

Maryland State Retirement and Pension System



MARYLAND
STATE RETIREMENT
and PENSION SYSTEM

Maryland Pension Risk Mitigation Act

Risk Assessment

January 2023

Introduction

In accordance with the State Personnel and Pensions Article § 21-116(e) (MSAR #11752), The Maryland Pension Risk Mitigation Act, the Board of Trustees is submitting an assessment of risk for the several Systems. This report also addresses 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 overarching risk to the System is a failure to meet pension obligations in full and on time. There are many potential causes for such a failure. This report will focus on risks associated with the investment program.

The Board of Trustees is charged with the responsibility of managing the assets of the Maryland State Retirement and Pension System. Investment policies are designed to support the fulfillment of the Board's mission to optimize risk-adjusted returns to ensure that sufficient assets are available to pay benefits to members and beneficiaries when due.

In pursuing this mission, the most powerful tool at the Board's disposal is its long-term strategic asset allocation policy. The strategic asset allocation policy establishes a mix of investment types (stocks, bonds, real estate, etc.) that collectively are modeled to produce the required return with the least risk over the horizon of the pension liabilities. The Board works with its independent investment consultant and staff to establish this long-term policy. Beyond this top-down approach, the Investment Division also contributes to the System's risk management process in its implementation of the strategic asset allocation.

A mix of techniques are utilized at both levels of the investment process. The Board of Trustees and the Investment Division regularly engage with other market participants, including public pension plan peers, financial institutions, and academia, to ensure the System's investment policies and procedures represent leading practices.

Collectively, the Board's strategic allocation and the implementation of that allocation by staff could lead to heightened risk of a funding shortfall if:

1. The collection of assets in the strategic asset allocation fail to achieve the expected returns
2. The collection of assets in the strategic asset allocation achieves the average return over long periods of time, but experience extreme negative returns in the near term, reducing the value of System assets
3. The implementation of the strategic asset allocation by Investment Division staff markedly underperforms the benchmark returns
4. The implementation of the strategic asset allocation does not maintain sufficient liquidity to make benefit payments

The System continues to make progress on its risk management practices including how it addresses climate risk. In addition to dedicating additional personnel and technological resources to risk management, the Board's strategic asset allocation work continues to evolve. From an opportunity standpoint, the System's portfolio is invested in companies that could benefit from the transition to a

lower carbon economy. Consistent with the proxy voting policies and procedures detailed in the Investment Policy Manual, the System also addresses climate risk through its engagement and advocacy efforts. Recent highlights include:

1. *Human Capital.* The Investment Division added an Associate to the risk team in the summer of 2022. In addition, the newly-created Senior Governance Officer position was filled during the year.¹ As an active member of the Investment Division, the Senior Governance Officer supports the overall investment program by acting as Secretary to the Board of Trustees' Governance Committee and chairing the Environment, Social, and Governance Committee and the Diversity, Equity, and Inclusion Committee, among other responsibilities.
2. *Systems Infrastructure.* Staff migrated to BlackRock's Aladdin Risk system and completed the software implementation project in the beginning of 2022. Among other benefits, Aladdin offers a suite of headline ESG analytics, including carbon emissions data, from several third-party vendors. Last year's report introduced these analytics on a single United States public equity portfolio, while this year's report evaluates the carbon footprint of the overall public equity portfolio which spans global markets and constitutes approximately one-third of the total System portfolio. The Investments Division is actively evaluating additional ESG and climate measurement tools, including company-level transition readiness scores, to complement the headline analytics currently accessible via Aladdin Risk. Staff believes this effort is consistent with the following State Personnel and Pensions Article § 21-116.1:
 - (b)(4) – Requiring utilization of best data and practices available in current science, investment strategies, and climate risk analysis
 - (d)(2) – Requiring development of a transition assessment relating to investments in high-impact sectors.
3. *Strategic Asset Allocation.* Meketa Investment Group ("Meketa") led the strategic asset allocation review in the summer of 2021. Climate analysis was a key input of the process for the first time. The Board adopted a policy mix that shared characteristics with the "climate sensitive" option and held up well in climate scenario analysis. Staff will work with Meketa to revisit similar policy options in future strategic reviews, typically conducted every three to five years. In addition, Staff integrates ESG factors throughout the investment process and will continue to enhance these efforts through policy integration in addition to active ownership and engagement, as described in the System's Environmental, Social and Governance ("ESG") Risk Committee Reports². Staff believes these established practices align with the State Personnel and Pensions Article § 21-116.1(b)(3) which requires a process for regular reassessment of the potential systemic risks of the impact of climate change on the assets of the several systems.
4. *Active Management and Sustainable Investments.* As part of its investment strategy, the System utilizes active management in public and private markets. Based on Staff's discussion with the Systems investment managers, during initial due diligence as well as in ongoing monitoring, ESG

¹ <https://www.pionline.com/esg/maryland-state-retirement-appoints-dominique-cherry-navigate-esg-matters>

² <https://sra.maryland.gov/esg-risk-committee-reports>

and climate physical and transition risk considerations are largely being incorporated into decision-making and security selection.

