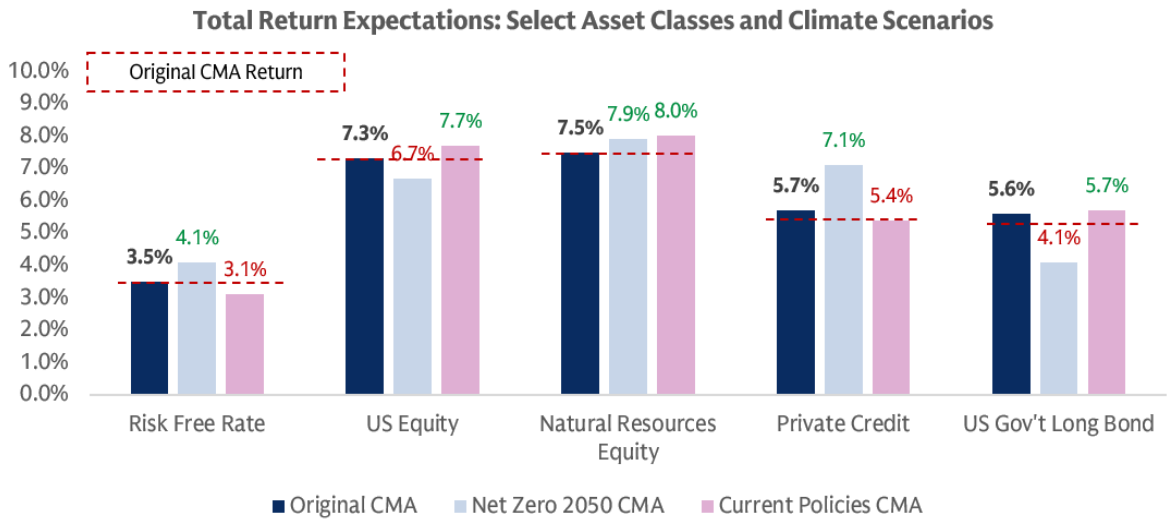

Figure 5

Going forward, staff will continue to collaborate with this manager as it strives to further integrate climate risk analysis into its investment process.

Physical risk map

Using data from the National Oceanic and Atmospheric Administration[5] ("NOAA"), Figure 6 displays the System's 50 largest individual property holdings in the System's core open end private real estate portfolio on a map of the United States under an extreme scenario where sea levels rise by eight feet. These 50 holdings represent an aggregate value of $692.1 million, or approximately 0.9% of the System's total assets, and are held in core open-end private fund structures. Fifteen of the 50 properties are in impacted areas according to the NOAA sea level rise data, representing approximately 0.3% of the System's total assets.

Figure 6

At the time of writing, staff is conducting a procurement process for climate risk and climate transition opportunities analytics. Staff believe these tools, once implemented,

[5] https://coast.noaa.gov/slr/

will expand the System's ability to measure and monitor additional dimensions of physical risk related to climate change.

Global Real Estate Sustainability Benchmark

For its core real estate portfolio, the System utilizes the Global Real Estate Sustainability Benchmark ("GRESB") to assess the ESG performance. GRESB is an investor-driven organization committed to assessing the ESG performance of real assets globally. GRESB performs annual assessments on participating companies and funds to capture information regarding the ESG performance and best practices of real estate portfolios. The assessments provide a consistent, global framework for investors to engage with managers relating to ESG performance. Key aspects of the GRESB analysis include energy consumption, greenhouse gas emissions, water consumption, and waste management.

The System measures the ESG performance of its core real estate managers, representing approximately 65% of the System's private real estate portfolio. Core investments are primarily stabilized assets which are intended for a longer-term holding period, compared to investments in the value-add and opportunistic portfolios. Value-add and opportunistic funds have shorter term holding periods, making annual comparisons less informative and potentially misleading. These characteristics make the year-to-year comparisons in the core portfolio less noisy and more meaningful. As shown in Figure 7 and Figure 8 below, the System's core real estate managers score above average GRESB scores in the latest report and have been steadily improving over the past five years.

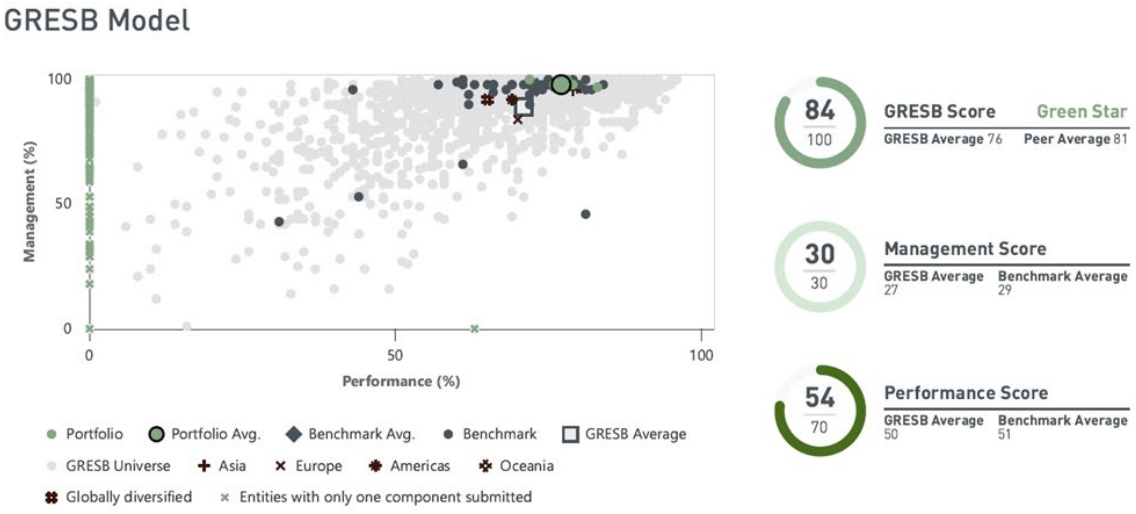

Figure 7

Figure 8

Insurance

To learn more about how our real estate managers are managing insurance costs for our portfolio, staff reached out to nine of our managers who manage ten open-end commingled funds. Staff received complete responses from nine of these funds that manage approximately 65% of the real estate portfolio. These funds have billions of dollars in real estate assets spread throughout the United States. This diversification helps lower costs.

These firms typically have an internal staff that work with insurance consultants and brokers to reach out to a large number of insurance providers to look for the best value for these assets. Renewals are generally annually.

Most assets are covered under one policy. There are instances where select assets are covered under an individual policy because of special requirements or by a joint venture partner's insurance policy.

When looking at the four main institutional real estate sectors, they can be classified as commercial (office, retail and industrial) or apartments. Most commercial tenant leases are set up where the tenant directly covers the operating expenses or increases in operating expenses including insurance. When looking at a tenant's total cost, insurance is a fairly small line item with base rent, property taxes, utility costs and repairs and maintenance expenses typically being larger. For apartment assets, the assets have to pay the insurance costs out of the gross rent received. Managers reported that there were no

instances where they could not get insurance for a property and there have been no material changes in insurance coverage.

Staff asked the managers about the property insurance increases during the last four years and average annual rate increase was 4.6%. This data was skewed higher by one manager and when we took their data out the average annual rate increase was only 2.7%.

