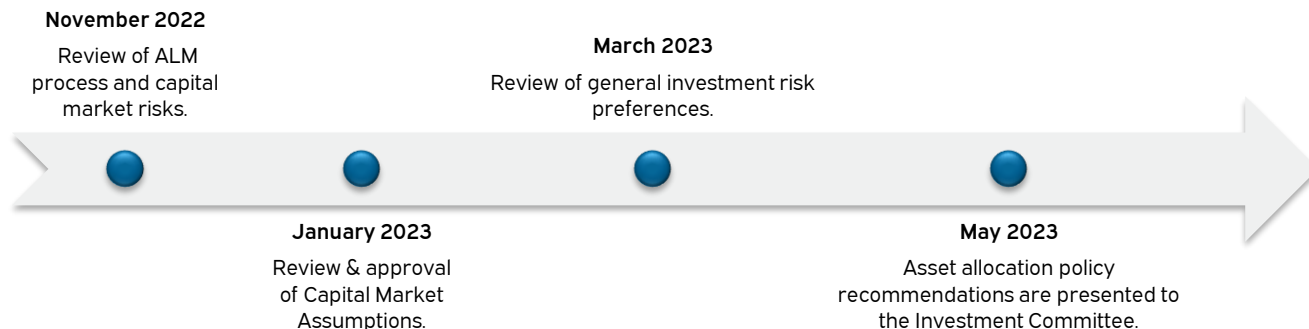


## MEMORANDUM

**TO:** Investment Committee, CalSTRS  
**FROM:** Stephen McCourt, Allan Emkin, Mika Malone, Eric White, Stephanie Sorg, Meketa Investment Group  
**CC:** Chris Ailman  
**DATE:** May 4, 2023  
**RE:** Opinion Memo – ALM Study Capital Market Assumptions

### Summary & Recommendation

For the past nine months, Meketa has worked with Staff on the ALM study process. In concert with investment Staff, we have presented the following: 1) a review of the ALM process and capital market risks at the November 2022 meeting, 2) a review (and Investment Committee approval) of Capital Market Assumptions at the January 2023 meeting, and 3) a review of general investment risk preferences at the March 2023 meeting. At the May Investment Committee meeting, Staff will present to the Investment Committee a specific recommendation on an Asset Allocation policy.



***After independently evaluating of Staff's proposed changes, Meketa concurs with Staff's recommended changes to CalSTRS strategic asset allocation policy.***

### Discussion

#### Summary of ALM Process and Key Decision Points

CalSTRS' process for developing asset allocation policy represents an industry best practice, honed over time through Asset Liability Management ("ALM") reviews every four years. The process generally lasts 9-12 months. The 2022/23 ALM process is comprised of the following elements.

This ALM process began in the middle of 2022, with a discussion of several new strategic concepts related to asset allocation. Those concepts included: 1) Private Credit as an investment opportunity, 2) the concept of an Opportunistic asset class, and 3) the potential impact of a new economic and



geopolitical environment post-COVID. The October 2022 Board meeting included education on a variety of long-term risks to the portfolio. Based upon that review, the Board directed the Staff to include climate risks and geopolitical risks into the ALM process. At the November 2022 Investment Committee meeting, Staff reviewed the ALM process and the required decision points. At the January 2023 Investment Committee meeting, Staff recommended, and the Committee approved, Capital Market Assumptions for each asset class, a critical component to the modeling process. At the March 2023 Investment Committee meeting, Staff recommended, and the Committee approved, a general risk level for the development of asset allocation policy. At the May meeting, Staff will present a specific asset allocation policy, and a description of the modeling and analysis that supports the recommendation.

Each ALM cycle builds on previous studies, with additional new analysis and thought. New for this ALM modeling process, CalSTRS specifically modeled climate risk scenarios and geopolitical risk scenarios, based on Board input at the October 2022 meeting. A description of this modeling process, conducted by Meketa, is included in this memorandum.

Further, Staff has constructed a sophisticated liquidity stress test, given cash flow requirements and increased exposure to less liquid asset classes. The details of that stress test are described in Staff's agenda item, and we discuss the implications below.