Successful active management strategies are expected to benefit from trends, including the climate transition, that produce winners and losers. In public markets, Staff generally expects its active managers to overweight securities issued by companies better positioned to navigate the climate transition as compared to their respective benchmark indices. Large, listed companies themselves are also making strategic investments in transition opportunities, such as Microsoft's debt investment into direct air capture firm Climeworks AG³.

With respect to private markets, Staff maintains a similar expectation that the System's portfolio will include companies seeking to capitalize on the transition to a lower carbon economy. For example, Staff believes the largest future winners could be relatively small investments today in the System's venture capital portfolio. Representative portfolio themes include solar, commercial fusion energy research, and plant-based foods.

The Investments Division has recently begun to systematically track investments, and is actively evaluating opportunities in the transition in response to the following sections of State Personnel and Pensions Article § 21-116.1:

- (b)(2) – requiring an assessment to identify investment opportunities in (i) emerging technologies in renewable energy and (ii) transitioning, reducing, and eliminating carbon-emitting technology
- (d)(1) – requiring the Chief Investment Officer to identify environmentally sustainable investment opportunities to support a low-carbon economy

For example, in the period beginning July 1, 2022, through January 1, 2022, the team conducted approximately 560 meetings with both current and prospective managers. Of those meetings, approximately 23% were tied to climate risk either directly through a dedicated strategy, or indirectly by way of successful implementation of the manager's investment process leading to potential changes in the underlying portfolio companies they own – all in an effort to minimize exposure to various risk factors.

Additionally, the recent creation of a Theme Team within in the Investments Division is part of an effort to establish a more deliberate process for identifying risks and value driving opportunities related to ESG and Climate.

5. *Engagement and Advocacy.* The ESG Risk Committee issued its third biennial report in February 2022⁴. This report describes the System's policies and procedures with respect to responsible investing, along with recent highlights pertaining to engagement and advocacy. It is being submitted in full as an attachment to this year's risk assessment. Staff believes the proxy voting and engagement activities described in the ESG Risk Committee report already align with the following State Personnel and Pensions Article § 21-116.1

³ <https://www.wsj.com/articles/climate-startup-removes-carbon-from-open-air-in-industry-first-11673492767>

⁴ <https://sra.maryland.gov/esg-risk-committee-reports>

- (e)(1) – Requiring the policies of the Board of Trustees to address and mitigate climate risk in the investment of system assets through direct engagement with managers, brokers, or other entities
- (e)(2) – Requiring the policies of the Board of Trustees to address and mitigate climate risk in the investment of system assets through Proxy Voting

As noted above The Chief Investment Officer and Staff regularly engage with other market participants, including public pension plan peers, financial institutions, data providers, and academia, to ensure the System’s investment policies and procedures represent leading practices, and to understand the latest developments in climate risk analytics. The Chief Investment Officer, Board of Trustees, and Staff has been actively engaging and will continue to work with groups (e.g., Part of an informal group of asset owners housed under the Sustainable Finance Institute, Inevitable Policy Response, Massachusetts Institute of Technology, University of Maryland, Climate Action 100, Council of Institutional Investors, et al) to evaluate the practical implications of establishing “an advisory panel of experts in the analysis of climate change risk to provide the most current science and data available,” as stipulated in the State Personnel and Pensions Article § 21-116.1(e)(4). Future submissions of this report will provide progress updates.

Assessment of the System’s Investment Risk

Strategic Asset Allocation

Periodically, the System conducts an asset allocation review that evaluates long-term expected returns for the System as well as a variety of different measures of risk. Meketa Investment Group (“Meketa”), the Board’s general consultant, led the most recent strategic asset allocation review in September 2021 which explicitly addressed climate risk. The following analyses utilize Meketa’s 2022 midyear capital markets assumptions to compare four asset allocation portfolios:

1. The System’s portfolio exposures as of 9/30/2022 (“Current Portfolio”)
2. The System’s strategic policy benchmark, adopted in September 2021, effective 7/1/2022 (“Strategic Policy”)
3. A mix of 60% S&P 500 Index, 40% Bloomberg US Aggregate Bond Index (“60/40 Portfolio”)
4. Meketa’s estimation of the public pension plan large peer universe (“Large Public Peers”)

Strategic Asset Allocation Portfolio Summary

Asset Class	Current Portfolio (%)	Strategic Policy (%)	60/40 Portfolio (%)	Large Public Peers (%)
Public Equity	27.7	34.0	60.0	45.6
Private Equity	21.9	16.0	0.0	11.1
Rate Sensitive	19.8	21.0	40.0	18.0
Credit	7.9	8.0	0.0	7.9
Real Estate	11.8	10.0	0.0	9.4
Natural Resources & Infra	5.1	5.0	0.0	2.6
Absolute Return	4.7	4.0	0.0	4.4
Cash	-1.5	0.0	0.0	0.5
<i>Expected Return</i>	<i>8.59</i>	<i>8.34</i>	<i>6.70</i>	<i>8.19</i>
<i>Standard Deviation</i>	<i>13.6</i>	<i>13.0</i>	<i>10.9</i>	<i>13.5</i>
<i>Sharpe Ratio</i>	<i>0.45</i>	<i>0.45</i>	<i>0.39</i>	<i>0.42</i>