Utilization of the best data and practices in current science

The preceding sections of this report demonstrate how climate risk is integrated in the System's investment practices and analytical tools. Through the System's risk software, staff have access to ESG analytics from several vendors. Table 5 includes a sample of these analytics.

Sustainalytics	Refinitiv	ISS	Clarity AI
• Controversy categories • Overall product involvement • Carbon – Total Emissions • ESG Risk Category, Score, Percentile	• ESG Score • Controversies Score • Resource Use, Emissions, and Environmental Innovation scores • Workforce, Human Rights, Community, Product Responsibility scores • Management, Shareholder, CSR scores • Total CO2-equivalent Emissions to Revenue	• ESG Rating Decile Rank • ESG Rating Overall • GQS Overall Score • SDG Impact Rating	• ESG Risk Score • ESG Impact • UN Sustainable Development Goals • SFDR PAIs • EU Taxonomy

Table 5

Staff is in the early stages of working with these datasets and recognizes there are challenges in their application including with respect to security universe coverage, widespread use of proxies, and lack of consistency across vendors and throughout time. Notwithstanding these challenges, staff is committed to the continued integration of these tools into its suite of analytics. At the time of writing, the System is conducting a procurement process for climate risk and climate transition opportunities analytics services.

Thunderstorm damage, Maryland
Adobe Stock

Develop transition assessments related to high impact sectors

The System is evaluating the requirements associated with developing a transition readiness assessment framework. In practice, the framework would include company-specific analyses and engagement strategies carried out by climate and investment professionals with subject matter expertise. Within a given sector, key performance indicators would be identified to allow for cross-company comparisons. After this initial assessment work, company-specific engagement plans would be formulated and carried out before ultimately deciding whether to hold or sell securities issued by the company in question. This type of analysis is labor-intensive and time-consuming. Nonetheless, the System will continue to evaluate the optimal way to conduct transition assessments going forward.

Evaluate whether managers are taking steps to transition to a more sustainable business model

Annual Compliance Questionnaire

Each year, staff requests that managers complete an annual compliance questionnaire. There are three questions regarding ESG practices in the questionnaire. As shown in Figure 9, nearly 80% of managers have a written ESG policy while 66% have an internal team or utilize third party ESG research and 59% integrate ESG factors into the investment decision-making process.

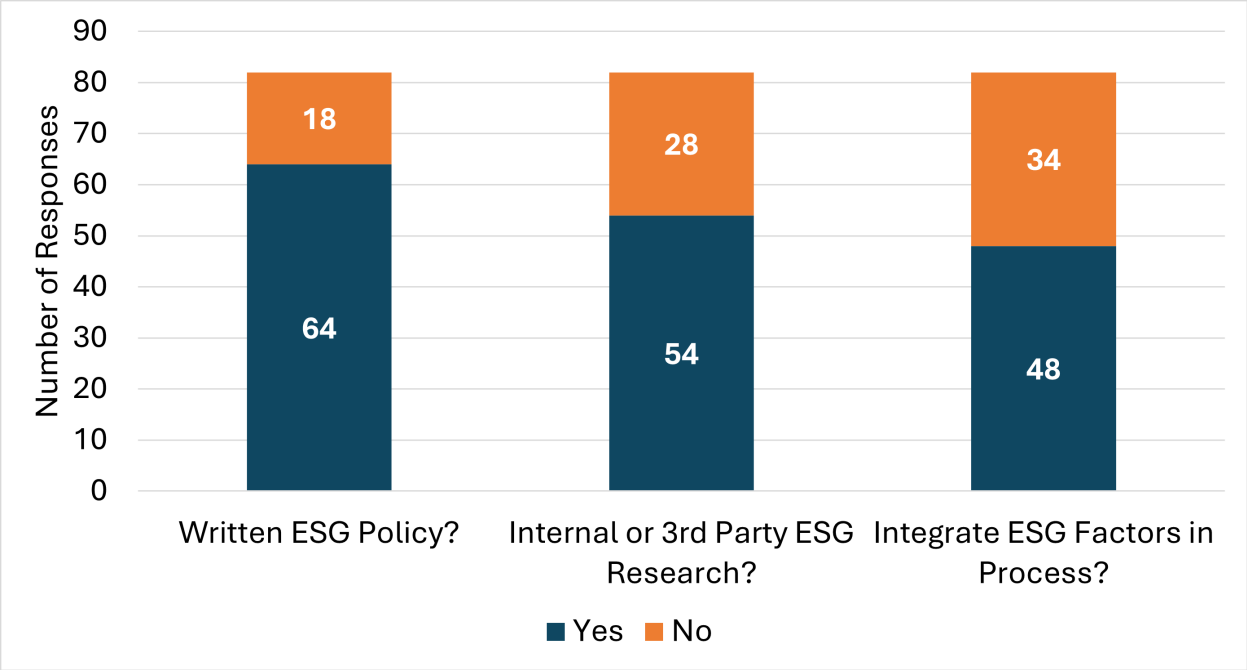

Figure 9

Investments division staff, working alongside the Climate Advisory Panel, is in the process of drafting supplemental questions for inclusion in its initial and ongoing due diligence documents to enhance the System's understanding of the comprehensiveness of managers' activities and strategies to identify and manage climate risks across asset classes.

Private Infrastructure

In 2024, one of the System's private infrastructure managers continued to advance its climate goals under the guidance of its 2020 Infrastructure Climate Change Strategy. This strategy is built on five foundational pillars: responsible asset management, integration of

climate considerations into asset frameworks, emissions reduction, support for a just transition, and leadership through stakeholder engagement. Throughout the year, the organization made notable progress, including increased investments in renewable energy and a shift by several portfolio companies toward lower-carbon fuels and energy solutions.

A key achievement in 2024 was the reduction of Scope 1 and 2 financed greenhouse gas (GHG) emissions across the infrastructure equity portfolio by 1.38m tCO_2e as of end of 2024. This represents a 66% progress reduction in GHG emissions in relation to its 2030 Infrastructure Equity Portfolio Target. All targets and progress towards them are calculated on an equity share basis, with scope 2 market-based emissions. Additionally, over 97% of investee companies now have interim or long-term (Net-Zero) emissions targets in place.

Several portfolio companies demonstrated leadership in decarbonization. A global utilities firm achieved a 45% reduction in Scope 1 and 2 emissions from a 2017 baseline, driven by the addition of 842 MW of wind and solar capacity and investments in biomethane production. A US-based liquid petroleum pipeline operator maintained a 50% emissions reduction from 2019 levels and played a pivotal role in delivering the first shipment of sustainable aviation fuel (SAF) to a midwestern airport in the United States. A Polish energy company advanced its coal-to-gas transition, completing a major conversion project in Poznan ahead of schedule and under budget, contributing to its goal of phasing out coal by 2030.

The infrastructure manager also supported transition planning and climate resilience across its portfolio. Notable progress was made at an Australian airport and water utility, where advanced adaptation strategies were implemented. Efforts to better understand and manage Scope 3 emissions were expanded, including the development of standardized methodologies for calculating avoided emissions. A highlight in this area was the Australian SAF project, which aims to meet approximately 8% of the country's aviation fuel demand through a proposed facility in partnership with Ampol and GrainCorp.