### **Summary of Staff Modeling and Recommendation**

Staff's modeling process and analysis of potential asset allocation options is based on a few fundamental principles:

- Asset Allocation policy portfolios should reflect the risk-level preference expressed by the Investment Committee at the March meeting.
- As a very large pool of assets, asset allocation policy changes at CalSTRS should generally be modest, as transition costs and frictions can be significant.
- Risk should be viewed from a wide variety of perspectives, not just forward-looking market value / rate of return volatility expectations.
- Asset allocation policies must be developed within a framework of CalSTRS' liabilities and cash flows.

Staff's item provides a summary of five asset allocation policy options (labeled Options A-D, plus the Current Policy), with expected returns ranging from 7.2% to 7.4% (current policy is 7.4%) and expected volatility ranging from 9.4% to 10.1% (current policy is 10.4%). The recommended policy (Policy A) expresses an expected return of 7.4%, equal to that of the current asset allocation policy, and an expected volatility of 10.1%, 30 basis points lower than that of the current policy. Thus, the recommended policy represents a more efficient mix of risk and return than the existing policy.

This improved efficiency (higher return for each unit of risk) is largely the result of taking advantage of additional allocations to illiquid strategies, Private Credit (+2%), Private Equity (+1), and Private Infrastructure (+1), and reduction of the allocation to publicly traded global equities (-4%). Staff explains that these allocation adjustments not only result in stronger expected risk-adjusted returns, but also align with the Board's Net Zero framework.



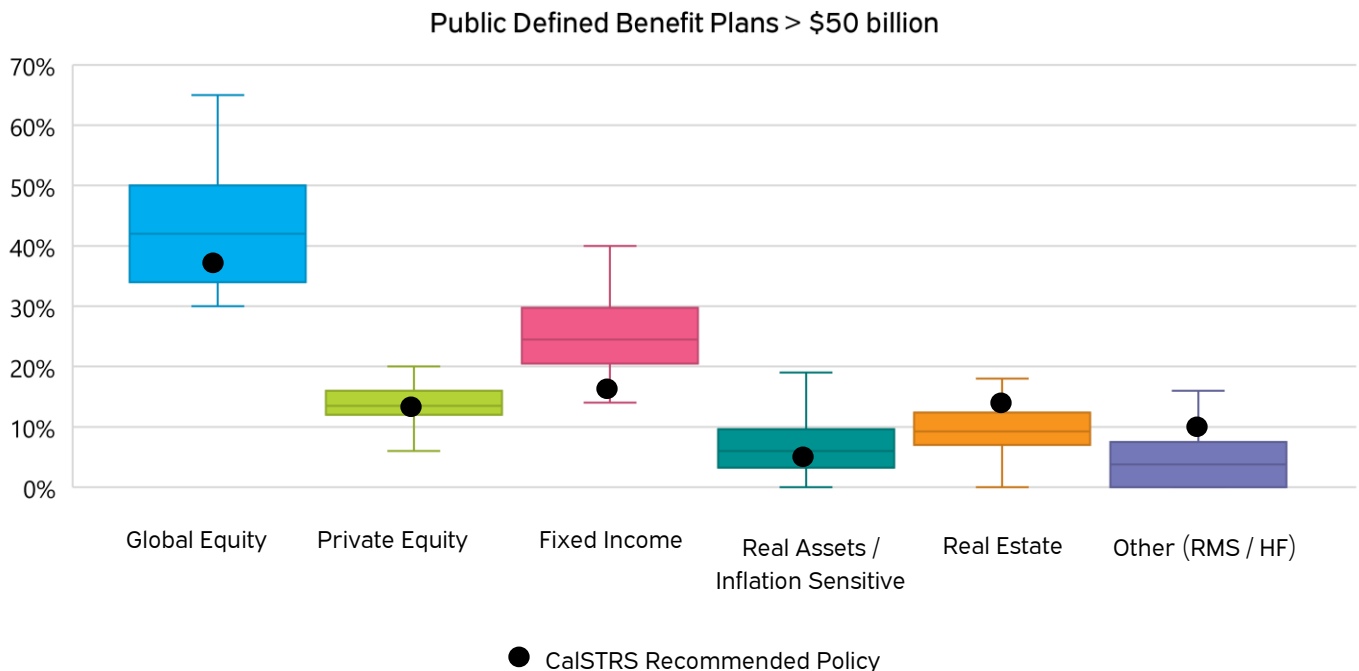
Because of the recommended Policy’s higher allocation to illiquid assets, Staff conducted meaningful liquidity analysis, described below, to ensure that CalSTRS could comfortably support the higher levels of illiquidity.