Source: Meketa Investment Group

The asset allocation review analyzes numerous measures of risk including statistical and scenario-based approaches. These approaches help evaluate the risk that a period of underperformance could severely impact the existing pool of assets. These approaches include:

- Historical Scenarios Analysis: Assessing how the System would have performed in different historical scenarios with its current asset allocation. There are many different types of events that could result in sub-par returns for the System. In particular, extreme shocks such as the Global Financial Crisis and the Stagflation of the 1970s would have the most severe impact.

Historical Negative Scenario Analysis – Cumulative Return

Scenario	Current Portfolio (%)	Strategic Policy (%)	60/40 Portfolio (%)	Large Public Peers (%)
COVID-19 Market Shock (Feb 2020-Mar 2020)	-13.5	-13.8	-21.4	-17.8
Taper Tantrum (May - Aug 2013)	-0.9	-1.2	0.4	-0.2
Global Financial Crisis (Oct 2007 - Mar 2009)	-22.6	-22.2	-24.1	-28.9
Popping of the TMT Bubble (Apr 2000 - Sep 2002)	-8.2	-8.5	-14.8	-15.1
LTCM (Jul - Aug 1998)	-6.0	-6.8	-8.5	-8.5
Asian Financial Crisis (Aug 97 - Jan 98)	4.7	2.8	4.1	2.6
Rate spike (1994 Calendar Year)	3.1	1.7	-0.4	2.8
Early 1990s Recession (Jun - Oct 1990)	-2.8	-3.9	-7.3	-5.6
Crash of 1987 (Sep - Nov 1987)	-6.9	-8.2	-16.9	-11.8
Strong dollar (Jan 1981 - Sep 1982)	5.1	4.9	10.6	3.6
Volcker Recession (Jan - Mar 1980)	-4.0	-4.2	-5.9	-4.3
Stagflation (Jan 1973 - Sep 1974)	-17.9	-19.0	-22.4	-21.5

Source: Meketa Investment Group

- Stress Testing: Estimating the possible risk of various changes in market conditions (e.g., interest rates, credit risk, currency fluctuations) by varying degrees. The largest market risk factors are equity market declines and widening credit spreads.

Stress Testing: Impact of Market Movements – Expected Return under Stressed Conditions

Scenario	Current Portfolio (%)	Strategic Policy (%)	60/40 Portfolio (%)	Large Public Peers (%)
10-year Treasury Bond rates rise 100 bps	3.3	3.1	2.6	4.3
10-year Treasury Bond rates rise 200 bps	-1.6	-2.0	-2.8	-0.7
10-year Treasury Bond rates rise 300 bps	-4.9	-5.0	-3.1	-3.2
Baa Spreads widen by 50 bps, High Yield by 200 bps	1.0	1.1	0.9	0.5
Baa Spreads widen by 300 bps, High Yield by 1000 bps	-19.2	-19.1	-19.4	-22.2
Trade Weighted Dollar gains 10%	-3.1	-3.5	-0.8	-3.6
Trade Weighted Dollar gains 20%	-1.3	-1.2	2.7	-1.3
U.S. Equities decline 10%	-5.7	-5.5	-5.4	-6.1
U.S. Equities decline 25%	-16.4	-16.0	-15.6	-17.8
U.S. Equities decline 40%	-23.7	-23.8	-25.8	-27.7
Inflation slightly higher than expected	-0.5	-0.5	-0.9	-0.6
Inflation meaningfully higher than expected	-4.4	-4.7	-7.8	-6.1
Low Growth and Low Inflation	-5.7	-5.9	-6.6	-6.8
Low Growth and High Inflation	-8.8	-9.4	-10.0	-10.9
Brief, moderate inflation spike	-3.5	-3.6	-1.8	-2.9
Extended, moderate inflation spike	-5.9	-6.1	-4.5	-5.6
Brief, extreme inflation spike	-7.5	-7.6	-6.1	-7.3
Extended, extreme inflation spike	-9.8	-9.9	-8.8	-9.9

Source: Meketa Investment Group

- Value at Risk (VaR) and CVaR: Statistical measures of potential large drawdowns in the market value of investments. VaR is a measure of the risks to the System in the majority of potential outcomes, generally 67% to 99% of the time. The System’s conditional value at risk (CVaR), evaluates the range of outcomes assuming the market is already outside the reasonably expected range. This is often described as a tail risk or black swan event. The System’s one-month CVaR, as reflected in the below table, indicates the policy allocation could lose 9.7% of market value in a single month. This potential loss of 9.7% is an average of the worst 1% of cases, so it is possible for an extreme outlier event to produce a greater loss.