Throughout the year, the infrastructure manager maintained active engagement with governments, industry groups, and communities to promote sustainable infrastructure outcomes. It also enhanced transparency with clients and aligned with evolving global regulations such as the EU's Sustainable Finance Disclosure Regulation and Australia's adoption of IFRS Sustainability Standards. Client feedback indicated record-high levels of satisfaction with the organization's sustainability engagement.

Looking ahead, the infrastructure manager remains committed to supporting the global transition to a low-carbon economy while delivering strong investment returns. It recognizes the growing energy demands driven by AI and electrification trends and plans to

pursue strategic investment opportunities in response. The focus will remain on evolving the climate strategy, improving data quality, and enabling portfolio companies to achieve credible and economically viable long-term decarbonization outcomes.

Public Equity and Private Real Estate

J.P. Morgan Asset Management (JPMAM), which manages investments in public equity and private real estate on behalf of the System, recently published its 2025 Global Climate Report[6]. JPMAM has established a robust governance structure to oversee climate-related risks and opportunities. The board and its committees play a central role in supervising these issues, ensuring that climate considerations are embedded in strategic decision-making. Senior management, including investment and risk leaders, are actively involved in implementing climate strategies and monitoring progress across the organization.

Climate change is a key strategic focus for JPMAM. The firm integrates environmental, social, and governance (ESG) factors into its investment processes, using them to identify both risks and opportunities over short-, medium-, and long-term horizons. To support this, JPMAM is enhancing its access to climate data and analytics. It is also expanding its range of sustainable investment products and prioritizing climate-related themes in its corporate engagement and proxy voting activities.

JPMAM employs a structured framework to identify, assess, and manage climate-related risks. These include both physical risks—such as extreme weather events—and transition risks, like regulatory changes or shifts in market preferences. Risk management responsibilities are distributed across the organization, with multiple lines of defense including portfolio managers, compliance teams, and risk officers working together to ensure climate risks are appropriately addressed.

To track its progress, JPMAM reports on various climate-related metrics, including the carbon footprint and carbon intensity of its assets under management. The firm acknowledges existing gaps in emissions data and is actively working to improve data quality and coverage. It also monitors greenhouse gas emissions across its portfolios and has committed to sustainability targets, including reducing its own operational emissions and aligning its investment strategies with net-zero goals.

Private Equity

One of the System's US-based private equity general partners maintains a policy to ensure material risk factors are integrated into its investment process. The policy draws upon the United Nations Principles for Responsible Investment, the Ten Principles of the United

[6] https://am.jpmorgan.com/content/dam/jpm-am-aem/global/en/sustainable-investing/tcfd-report.pdf

Nations Global Compact, and the American Investment Council's responsible investment guidelines. Covering a range of issues, the policy specifically addresses environmental management (i.e., biodiversity evaluation, regulatory compliance, spill and contamination mitigation) and climate change (i.e., physical- and transition-related risks) while recognizing that materiality varies across portfolio companies.

The firm's general counsel and chief compliance officer leads ESG initiatives, participates in investment committee meetings, and supports deal teams by engaging with an external ESG consultant. The consultant's findings are reviewed as part of pre-investment diligence and set the stage for post-investment monitoring. Following acquisition, portfolio company management teams are responsible for ESG performance which the private equity firm monitors through board participation. As necessary, the firm will involve its external consultant to ensure ESG considerations are integrated into long-term value creation plans. Additionally, the manager is signatory of the ESG Data Convergence Initiative[7] (EDCI) and, therefore, collects company specific key performance indicators to measure, benchmark, and improve overall portfolio results.

Another of the System's private equity managers, based in Asia, recently published its 2024 Impact Report. As stated, the firm's goal is "to create long-term value through an integrated and analytical approach to sustainability issues." In 2024, the firm utilized data from EDCI to conduct a materiality assessment for 22 portfolio companies which led to productive dialogue with management teams about how sustainability initiatives can add value to their businesses. Also during the year, the firm exited its investment in the largest independent industrial gas supplier in China. During its ownership, a robust decarbonization plan was created to improve energy efficiency, increase renewables consumptions, and increase carbon capture. Relative to baseline figures, the company reduced its carbon intensity by 21%, increased renewable energy usage by 300%, and doubled the amount of carbon captured by the end of 2024. The company also published its first publicly available sustainability report using IFRS Sustainability Disclosure Standard at the private equity manager's urging.

Another of the System's private equity managers, based in Australia, published its third annual ESG Report in October 2025. Australia and New Zealand are undergoing a transition to Net Zero. The manager has been measuring its own carbon footprint and that of its portfolio companies since 2020 and continues to review emissions profiles today. The manager continues to engage with companies on climate change which includes evaluating physical risk for companies with material real estate exposure and hosting discussion forums in preparation for upcoming Australian Sustainability Reporting

[7] https://www.esgdc.org/

Standards. In addition to the progress observed at its portfolio companies, as shown in Table 6 below, the carbon intensity of its own business has improved as well as the manager is more circumspect about essential business travel and has committed to purchasing green electricity where it is in control.

	2020	2022	2025
Companies measuring emissions	1	8	16
Companies providing ESG data	0	8	16
Decarbonization plans in progress	0	2	6

Table 6

Lastly, another US-based private equity manager for the System published its latest ESG Report in October 2025. The firm deepened its commitment to ESG diligence and accountability in 2024 by expanding its climate analysis in partnership with a specialty consultant headquartered in Germany and increasing factor integration into its enterprise risk management platform. Additionally, the firm completed its fourth reporting cycle with EDCI achieving 100% participation across its latest fund and its fourth ESG Report is fully aligned with the TCFD framework. The EDCI submission includes GHG emissions and data on renewable energy consumption. The firm completed its second UN PRI signatory submission and received four stars for its overall ESG program. Lastly, two independent ESG assessment firms rated the manager's program as top quartile among private equity firms globally.

Identify, analyze, define and prioritize asset class specific metrics to evaluate transition readiness

The preceding sections demonstrate many examples and descriptions of ways the System works with managers, data providers, index providers, and consultants to analyze climate risk. While much research lies ahead, the System's relationships and analytical tools provide a solid base. At the time of writing, staff is conducting a procurement process for climate risk and climate transition opportunities analytics services to improve its measurement and monitoring capabilities across asset classes.

Direct engagement with managers, brokers, and other entities

The System has been formally tracking and reporting its meeting with climate-oriented investment managers since the third quarter of 2023. As shown in Figure 10, Investments staff meets with an average of roughly 100 managers per quarter to discuss a strategy where climate risk is integrated into the investment process while meetings with dedicated climate strategy managers have averaged nearly 20 per quarter. These interactions include meetings with current and prospective managers.