### Importance of Liquidity Management and Modeling

As shown in Chart 1 of Item 3, the allocation to illiquid assets in the CalSTRS asset allocation policy has risen steadily for the past two decades, from roughly 15% in 2002 to 38% in the recommended Policy. Staff discussed and evaluated liquidity from two perspectives: operational liquidity (ability to pay benefits and expenses) and strategic liquidity (ability to maintain stable asset allocation over time). Staff, after detailed analysis, determined that the existing practice for ensuring operational liquidity is sufficient to handle the modest increase in private market assets in the recommended asset allocation policy. Further, Staff and the Committee have discussed further building out liquidity management practices within CalSTRS, which would be aligned with the needs of a fund with higher levels of illiquid assets.

Strategically, in Chart 3 of Item 3, Staff highlights that the amount of daily liquid assets in the portfolio would continue to be more than ten times the size of annual benefit payment, only slightly lower than the existing policy. Chart 4 highlights that the recommended policy only slightly increases the allocation to private market assets in a realistic downside scenario (90th percentile outcome – or an investment outcome associated with a one-in-ten probability).

### Peer Comparison<sup>1</sup>



<sup>1</sup> Fixed income allocation includes cash.



As part of Meketa’s review, we compared the current policy asset allocation to a peer group of Public Defined Benefit plans with assets greater than \$50 billion. Constituents consisted of the 25 largest public pension systems in the US (by assets under management), and policy allocation targets were compiled and aggregated by asset class. The chart and corresponding table articulate the percentile spread between the highest and lowest allocations to each asset class. The results show that CalSTRS’ recommended policy target to Global Equity (38%) and Private Equity (14%) were roughly in-line with the peer group averages. Fixed Income (16%) was notably lower than the peer average (26%), and Real Estate (15%) and RMS (10%) were materially higher than peers.

	Global Equity (%)	Private Equity (%)	Fixed Income (%)	Real Assets / Inflation Sensitive <sup>1</sup> (%)	Real Estate (%)	Other (RMS/HF) (%)	Strategic Leverage <sup>2</sup> (%)
Maximum	65	25	40	30	18	16	0
3rd Quartile	50	16	29	9	12	7	0
Median	42	14	25	6	9	4	0
1st Quartile	34	12	21	4	7	0	0
Minimum	30	5	14	0	0	0	-40
Average	42	14	26	8	10	4	-3
<b>CalSTRS Policy</b>	<b>42</b>	<b>13</b>	<b>14</b>	<b>6</b>	<b>15</b>	<b>10</b>	<b>0</b>
<b>Recommended Policy</b>	<b>38</b>	<b>14</b>	<b>16</b>	<b>7</b>	<b>15</b>	<b>10</b>	<b>0</b>

### Meketa Modeling for Climate Risks and Geopolitical Risks

As part of the ALM process, Meketa was asked to independently model climate risk and two geopolitical risks. These risks were identified by the Board at its October offsite meeting and directed to be part of the ALM process. We describe our process for modeling these risks below.

### Meketa Simulation Analysis Approach

Meketa’s asset allocation modeling tools allow us to conduct scenario analyses on a wide variety of long-term capital market risks. Meketa uses a top-down, statistical approach to give asset allocators a “big picture” estimation of potential impacts to returns and risk that could confront them in fundamentally uncertain situations where the magnitude, direction, and timing of economic shocks and investment risks can vary substantially from historic norms.