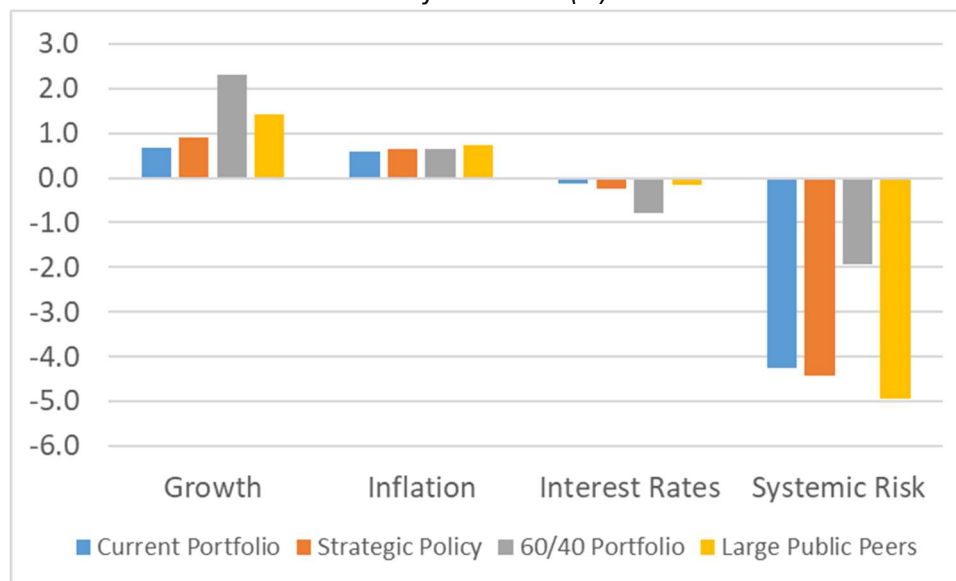
Conditional Value at Risk

Time	Current Portfolio (%)	Strategic Policy (%)	60/40 Portfolio (%)	Large Public Peers (%)
1 month	-9.7	-9.3	-7.8	-9.6
3 months	-15.8	-15.1	-12.8	-15.7
6 months	-21.0	-20.0	-17.0	-20.9

Source: Meketa Investment Group

- Economic Regime Management (ERM) Factor Sensitivity: A measure of the System’s exposure to several economic risk factors (e.g., interest rate, growth, inflation). The largest risk exposure to the System is Systemic Risk, which was the main driver of the global financial crisis during the 2008-2009 period. Because most of the volatility of returns is a result of equity price risk, the System is also sensitive to changes in growth rates. Interest rate and inflation surprises have smaller impacts on the System.

ERM: Portfolio Sensitivity Comparison
Portfolio Return (%)



Source: Meketa Investment Group

- Tracking Error Attribution: Estimates the expected variation in performance versus peers over time. While not a direct risk to the System, it is important for Trustees to evaluate the asset allocation relative to the peer average. Tracking error is a metric that can be used to measure the variability of the System's returns versus the peer average. With the current asset allocation, the System can expect long-term variability of the difference between the System's return and the peer average return (tracking error) to average 2.29% per annum due to differences in asset allocation.

The vast majority of tracking error stems from the System's allocations to equities and rate sensitive fixed income differing from peers. Supplemental information in the report discusses the process of determining asset class expected returns and risk, as well as a comparison to peers' expected return forecasts. While the System's allocations differ from peers, the Current Portfolio is expected outperform this representative peer portfolio by 40 bps annually at a similar level of volatility for better a risk-adjusted expected outcome.

Sources of Tracking Error

Current System Portfolio versus Strategic Policy, 60/40, and Peers

Asset Group	Strategic Policy (bps)	60/40 Portfolio (bps)	Large Public Peers (bps)
Rate Sensitive	1	29	48
Global Credit	3	25	1
Growth/Equity	80	433	136
Global Real Assets	21	66	32
Other	1	5	13
Total	107	558	229