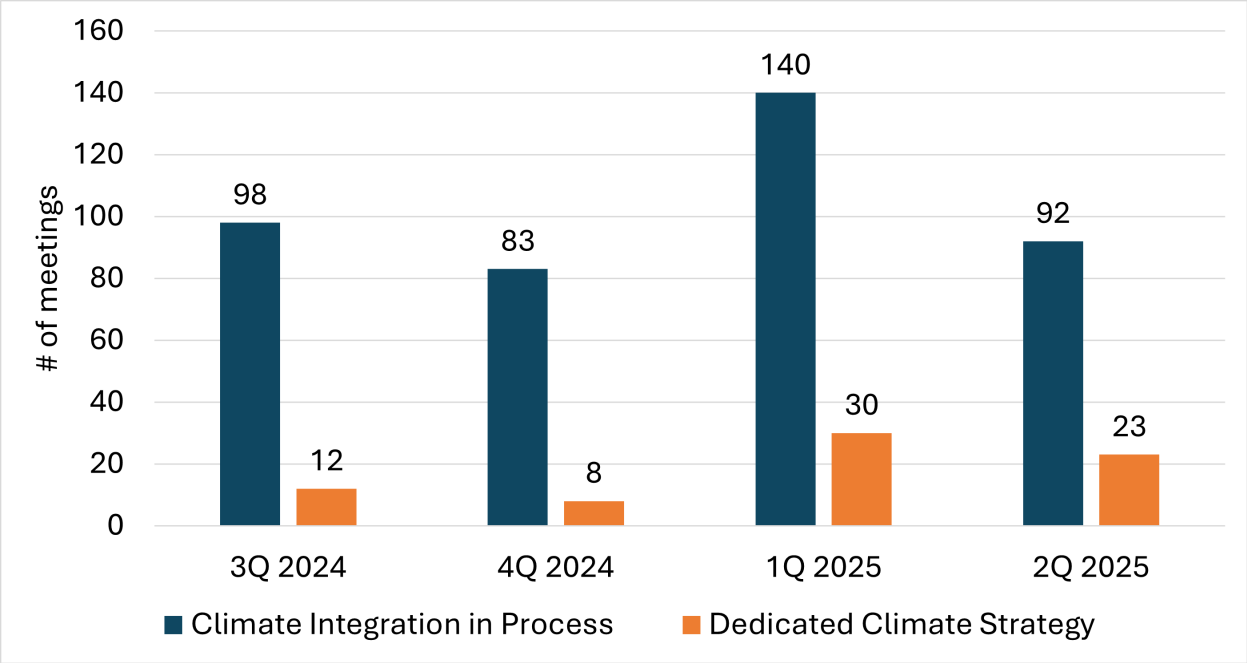

Figure 10

Highlights of these meetings include:

- Current manager of a private equity mandate. Staff have held a series of meetings with a manager to enhance the System's understanding of the manager's climate risk considerations and evaluation of climate transition investment opportunities. The manager will educate the System's Climate Advisory Panel in early 2026 on how it assesses climate risks in its investment portfolio – with the potential for the System to apply relevant climate risk management strategies learned in its own investment portfolio.
- Current manager of public equity mandate. Staff have partnered with a large manager to conduct a pension board education session on why climate risk matters for pension funds in November 2025. The manager will cover, among several topics,

how it incorporates climate risk considerations into its investment portfolios, Net Zero scenario analyses, and global and regional trends and how they impact energy demand and supply and shape geopolitical competition in the context of energy transition dynamics**.**

- Staff conducted several engagements with the System's managers with exposure to a large company whose mission is to accelerate the world's transition to sustainable energy. The managers provided Staff with their perspectives on the firm, including their investment outlooks, company engagements and proxy voting actions, and portfolio exposure (underweight or overweight) considerations versus relevant reference benchmarks. The System further engaged the company's leadership team directly as well as alongside other investors and investor groups.
- Staff and the Climate Advisory Panel will identify additional money managers to engage, with respect to potential educational discussions about the managers' approach to considering and managing climate risks and identifying energy-transition investment opportunities in their respective investment portfolios.

Proxy voting

The investment Policy Manual (IPM) includes the System's proxy voting guidelines which are updated on a regular basis. Per these guidelines, the System voted in favor of more than 50 climate action-oriented shareholder proposals in 2024.

These climate-related proposals requested companies to provide additional disclosures or take action on a range of topics including: disclosing greenhouse gas emissions (GHG) reduction targets; adopting or disclosing GHG emissions targets (including science-based targets) aligned with the goals of the Paris Climate Agreement; publishing climate transition plans and full value chain GHG emissions; reporting on climate change-related risks in supply chains and on corporate board oversight of climate-related policies; disclosing and reducing GHG emissions associated with underwriting, insuring and investing; reporting on clean energy supply financing ratios and on a 'just' transition; disclosing climate lobbying activities including with respect to alignment with companies' own climate goals or Paris Agreement goals; integrating GHG emission reduction targets into executive compensation metrics; and incorporating provisions on board-of-director competencies to manage climate-related business risks and opportunities.

Periodic review and assessment of effectiveness of proxy voting and direct engagement procedures

As part of its responsibilities as described in the IPM, staff provides regular reporting to the Corporate Governance and Securities Litigation Committee ("CGSLC") on its engagement and advocacy activity and outcomes. As is necessary and appropriate, Investment Division staff perform a periodic assessment and review of the engagement procedures and proxy voting guidelines to evaluate their effectiveness and report relevant findings to the CGSLC for its review and consideration of any proposed changes to this policy.

Establish a climate advisory panel of experts

The charter for the Climate Advisory Panel ("Panel") was approved by the Board of Trustees in December 2024. The Panel was established as a committee of the Board Trustees in accordance with SPP Article §§ 21-108(b) and 21-116.1(e)(4). The objective of the Panel is to support and advise the System's Board and its committees, consultants, and Investment Division on climate-related investment risks and opportunities using the most current science and data available, consistent with fiduciary duties and the goals and objectives of the investment program – including establishing a path to a long-term sustainable portfolio,

The Board-appointed five-member panel of outside experts in the analysis of climate investment risk and opportunities includes: Angelo Calvello, founder, C/79 Consulting; Mary Cerulli, founder of Climate Finance Action Inc.; Maria Elena Drew, head of global sustainability at T. Rowe Price; Douglas Lawrence, vice chair of Climate Group's board of trustees; and Stacy Swann, founder of Resilient Earth Capital.

The Panel held its inaugural meeting June 2025 to review its charter, clarify its responsibilities, codify its priorities, and establish a framework for collaboration with the System's leadership and Investment Division. The Panel held subsequent meetings in July, August, September, and October of 2025. The Panel's ongoing workstreams build on a multi-year effort by the System to align investment governance with evolving risk factors, including the physical and transitional impacts of climate change on global financial markets and the System's investment portfolio.

Smith Island, Maryland
Wikimedia Commons; photograph: USDAgov

Identify recent studies or actions by other state plans, financial institutions, or risk experts

Regulatory Retreat and Coalition Instability

The management of climate-related financial risk has reached a critical juncture in the U.S., marked by simultaneous action and retreat across federal and state levels. Federally, the Federal Reserve concluded its Pilot Climate Scenario Analysis (CSA) in 2024[8], an exploratory exercise with six major banks that was designed to gauge capabilities in identifying and managing complex physical and transition risks. While the pilot had no capital implications, its findings underscored wide variations in bank approaches and significant data and modeling challenges.

However, the federal climate disclosure push faced a setback in early 2025 when the SEC withdrew its defense of its climate disclosure rules, effectively suspending the federal

[8] https://www.federalreserve.gov/publications/2024-may-pilot-climate-scenario-analysis.htm

mandate and signaling a significant shift in regulatory priorities[9]. Concurrently, the U.S. Department of Labor announced its intent to overturn the 2022 rule that permitted ERISA plan fiduciaries to consider ESG factors[10], signaling ongoing regulatory uncertainty. This regulatory rollback was amplified in October 2025 when the Federal Reserve, FDIC, and OCC jointly rescinded the interagency Principles for Climate-Related Financial Risk Management for Large Financial Institutions[11], signaling a broad, formal withdrawal of federal climate risk guidance. Further federal action emerged as the DOJ and FTC indicated they would scrutinize anti-ESG efforts for potential antitrust violations[12], creating possible headwinds for coordinated climate-related actions among large asset managers.