All of our simulation models iteratively generate monthly return data beginning with the latest available actual data for 47 different economic, financial, and climate factors. Using available historical data to estimate relationships among these variables. The process assumes a randomized movement of each factor consistent with its historical behavior. The impact of all other relevant factors is added to derive

<sup>1</sup> Real Assets / Inflation Sensitive include Natural Resources, Commodities, Infrastructure, TIPS.

<sup>2</sup> Strategic Leverage components: CalPERS (-5%), Teacher Retirement System of Texas (-6%), State of Wisconsin Investment Board (-15%), MOSERS (-40%), Pennsylvania Public School Employees Retirement System (-7.5%)



a forecasted monthly return for each factor. We repeat this process for each month in the forecast period to generate a simulated return stream stretching across the entire period (a “simulation”). We then repeat this process to create multiple simulations. The relationships of 104 asset classes to these factors are estimated based on historical data and then applied to the simulated pathways, generating asset class returns for each simulation.

The first two scenarios ran were for Stagflation and Deglobalization. Stagflation is defined as a long term (decade of more) condition of slow global GDP growth, combined with high inflation. Events that could lead to this scenario include: aging demographics, declining global trade, low-growth government policies, and more dovish monetary policy. Deglobalization is defined as a specific condition where the post-World War II liberal democratic economic policy norms (free trade, limited protectionism, independent central banks, democratically elected governments, etc.) slowly erode, and are replaced by policies that are more inward looking (e.g., trade protections, industrial subsidies, coordinated fiscal and monetary policies, etc.).

The six climate scenarios we analyzed represented mixes of physical and transition risks. Physical risks describe the impacts of climate change on economies, generally through damage or disruption due to changes in precipitation and storms relative to history. Transition risks describe financial risks arising from changes in policy and behavior attempting to mitigate climate change. The scenarios vary from physical risk predominant (Current Policies, Nationally Determined Contributions “NDCs”) to transition risk predominant (Net Zero by 2050, Divergent Net Zero) as well as mixed scenarios (Delayed Transition, Below 2°C). In each case, the scenarios specify paths of macroeconomic variables and measures of physical climate change consistent with the specified amount of climate change and implementation of mitigation efforts.

In the climate analysis, we reviewed six different scenario sets from the Network for Greening the Financial System (“NGFS”), an international, intergovernmental organization made up of 121 national financial supervisory authorities and central banks sharing best practices for the development of environmental and climate risk management in the financial sector. The NGFS provides a suite of climate scenario assumptions covering different emission paths, transition strategies, and physical risk profiles. We modeled six of these scenarios, incorporating both transition and physical risk factors.



### NGFS Scenario Summaries<sup>1</sup>

	Scenario Name	Temp Target	Policy Reaction	Technology Change	CO <sub>2</sub> Removal
Orderly	Net Zero 2050	1.4°C	Immediate & smooth	Fast	Medium-high use
	Below 2°C	1.6°C	Immediate & smooth	Moderate	Medium-high use
Disorderly	Divergent Net Zero	1.4°C	Immediate but divergent among sectors	Fast	Low-medium use
	Delayed Transition	1.6°C	Delayed	Initially Slow but then Fast	Low-medium use
"Hot House"	NDCs	2.6°C	Nationally-determined	Slow	Low-medium use
	Current Policies	3.0°C+		Slow	Low use

### Geopolitical and Climate Modeling Results Discussion

The stagflation and deglobalization scenarios are both characterized by lower returns for growth-sensitive asset classes as well as by higher inflation and fixed income returns. Public and private equity returns decline in both scenarios, with a greater fall in a prolonged stagflation scenario than in deglobalization. Higher quality fixed income tends to perform more strongly in both scenarios. Impacts on credit are mixed, with stronger performance in a deglobalization context and weaker under stagflation. Real assets perform similarly in both scenarios, protecting more than equities but with lower returns than high quality fixed income. Although not directly observable, asset classes with more exposure to international securities generally perform more poorly in the deglobalization scenario than in a prolonged stagflation.