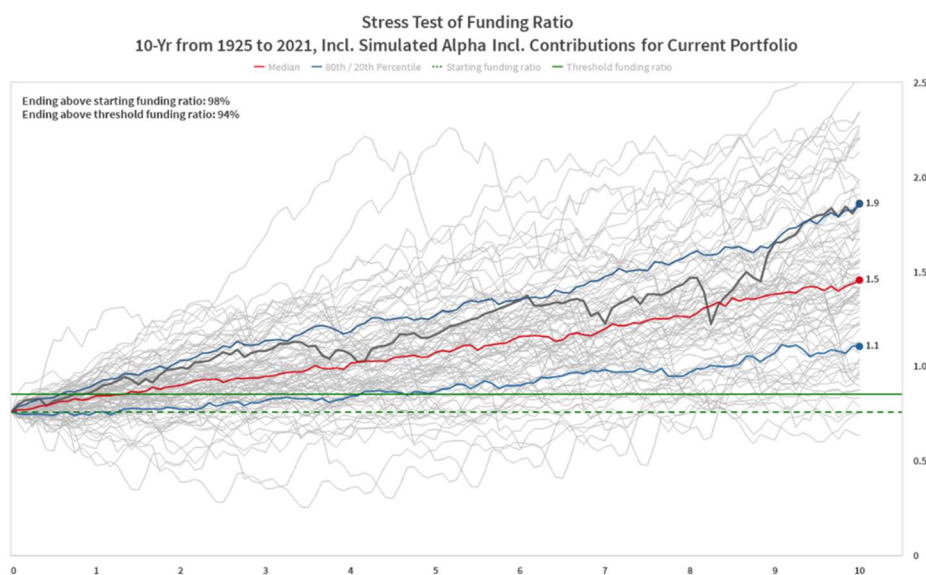
Source: Meketa Investment Group

Funded Status Stress Testing

Evaluating changes to the System’s funded ratio based on both historical scenarios and stress tests, as well as varying the sequence of investment returns over time, an equity market downturn has the most serious negative impact on funded status. Additionally, because the System currently pays more in benefits than it receives in contributions from the employees and employers, the sequence of returns is important. That is, the System could earn its actuarial rate of return, on average, over the next twenty years but still find itself well short of its anticipated funded status. For example, if the System has weak returns in years 1-10 offset by stronger returns in the future, the System’s ending funded status would be projected to be lower than if it produced its assumed rate of return in each year.

The Investment Division utilizes a risk budgeting tool provided by one of the System’s investment managers, Bridgewater Associates, to perform an asset-liability management analysis of the strategic policy. The chart below presents a stress test of the System’s funding ratio using 10-year time horizons, re-sampled every two years, since 1925. According to this analysis, using historical asset class returns and historical cash yields, there is a 94% chance of ending the prospective 10-year period at 85% funded. As reported in the fiscal year 2022 Annual Comprehensive Financial Report, the System is on track to achieve a funding ratio of 80% by 2026, 85% by 2030, and 100% by 2039.⁵ To be clear, this analysis is not a forecast and is subject to the inherent limitations associated with hypothetical performance analysis. Rather, the analysis is a helpful starting point to evaluate potential future outcomes in concert with the work performed by the System’s actuary⁶.

Historical Stress Test of Funding Ratio over 10-year Periods (1925-Present)



Source: Maryland State Retirement Agency, Bridgewater Associates

⁵ https://sra.maryland.gov/sites/main/files/file-attachments/1_cafr-2022_intro_1-14-r6.pdf?1674497712

⁶ <https://sra.maryland.gov/actuarial-valuation-reports>

The below table expresses the ending funding ratios in terms of annualized total returns based on historical asset class performance and historical cash yields. This information is not intended to serve as a forecast but as a basis for understanding the relationship between total returns and funding status over a 10-year timeframe.

<u>Scenario Outcome</u>	<u>Ending Funding Ratio</u>	<u>Annualized Total Return (Historical Cash)</u>
Median	1.5	9.6%
20 th Percentile	1.1	7.4%
80 th Percentile	1.9	12.6%

Source: Maryland State Retirement Agency, Bridgewater Associates

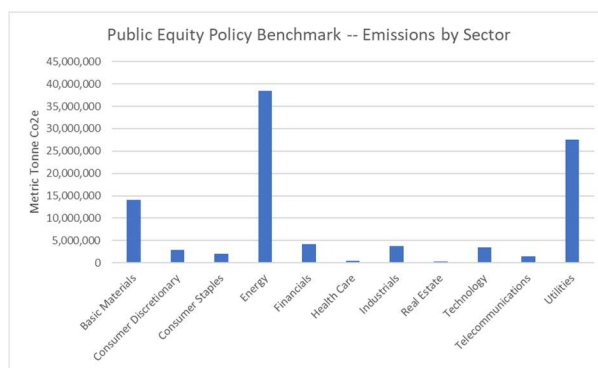
Climate Risk Analysis

Much like the broader industry, the System's ability to measure and model the effects of climate change evolves constantly. This section focuses on the carbon footprint of the public equity portfolio as compared to its benchmark. While this analysis provides a rough approximation of portfolio and benchmark emissions, there are important caveats.

First, the portfolio utilizes different holdings structures in implementing its investment strategy. Most securities are held directly at the System's custody bank; however, certain investments are made via fund entities. In these instances, the Investment Division often receives security-level reporting on a lagged basis and utilizes summary exposure reporting at times which brings some degree of proxying into the analysis.

In addition to parsing multiple holdings structures, the state of reporting of emissions data also poses challenges.⁷ This section utilizes Scope 1 (direct emissions from controlled and owned sources) and Scope 2 (indirect emissions from purchased electricity) from Sustainalytics, a leading vendor in the marketplace. Even though this section does not address Scope 3 (all other indirect emissions), some ambiguity remains in the analytics. Emissions are self-reported in some jurisdictions requiring vendors to use estimation models to expand the coverage universe. Fortunately, the marketplace continues to improve amid the demand for such information.