This political pressure led to a fracturing of global collaborative efforts. Following the withdrawal of major U.S. financial institutions, including BlackRock, the Net Zero Asset Managers (NZAM) initiative announced in January 2025 that it would suspend operations[13]. This withdrawal was shortly followed by a related development in Texas, where the State Comptroller announced the removal of BlackRock from its list of companies that allegedly "boycott energy companies," specifically attributing the delisting to the firm's exit from the NZAM and reduction in its participation in other climate groups[14]. The Net-Zero Banking Alliance (NZBA) also saw major departures, as large U.S. financial institutions like JPMorgan Chase, Bank of America, and Wells Fargo withdrew their membership in late 2024 and early 2025. This was soon followed by other global players, including UBS, HSBC, and Barclays. Following these high-profile departures, the NZBA announced in October 2025 it was ceasing operations, further signaling a breakdown of unified efforts among major lenders to achieve net-zero commitments[15].

Broad Asset Manager Policy Shifts

The trend of coalition withdrawals was accompanied by significant adjustments to investment stewardship policies among the largest U.S. firms:

[9] https://www.sec.gov/newsroom/press-releases/2025-58
[10] https://corpgov.law.harvard.edu/2025/06/19/trump-dol-withdraws-biden-era-esg-rule-and-crypto-guidance-for-erisa-plans/
[11] https://www.fdic.gov/news/press-releases/2025/agencies-announce-withdrawal-principles-climate-related-financial-risk
[12] https://www.ftc.gov/news-events/news/press-releases/2025/05/ftc-doj-file-statement-interest-energy-collusion-case-against-blackrock-state-street-vanguard
[13] https://www.netzeroassetmanagers.org/2025/01/
[14] https://comptroller.texas.gov/about/media-center/news/20250603-texas-comptroller-glenn-hegar-announces-update-to-list-of-financial-companies-that-boycott-energy-companies-1746731924320
[15] https://www.esgtoday.com/net-zero-banking-alliance-ceases-operations/

- Northern Trust Asset Management exited both the NZAM and Climate Action 100+ in January 2025, stating it could "independently and effectively manage material risks"[16].
- Vanguard continued its cautious approach, reporting in September 2025 that it supported no environmental or social shareholder proposals at U.S. portfolio companies for the second straight year[17], arguing that the proposals "did not address financially material risks to shareholders" or were overly prescriptive.
- State Street Global Advisors updated its 2025 proxy voting policy to be less prescriptive on climate disclosure[18]. Notably, SSGA removed its endorsement of the TCFD and SASB frameworks as core disclosure expectations, indicating a de-emphasis on specific global climate disclosure standards.

U.S. State Pension Fund Action and Legislative Mandates

Despite the federal uncertainty, state-level action among large public pension funds and legislatures continues to drive climate action and risk management. Among public pensions, major state funds continued to advance their Net-Zero commitments and integration of climate risk into their fiduciary mandates.

- California's funds, CalPERS and CalSTRS, remain committed to achieving Net Zero by 2050, with CalPERS pushing forward its $100 Billion Climate Action Plan[19] and CalSTRS targeting interim goals such as a 50% emissions reduction by 2030[20].
- New York's funds showed notable progress, with the New York City Systems achieving a 39% reduction in financed GHG emissions[21]. The New York State Common Retirement Fund expanded its Sustainable Investments and Climate Solutions program with an additional $2.4 Billion commitment and restricted

[16] https://www.esgdive.com/news/northern-trust-am-exits-climate-action-100-net-zero-assert-managers-initiative/738272/
[17] https://www.esgdive.com/news/vanguard-supports-zero-environmental-social-proposals-for-second-straight-proxy-season-in-2025/759282/
[18] https://www.georgeson.com/us/insights/state-street-global-advisors-2025-us-proxy-voting-policy
[19] https://www.calpers.ca.gov/newsroom/calpers-news/2024/calpers-climate-solution-commitments-surpass-53-billion#:~:text=SACRAMENTO%2C%20Calif.,between%20private%20equity%20and%20infrastructure
[20] https://www.calstrs.com/path-to-net-zero#:~:text=In%20September%202021%2C%20the%20Teachers,we%20remain%20resilient%20and%20sustainable
[21] https://comptroller.nyc.gov/reports/trs-annual-climate-report-fy2024/#:~:text=June%2030%2C%202024.-,Summary%20of%202024%20Accomplishments,to%20base%20the%20targets%20on

additional investment in coal and shale oil companies deemed unprepared for the energy transition[22].

- The Massachusetts Pension Reserves Investment Management (MassPRIM) adopted a new engagement strategy in 2025, commissioning external assessments to scrutinize managers' capacity and alignment on climate transition planning and deforestation risks, signaling a shift toward verifiable manager accountability[23].
- The Washington State Investment Board (WSIB) continued implementing its Climate Blueprint, focusing on enhancing climate-related reporting in alignment with the TCFD guidelines and increased investments in renewable energy companies by 29.7% with over $2.2 billion invested[24].
- Teacher Retirement System of Texas (TRS), even in a politically sensitive environment, reaffirmed its investment policy statement in September 2025, confirming it will consider Environmental, Social, and Governance (ESG) factors that are material to long-term returns and levels of risk, maintaining a focus on financial materiality amid anti-ESG political pressure[25].

Beyond pension management, state legislatures are now driving mandatory climate action:

- California has established the nation's most aggressive disclosure regime, with SB 253 and SB 261 mandating that thousands of large companies disclose their GHG emissions and climate-related financial risks, with first reports due in early 2026[26].
- Oregon formalized its approach by passing the Climate Resilience Investment Act (HB 2081A), a landmark law that provides a legislative mandate for the state pension fund to pursue clean energy investment opportunities, build a more climate-resilient fund to safeguard long-term value, and regularly publish transparent reporting to the legislature[27].
- Florida committed over $834 million to the 2025–2026 Resilient Florida Plan[28], demonstrating a broad recognition of acute physical climate risks.

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[22] https://www.osc.ny.gov/press/releases/2025/04/dinapoli-nys-pension-fund-commits-additional-24-billion-through-sustainable-investment-program
[23] https://www.responsible-investor.com/massachusetts-pension-fund-to-grill-managers-on-climate-deforestation-engagement/
[24] https://www.sib.wa.gov/docs/reports/sustainability/2024.pdf
[25] https://www.trs.texas.gov/sites/default/files/migrated/investment_policy_statement.pdf
[26] https://watershed.com/blog/california-disclosures-a-guide-for-companies
[27] https://apps.oregon.gov/oregon-newsroom/OR/OST/Posts/Post/Treasurer-Steiner-Marks-Passage-of-the-Climate-Resilience-Investment-Act
[28] https://floridadep.gov/sites/default/files/25-26 Resilient Florida Annual Plan_1.pdf

Global Pension Funds Net-Zero Acceleration

Major global pension funds and asset managers, particularly in Europe, Canada, and Australia, accelerated their Net-Zero commitments and took decisive strategic action:

- The Dutch fund PFZW executed a major strategic shift in 2025, withdrawing over $34 billion in equity mandates, including from Blackrock, to move to active management and gain influence over sustainability outcomes[29].
- BNP Paribas Asset Management reinforced its commitments, moving up its target for 80% low-carbon financing for energy production to 2028 with a goal of 90% by 2030[30].
- Canada's University Pension Plan (UPP), committed to Net-Zero by 2040, reported a 59% reduction in portfolio GHG emissions intensity in 2024 and progress toward committing $1.2 billion to climate solutions by 2030, with $658 million committed as of 2024[31].
- Health Employees Superannuation Trust Australia (HESTA) strengthened its interim target to a 50% reduction in normalized portfolio carbon emissions by 2030 and is targeting 10% of its portfolio to be invested in climate solutions like renewable energy and sustainable property by 2030[32].
- Canada's Healthcare of Ontario Pension Plan (HOOPP) reported an 11% reduction in absolute emissions, with its exclusion on new direct private investment in coal and oil coming into full effect in 2025. Its 2030 targets include reducing its real estate portfolio's emissions (Scope 1 and Scope 2) by 50% on an absolute basis, committing $23 billion towards green investments, and for 50% of its infrastructure and private equity portfolios to be covered by credible transition plans[33].

Corporate Engagement and Financial Risk Recalibration

- The Climate Action 100+ Net Zero Company Benchmark 2025 report showed continued positive trends in corporate emissions reductions and transition plan

[29] https://www.esgtoday.com/blackrock-lgim-lose-34-billion-in-mandates-from-dutch-pension-funds-shift-to-sustainability-focused-investment-policy/
[30] https://group.bnpparibas/en/our-commitments/transitions/energy-transition-and-climate-action
[31] https://myupp.ca/investments/responsible-investing/climate-action-plan-overview/#:~:text=To%20track%20our%20progress%20against%20our%20net%2Dzero,baseline%20and%20far%20exceeding%20our%202025%20target
[32] https://www.hesta.com.au/stories/moving-the-needle
[33] https://static1.squarespace.com/static/5b9a9754d274cbec1ca7f8f8/t/67b4843489964c353193580b/1739883572677/Shift%27s+2024+Report+Card+-+HOOPP+Analysis.pdf

disclosure among focus companies. However, the report also highlighted a slowdown in corporate climate policy engagement following several years of steady improvement[34].

- Network for Greening the Financial System (NGFS), significantly recalibrated the standard for climate risk analysis in late 2024 with the release of its Phase V scenarios. These updated scenarios project far more severe economic consequences under climate inaction, with global GDP losses under current policies potentially exceeding 30% by 2100. While damage projections are much higher with the new function, a global economic recession caused by climate change is not foreseen[35].
- Norges Bank Investment Management (NBIM), Norway's sovereign wealth fund, reinforced this dramatic increase in July 2025, warning that widely used market models significantly underestimate the physical climate risks to equity portfolios, potentially masking the true vulnerability of assets. NBIM calculated a 19% drop in its US equities portfolio by 2080, while models used by many asset managers predicted a loss of just 2%[36].
- An Institute for Energy Economics and Financial Analysis (IEEFA) 2025 study reinforced this risk assessment and for the long-term financial case for climate action. The report emphasizes the underperformance and high volatility of the fossil fuel sector, supporting the fiduciary decisions of pension funds engaged in divestment or exclusion. Key takeaways of the report include the fossil fuel sector has underperformed the S&P 500 in seven of the last 10 years and the energy sector now comprises barely 3% of the S&P 500's value, down from roughly 30% in 1980[37].

Critical Studies

- A Transition Pathway Initiative September 2025 report found that of the 2,000 companies assessed, Net Zero ambitions are rarely supported by convincing transition planning and implementation, would require emissions reductions

[34] https://www.climateaction100.org/news/climate-action-100-benchmark-results-show-mixed-progress-amongst-the-worlds-highest-emitting-companies/
[35] https://www.ngfs.net/system/files/2025-01/20241108_ngfs_scenarios_phasev_outreach_public_v2.pdf
[36] https://www.nbim.no/contentassets/6fdfd333e6bf460f8e538b9b55a95bb7/gpfg-climate-and-nature-disclosures-2024.pdf
[37] https://ieefa.org/financial-case-fossil-fuel-divestment

beyond those that companies have recently achieved, and that, in some cases, companies' plans depend on unproven technologies[38].

- A May 2025 academic study found that despite the promise to divest or reduce investments, global finance still holds profound ties with the fossil fuel sector, with no evidence of reduced funding to oil and gas companies. Rather, the high energy prices due to the war in Ukraine and concerns over energy security are seemingly strengthening these ties[39].
- A Transition Pathway Initiative October 2025 report found that banks had weakened their disclosures in areas such as Net Zero commitment, financing conditions for high-emission sectors, and fossil fuel policies, replacing terms like "commitment" with softer language such as "ambition" or "aspiration"[40].
- A 2024 study argued that the direct financial impact of divestment on fossil fuel companies is generally insignificant, with evidence much more supportive of the impact of engagement on corporate action. However, there is no systematic evidence of investor engagement causing companies to take strong climate action that is against their long-term financial interests[41].
- Bill Gates' recent essay, "Three Tough Truths About Climate,"[42] challenged the doomsday and emissions-centric views of climate action, arguing that the global climate community's strategy should pivot to prioritize human welfare and adaptation, stating the goal should be to "prevent suffering, particularly for those in the toughest conditions who live in the world's poorest countries." Gates asserted that the metric for success should be improving lives, not just emission and temperature targets, and urged a greater focus on innovation to drive the cost difference between clean and dirty technologies to zero.

[38] https://www.transitionpathwayinitiative.org/publications/uploads/2025-state-of-the-corporate-transition-2025.pdf

[39] https://www.sciencedirect.com/science/article/pii/S2666791623000131#:~:text=Funds%20marketed%20as%20%27climate%2Dthemed,Hodgson%20and%20Mooney%2C%202021)

[40] https://www.transitionpathwayinitiative.org/publications/uploads/2025-state-of-the-banking-transition-2025.pdf

[41] https://www.bordertocoast.org.uk/wp-content/uploads/2024/09/Border-to-Coast_Divestment-and-Engagement-in-the-Context-of-Climate-Change_August-2024.pdf

[42] https://www.gatesnotes.com/home/home-page-topic/reader/three-tough-truths-about-climate

Interstate 68 in Garrett County, Maryland
Wikimedia Commons; photographer: FormulaNone

Implications & Outlook

The divergent trajectories between U.S. and global climate-finance frameworks suggest major implications for investors, fiduciaries, and policymakers. The withdrawal of federal mandates in the U.S. opens a widening regulatory gap relative to international peers. Capital-market participants face a more complex web of disclosures and uncertainty in climate risk models. With federal guidance dissipating, climate governance is shifting toward state-level governments and institutional investors. U.S. portfolios must navigate patchwork regulation, while global peers accelerate their decarbonization frameworks, increasing jurisdictional divergence. The disbanding of coalitions, combined with research questioning the effectiveness of engagement and divestment, signals that fiduciaries may consider moving away from symbolic commitments to verifiable capital-alignment practices to maintain credibility and manage long-term risk.

Recommend best practices for IPM

In 2023, the Chief Investment Officer and the Senior Governance Manager worked closely with the Board of Trustees to achieve several milestones: addition and approval of policy

language to incorporate all requirements of *State Retirement and Pension Systems – Investment Climate Risk – Fiduciary Duties* in February 2023; approval of a framework for sustainable investing in May 2023; and adoption of further policies and procedures related to sustainable investing in the Investment Policy Manual in September 2023.