### Scenario Impact on Average 20-Year Expected Return Versus Baseline (Select Policies and Asset Classes)

	Stagflation (%)	Deglobalization (%)	Legend
Global Equity	-2.4	-1.5	<-1%
Cash	0.0	0.6	0% - 1%
IG Bonds	0.5	2.4	>1%
TIPS	0.2	3.1	>1%
HY Bonds	-1.3	1.4	>1%
Direct Lending	-1.6	1.6	>1%
Private Equity	-4.5	-1.6	<-1%
Real Estate (Core Private)	-1.0	-1.1	<-1%
Infrastructure	-1.0	-1.2	<-1%
Alternative Risk Premia	-0.8	-1.2	<-1%
Commodities	3.7	2.7	>1%
CTAs	-0.1	-1.3	<-1%
Global Macro	-0.1	-1.1	<-1%

<sup>1</sup> "NGFS Scenarios for central banks and supervisors" presentation, September 2022.



	Climate: Current Policies (%)	Climate: Delayed Transition (%)	Climate: NDCs (%)	Climate: Below 2° (%)	Climate: Net Zero 2050 (%)	Climate: Divergent Net Zero (%)
Global Equity	1.2	0.4	0.0	-0.3	-0.3	-0.9
Cash	0.0	0.0	-0.1	0.0	0.0	0.0
IG Bonds	0.4	0.2	0.2	0.1	0.1	0.2
TIPS	0.2	-0.7	-0.3	-0.2	-0.4	-0.3
HY Bonds	0.3	-0.6	-0.3	-0.2	-0.9	-0.8
Direct Lending	0.4	-0.7	-0.4	-0.2	-0.9	-0.9
Private Equity	1.4	0.5	0.0	-0.4	-0.3	-1.1
Real Estate (Core Private)	-0.1	-0.1	-0.2	-0.1	-0.4	-0.7
Infrastructure	-0.4	-0.2	-0.3	-0.1	-0.3	-0.5
Alternative Risk Premia	0.0	-0.6	-0.3	-0.1	-0.7	-0.6
Commodities	-0.3	-1.3	-1.3	-0.2	-1.0	-1.6
CTAs	0.0	0.0	0.0	-0.1	0.0	0.0
Global Macro	0.2	-0.1	-0.1	-0.1	-0.1	0.0

**Legend**

- <-0.5%
- 0.5% – 0%
- 0% - 0.5%
- >0.5%

Across climate scenarios, outcomes tend to vary by departure from the current climate status quo as well as by the volatility of policy changes, with greater changes from the status quo and more policy volatility leading to more negative outcomes. Policies closer to current policies (Current Policies, Delayed Transition, NDCs) generally exhibit stronger equity returns, while fixed income performance is mixed. The most extreme downside outcomes across asset classes generally occur in scenarios with less coordinated climate policies (Divergent Net Zero, NDCs, Delayed Transition). Scenarios with greater degrees of climate change mitigation (Net Zero scenarios) trend towards lower outcomes versus the baseline. The impact of climate transition risk tends to dominate, although the contribution of physical risks is relatively higher in several asset classes, notably real estate, farmland, and infrastructure.

Although individual asset class returns can vary substantially within each scenario, the impacts on well-diversified asset allocation policy portfolio are less pronounced.

### Scenario Impact on Average 20-Year Expected Return Versus Baseline (Policy Options)

	Stagflation (%)	Deglobalization (%)
Current Policy	-1.8	-0.7
Recommended Policy	-1.7	-0.7
Policy 2	-1.7	-0.6
Policy 3	-1.7	-0.6
Policy 4	-1.6	-0.5