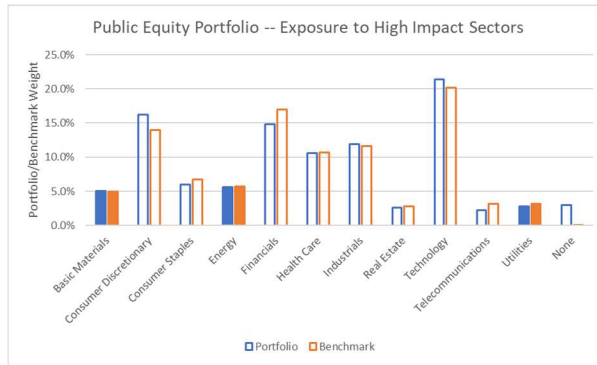
Companies operating in energy, utilities, and basic materials have the largest Scope 1 and Scope 2 emissions profiles due to their nature of their activities, as shown in the chart below.



Source: Maryland State Retirement Agency, BlackRock Solutions, Sustainalytics

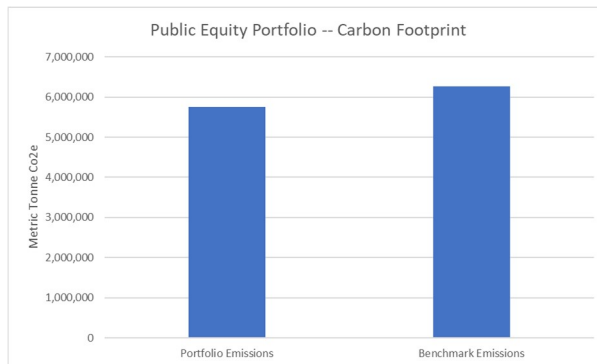
The following chart shows the public equity portfolio exposure to each sector as compared to its benchmark. The high impact sectors are highlighted to show that, on balance, the portfolio has relatively less exposure to these companies.

⁷ <https://mitsloan.mit.edu/centers-initiatives/mit-sloan-sustainability-initiative/carbon-confusion>

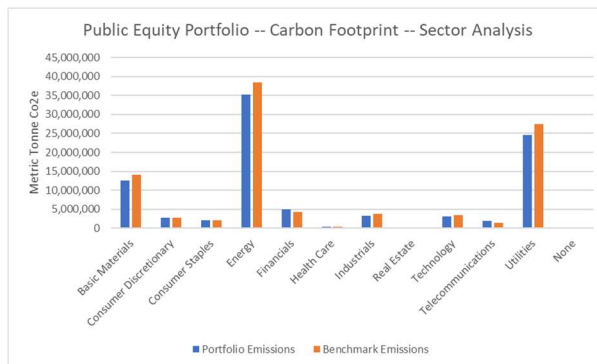


Source: Maryland State Retirement Agency, BlackRock Solutions, Sustainalytics

As shown in the next two charts, the public equity portfolio has a lower carbon footprint than its benchmark. This outcome is the result of different facets of the investment decision-making process. For example, Staff may allocate capital to a manager whose strategy tends to invest in companies outside high impact sectors. Security selection decisions made at the manager level also play a role. While the portfolio has a small overweight of 0.1% to basic materials, as seen above, the portfolio has a lower emissions profile than the benchmark in this sector. The cumulative effect of active management decisions result in a more efficient portfolio in terms of carbon emissions.



Source: Maryland State Retirement Agency, BlackRock Solutions, Sustainalytics



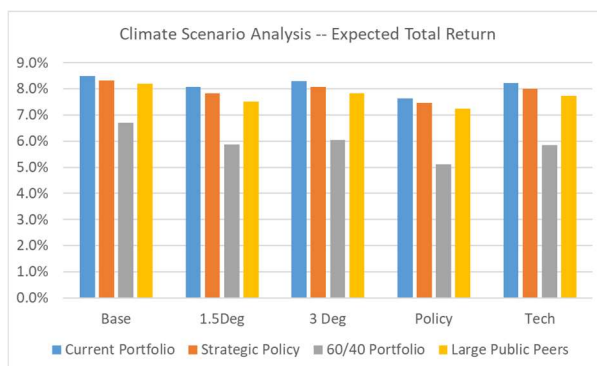
Source: Maryland State Retirement Agency, BlackRock Solutions, Sustainalytics

Going forward, the Investment Division will expand its use of these analytics to other asset classes beyond public equity. Staff expects to benefit from having access to multiple vendors’ analytics in a single platform for risk analysis as it continues to evaluate how the portfolio and its benchmark are positioned for the energy transition.