Examine potential magnitude of the long-term risks and opportunities of multiple scenarios and related regulatory developments

Strategic Asset Allocation

The Board conducts a formal strategic asset allocation study every three to five years in collaboration with its general investment consultant and investment staff. The following exhibits incorporate various statistical and scenario-based approaches to understand how the System's strategic policy benchmark might perform in the future. This analysis is based on Meketa's 2025 capital markets assumptions which is the latest available information at the time of publication. The Current Policy mix is shown alongside the strategic asset allocation policy adopted in March 2025 by the Board of Trustees.

Table 7 shows the strategic policy targets across asset classes as well as summary risk and return forecasts over the next 20 years.

Asset Class	Current Policy	Adopted March 2025
Public Equity	34.0%	36.0%
Private Equity	16.0%	19.0%
Rate Sensitive	20.0%	18.0%
Credit	9.0%	12.0%
Real Estate	10.0%	9.0%
Natural Resources & Infra	5.0%	6.0%
Commodities	0.0%	0.0%
Absolute Return	6.0%	0.0%
Expected Return (20 year)	8.71%	8.98%
Standard Deviation	12.3%	13.3%
Sharpe Ratio	0.47	0.45

Table 7

Table 8 presents hypothetical outcomes under various market events that have occurred in the past such as the COVID outbreak and Global Financial Crisis of 2008.

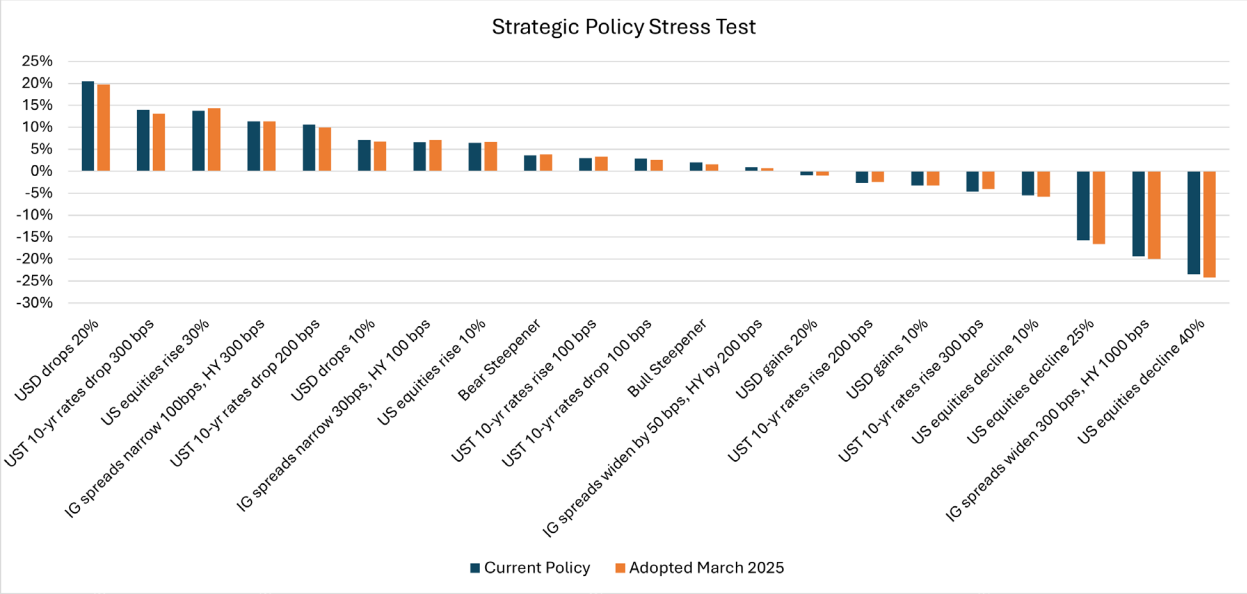

Table 8

Figure 11 displays return outcomes under various stress tests based on correlated shocks derived from changes in factors such as interest rates, stock prices, and foreign exchange.

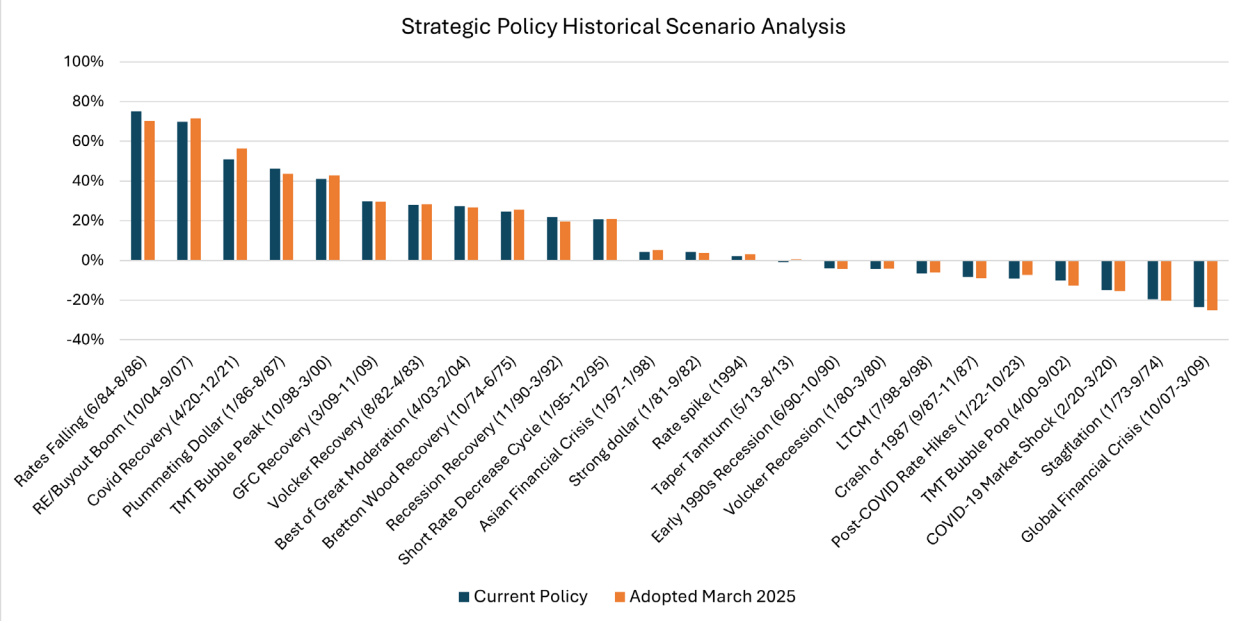

Figure 11

Figure 12 shows the probability of the System's assets achieving its 6.8% actuarial target over several time horizons. As of June 30, 2025, the System's funded ratio was 73.5%, slightly higher than the 73.4% reported in the prior year.