**Legend**

- <-1%
- 1% – 0%
- 0% - 1%
- >1%



	Climate: Current Policies (%)	Climate: Delayed Transition (%)	Climate: NDCs (%)	Climate: Below 2° (%)	Climate: Net Zero 2050 (%)	Climate: Divergent Net Zero (%)
Current Policy	0.7	0.2	0.0	0.0	-0.3	-0.7
Recommended Policy	0.7	0.2	0.0	-0.1	-0.3	-0.7
Policy 2	0.6	0.2	-0.1	-0.1	-0.3	-0.7
Policy 3	0.6	0.2	-0.1	-0.1	-0.3	-0.7
Policy 4	0.6	0.1	-0.1	-0.1	-0.3	-0.7

**Legend**

- <-0.5%
- 0.5% – 0%
- 0% - 0.5%
- >0.5%

On an absolute basis, a near-term, prolonged stagflationary scenario appears to present the greatest risk to long terms returns. Among climate scenarios, scenarios which have later transitions (Current Policies, Delayed Transition) appear to benefit the proposed portfolios, while more ambitious mitigation efforts (Net Zero 2050, Divergent Net Zero) present greater transition risks and more scope for negative outcomes. More middling scenarios, with modest climate change mitigation goals and modest degrees of policy coordination, impact the proposed portfolios to a lesser degree.

Despite variation in the absolute impact of each scenario on expected return versus a baseline forecast, the **degree of equity exposure is the predominant driver of relative proposed policy returns**. The Current Policy has the highest combined exposure to public and private equity and, consequently, has the weakest return impact relative to the other policies in negative growth scenarios. By contrast, the Current Policy performs well in scenarios where equities rise.

The Stagflation and Deglobalization scenarios demonstrate the largest sensitivities to reduced equity exposure, with annual expected returns dropping by a range of 0.5% to 1.8% from the policy with the highest equity allocation (Current Policy) to the one with the lowest (Policy 4). Although those amounts appear modest, when compounded over a long-term planning horizon on a large portfolio, like CalSTRS', the amounts are significant. The climate scenarios show less impact from asset allocation, generally being clustered within a relatively tight window of expected returns, supporting CalSTRS' focus on addressing climate risks at the portfolio implementation level.

### Conclusion and Follow-On Considerations

Staff's recommended asset allocation policy is based on a broad set of analyses, in which Staff evaluates risks and returns from a variety of perspectives. Once the Investment Committee decides on an appropriate asset allocation, there will be several follow-on considerations for the Committee over the next several meetings:

- *Approving target ranges around each target:* In addition to asset allocation targets, the Committee adopts ranges around the target that provide guidance to Staff when rebalancing asset classes over time. Staff would intend to recommend target ranges at the July meeting.
- *Approving an implementation/transition plan:* Presuming the new asset allocation policy differs from the current one, Staff would be recommending a transition and implementation plan. This plan would be presented to the Committee over the next several meetings.





→ *Modifying asset class policies:* With or without a revised asset allocation policy, there are likely to be structural changes that Staff would recommend within certain asset classes to reflect the ALM analysis. For example:

- **Fixed income:** inclusion of a meaningful target allocation to Private Debt strategies.
- **SISS:** new policies to define SISS' role within the asset allocation framework, and a potential Opportunistic asset class (with a 0% target).
- **RMS:** Potential changes to the underlying allocation targets for the four components of RMS.
- **Inflation Sensitive:** Potential changes to the underlying allocation targets for the components of Inflation Sensitive.
- These policy recommendations are likely to come before the Committee over the next year.

While asset allocation policy is the most impactful decision the Investment Committee will make, the Committee will need to turn its attention to implementation issues afterwards. Staff is aware of each of the implementation requirements and will be reviewing them with the Committee over time.

Staff's process for developing its asset allocation recommendation to the Investment Committee has been robust and represents an industry best practice in asset allocation policy development. Staff has been responsive to Meketa's feedback during the process and has considered each of the issues that Meketa surfaced. The recommendation in front of the Committee represents the best thinking of Staff and Meketa.

***After independently evaluating of Staff's proposed changes, Meketa concurs with Staff's recommended changes to CalSTRS' asset allocation policy.***

If you have any questions, please feel free to contact us at (760) 795-3450.

SPM/SBS/AE/EW/jls