Meketa Investment Group – Climate Change Analysis

The Investment Division has been working with Meketa on climate change modeling for the last several years. As described in prior Risk Assessments, Meketa’s model runs 185 million simulations to generate a range of possible impacts of climate change on the System’s portfolio over a ten-year horizon. The analysis estimates financial impacts across 35 risk factors in 44 asset classes that interact both directly and indirectly. In prior analyses, Meketa has examined the impact of a 2°C increase in global average temperature and a commensurate level of carbon dioxide emissions over the subsequent ten years.

This year’s analysis includes four climate scenarios – 3°C temperature increase/minimal mitigation, 1.5°C temperature increase/heavy mitigation, policy/carbon tax, and technology/carbon intensity reduction – as shown above in the section on strategic asset allocation. The following chart applies the scenarios across the four portfolios shown above in the section addressing strategic asset allocation. The Current Portfolio and Strategic Policy are expected to outperform in all scenarios, though the expected returns are somewhat lower in each climate scenario with the policy/carbon tax instance showing the most degradation.



Source: Meketa Investment Group

The path of the energy transition that transpires will greatly influence the type and timing of risks to System assets. To help evaluate the current and potential future states of the energy transition the investment team is evaluating research produced by groups such as the Inevitable Policy Response (IPR). The IPR provides a quarterly assessment⁸ of the progress on the path to 1.5°C and the areas that are on, behind or ahead of pace. These and similar tools help the System evaluate the likelihood of stranded assets, the need for investment in mitigation and the remaining opportunity set for transition investments.

⁸ <https://www.unpri.org/inevitable-policy-response/the-inevitable-policy-response-2022-quarterly-forecast-trackers/9910.article>

Implementation Risk Management

Once the Board of Trustees establishes the System’s strategic asset allocation, the Chief Investment Officer, working with investment 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 1.60% versus the strategic policy index as of 9/30/2022, meaning that approximately 67% of the time, the realized return will be within a range of +/- 1.60% around the expected outperformance above the benchmark return. The vast majority – more than 85% – of total active risk can be attributed to security selection decisions, a function of the Investment Division’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 the Growth asset class, which includes public and private equity, constitutes the bulk of overall selection risk.

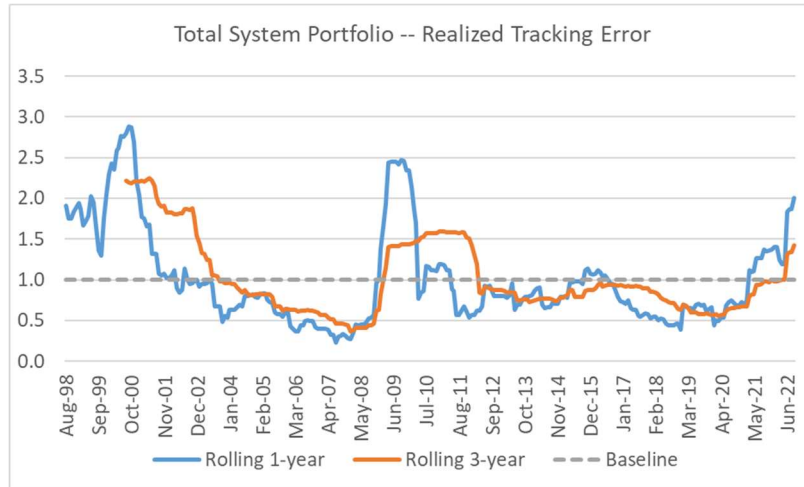
Total Active Risk (basis points)

Asset Class	Allocation risk (bps)	Selection risk (bps)	Style risk (bps)	Total active risk (bps)
Total System Portfolio	2	138	21	160
Public Equity	10	5	11	26
Private Equity	0	49	0	49
Rate Sensitive	3	-4	0	0
Credit	1	15	0	17
Real Estate	0	30	0	30
Nat Res & Infra	-7	33	-2	25
Commodities	-1	0	0	-1
Absolute Return	-4	9	13	18
Multi Asset	-2	0	-2	-3
Cash	0	0	0	0
Total Plan Overlays	1	1	-2	0

Source: Maryland State Retirement Agency

To contextualize this estimate of tracking error, the following chart displays historical realized tracking error since the late 1990s. There are two noticeable spikes, one around the bursting of the tech bubble and another around the great financial crisis, during the first half of the time series. Following each of the episodes of market tumult, an extended period subdued volatility took hold. The latest plots in the

time series reflect the current market environment characterized by the global pandemic and stubborn inflation environment.



Source: Maryland State Retirement Agency

Review of Recent Studies and Actions

Maryland State Retirement Agency staff conducted a review of recent studies and actions with respect to portfolio risks with the goal of identifying leading practices not currently employed that could be recommended for inclusion in the Investment Policy Manual.