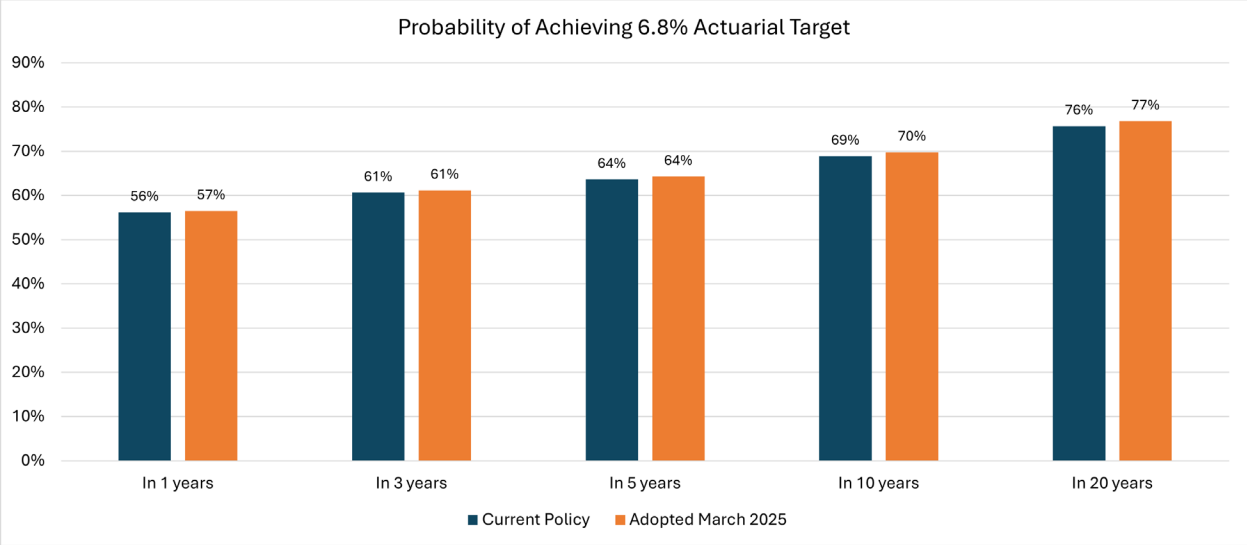

Figure 12

Implementation

Once the Board establishes the System's strategic asset allocation, the Chief Investment Officer, working with staff, specialty consultants and asset managers, is responsible for implementation. To capture the different types of risks associated with the implementation process, the Investment Division estimates tracking error, which measures the variability in the difference between realized and benchmark returns, broken down according to three distinct phases of the investment process as follows:

1. Allocation risk – the risk that results from an over- or under-weight position in a particular asset class
2. Style risk – the risk that results from assigning a benchmark to a manager that is different from a particular asset class benchmark
3. Selection risk – the risk that results from a manager building a portfolio of securities that is different from the constitution of the assigned benchmark

The System's portfolio produces an estimated tracking error, or "total active risk," of 0.87% relative to strategic policy benchmark as of June 30, 2025, as shown in Table 9. This means approximately 67% of the time, the realized excess return will be within a range of +/- 0.87% around its expected mean. Most of the total active risk can be attributed to security selection decisions, a function of staff's belief that markets exhibit varying degrees of efficiency across asset classes and geographies, providing opportunities for skilled investors to add value. Selection risk within asset classes where private markets investments play a prominent role constitutes the bulk of overall selection risk.

Asset Class	Allocation risk (bps)	Selection risk (bps)	Style risk (bps)	Total active risk (bps)
Public Equity	-12	18	3	8
Private Equity	0	42	0	42
Nominal FI	11	-3	-2	7
Inflation FI	2	0	0	2
US Credit	-1	8	6	13
Non-US Credit	0	0	0	-1
Real Estate	0	-1	0	-1
NR & Infra	3	14	1	19
Commodities	0	1	0	0
Absolute Return	1	8	-4	6
Multi Asset	-1	0	-2	-3
Cash	0	0	0	0
Total Plan Overlays	-5	0	0	-5
Total System Portfolio	**-3**	**87**	**3**	**87**

Table 9

To contextualize estimated tracking error, Figure 13 displays historical realized tracking error since the late 1990s using monthly returns calculated by the System's custodian bank that serves as the performance book of record. There are three noticeable spikes, one around the bursting of the tech bubble, another associated with the great financial crisis, during the first half of the time series, and the latest reflecting the high inflation environment on the heels of the global pandemic. Following each of the episodes of market tumult, an extended period of subdued volatility took hold.

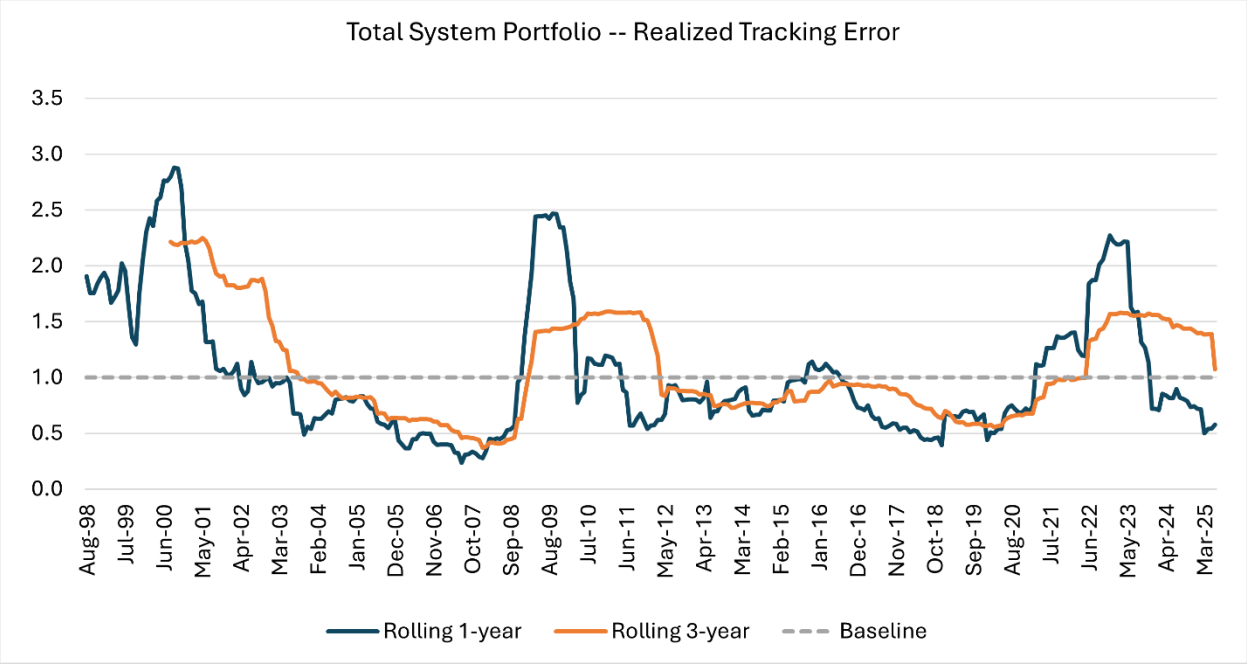

Figure 13

Assateague Island, Maryland
Adobe Stock

Conclusion

The System continues to make progress with respect to climate risks and opportunities in its investment portfolio. Going forward, staff will continue the education process relating to the integration of additional quantitative tools into its climate risk management process while drawing upon the expertise of the Climate Advisory Panel. While there is no industry standardization around climate risk management and challenges persist relating to the use of assumptions and accuracy of models, staff is confident that the System's Annual Climate Risk Assessment will continue to expand and provide more meaningful and insightful analysis.