- *Harvard Management Company.*⁹ In February 2022, Harvard Management Company (“HMC”) submitted its annual progress report towards its 2050 net-zero goal. The report addresses achieving carbon neutral operations; investing in climate transition; collaborative engagements; fossil fuel exposure; improving data access; and developing appropriate methodologies. The latter two topics are particularly relevant for any investor with significant exposure to private markets and hedge fund strategies that rely on derivatives and short selling. The report describes these issues as systemic challenges that require industry-wide solutions and the collaboration of asset owners, asset managers, data providers, and NGOs.
- *IPR 2022 Policy Gap Analysis.*¹⁰ The Inevitable Policy Response (“IPR”), as described on the Principles for Responsible Investment (“PRI”) website¹¹, “is a climate transition forecasting consortium commissioned by the PRI which aims to prepare institutional investors for the portfolio risks and opportunities associated with an acceleration of policy responses to climate change.” The gap analysis builds upon prior sector-by-sector research across the G20+ economies that covers global policy, technology, and land use developments. According to the report, the 1.8°C forecast policy scenario – where global emissions fall by 80% in 2050 to hold warming well below 2°C – is still in reach even though there is no apparent political pathway that would deliver the 1.5°C required policy scenario. (IPR presented to the Board of Trustees at its education day in October 2022.)
- *Maine Public Employees Retirement System.*¹² MainePERS adopted its ESG policy in 2015 and has been reporting how ESG factors influence their investment decisions since 2017. The latest report addresses risks and opportunities; public market investments: engagement and proxy voting; private market investments; real estate; ESG metrics; ESG policy; and engagement policy.
- *Minnesota State Board of Investment.*¹³ The Minnesota State Board of Investments (“SBI”) uses Meketa as its general investment consultant. Meketa’s Climate Change Investment Analysis project for the SBI seeks to provide data, analysis, and options for the SBI to further develop its investment strategy to address long-term climate investment risks and opportunities. Three phases of the project included a review of high-level global trends, results and analysis of a survey of 20 public pension plan climate leaders, and analysis of the SBI portfolio’s current exposures to climate risks and opportunities. (Maryland State Retirement Agency participated in the survey of climate leaders.)

⁹ <https://www.hmc.harvard.edu/wp-content/uploads/2022/02/2022-Climate-Report.pdf>

¹⁰ <https://www.unpri.org/download?ac=17459>

¹¹ <https://www.unpri.org/sustainability-issues/climate-change/inevitable-policy-response>

¹² <https://www.mainebers.org/investments/esg/>

¹³ <https://msbi.us/climate%20change>

- *New York State Common Retirement Fund.*¹⁴ In June 2019, the comptroller released a Climate Action Plan to address climate risks and opportunities across asset classes. The Common Retirement Fund (“CRF”) has committed \$20 billion (7.5% of assets as of June 30, 2022) to a formal Sustainable Investments and Climate Solutions program. So far, commitments have been made across asset classes including clean and green infrastructure funds as well as real estate funds certified in Leadership in Energy and Environmental Design. CRF also assesses how managers incorporate ESG factors into investment decisions and has set a 2040 target for reaching net zero emissions. CRF published its latest progress report in July 2022.

¹⁴ <https://www.osc.state.ny.us/common-retirement-fund/sustainable-investments-and-climate-solutions-program>

Recommendation of Best Practices for the Investment Policy Manual

The Board of Trustees regularly reviews and updates the Investment Policy Manual in consultation with the Investment Division. Several recent revisions have been made to enhance the policies and procedures with respect to risk management, as well as corporate governance and proxy voting. The risk management section provides the purpose, asset allocation, analytical measures, non-market risks, liquidity risk, counterparty risk, and leverage risk.

In addition, the corporate governance and proxy voting section addresses the following topics:

1. Board of Directors
2. Shareholder Rights and Defenses
3. Capital/Restructuring
4. Compensation
5. Social/Environmental Issues
 - a. Animal Rights
 - b. Consumer Issues
 - c. Climate Change and the Environment
 - d. Diversity
 - e. General Corporate Issues
 - f. International Issues, Labor Issues, and Human Rights
 - g. Sustainability
6. Routine/Miscellaneous

After reviewing the System's risk management processes in comparison with the leading practices of peers and new research from academic literature, it appears the System engages in leading practices concerning the evaluation and management of risks associated with the investment of System assets.

The most recent review of the System's practices by the United Nations-supported Principles for Responsible Investment (UN PRI) serves as evidence. As UN PRI advised, "On an individual basis, per the PRI Summary Scorecard Data, MSRPS has improved significantly across all assessed categories since 2017. Notably, in the strategy and governance module, Maryland has improved from a C to an A rating since 2017." UNPRI also noted that the System scores better than average in seven of ten categories when compared to a peer group of ten other state, county, and city retirement funds using 2020 PRI reporting.

The Investment Policy Manual is a living document that is revised regularly. Given the pace of change in matters pertaining to climate risk over the last few years, from actions of the System's peer plans to the Investment Division's organizational structure as well as the quality of analytics in the marketplace, the next review of the Investment Policy Manual will be an appropriate time to revise language and strengthen policies where necessary. Furthermore, the Board of Trustees and the Investment Division will monitor the divestment plans underway at state pension peers as it pertains to fiduciary duty and other implementation issues that may arise.