



## Investment Committee

### Item Number 3a – Open Session

**Subject:** CalSTRS Net Zero Strategy First Year Progress and Planning Update

**Presenter(s):** Christopher Ailman, Scott Chan, Kirsty Jenkinson, Brian Rice

**Item Type:** Action

**Date & Time:** August 31, 2022 – 50 minutes

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**Attachment(s):** Attachment 1 – CalSTRS 2022-23 Asset-Liability Management (ALM) Study Fact Sheet

Attachment 2 – Low Carbon Index Modeling Assumptions

Attachment 3 – Low Carbon Index Modeling Risk Analysis

Attachment 4 – Meketa Net Zero Concurrence Memo

**PowerPoint(s):** CalSTRS Net Zero Strategy Update August 31, 2022

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#### **Item Purpose**

Since the Investment Committee (IC) approved staff's recommendation to adopt CalSTRS net zero emissions pledge last September, there has been a growing level of scientific analysis around the impacts of climate change, increased levels of climate-related data and analytical tools, and increased responses to climate impacts from corporations, technology providers, policy makers and regulators. In addition, the ongoing physical impacts of climate change are being witnessed in the form of droughts, heat, extreme weather events and famine.

Staff recognizes that the IC has made the net zero pledge an extremely high priority as part of its oversight role of the trust Fund. Staff takes its responsibility to implement the pledge very seriously and has committed significant resources, both internal and external, towards prudently integrating net zero considerations across the investment portfolio to support the retirement security of California's educators.

The purpose of this item is to provide IC members with a further update on progress since the [May 2022 Investment Committee](#) meeting and to recommend four actions that staff believes the IC should take to advance CalSTRS' pledge to achieve net zero portfolio emissions by 2050 or sooner. Specifically, these recommendations relate to reducing absolute Scope 1 and Scope 2 emissions in

the CalSTRS portfolio based on analyses conducted by staff in the Global Equity (GE), Investment Strategy & Risk (ISR) and Sustainable Investment and Stewardship Strategies (SISS) teams. Meketa Investment Group and the Board’s fiduciary counsel have reviewed staff’s report and recommendations and both support what is being proposed.

Throughout this item staff will periodically reference the importance of delineating between actions that CalSTRS has control over that help align the portfolio with the net zero pledge (e.g. investment policy, risk, benchmark decisions) and activities that others control (e.g. companies, policy makers) but which CalSTRS can seek to influence to help align the portfolio with the net zero pledge. Staff feels this important distinction reflects CalSTRS overall belief that achieving the net zero portfolio emissions pledge will require an integrated strategy targeted to effect action within CalSTRS’ control and influence action outside of CalSTRS’ control.

### **Recommendations**

**1) Set a 2030 Interim Emissions Reduction Goal for Total CalSTRS Fund:** Staff recommends that the IC set an interim goal of reducing total CalSTRS portfolio carbon emissions by 50% by 2030, to align CalSTRS with the time horizon for global, science-based goals to stabilize the climate.

**2) Adopt a Net Zero Investment Decision Making Process:** Staff recommends that staff and the IC adopt a net zero decision-making process that incorporates a comprehensive analysis of the impact on risk, return, emissions and funding status associated with any investment decision presented to the IC. Staff believe this process – and all related investment decisions – should be reviewed on an annual basis with the IC and adapted, as necessary, as part of the on-going monitoring of the progress of the CalSTRS net zero pledge implementation and broader decarbonization in the global economy.

**3) Reduce Emissions in Public Equity by Adopting a Target Allocation of 20% to the MSCI ACWI Low Carbon Target Index:** Staff recommends that the IC adopt a target allocation of 20% to the MSCI ACWI Low Carbon Target Index within the CalSTRS Public Equity allocation to begin realizing emissions reductions in alignment with the CalSTRS net zero pledge. Should the recommendation be accepted, staff will develop an implementation plan and report back to the IC on this plan similar to the current reporting process used for CalSTRS asset-liability management framework.

**4) Integrate Climate Scenarios into the CalSTRS Asset-Liability Management (ALM) Framework:** Staff recommends that the IC build on the insights gained by staff in preparing these recommendations to integrate a set of climate scenarios into CalSTRS’ traditional ALM framework.

## **Executive Summary**

Staff's rationale for the four recommendations are summarized below. Meketa Investment Group and the Board's fiduciary counsel reviewed staff's report and support these recommendations.

### ***Recommendation 1: Set a 2030 Interim Emissions Reduction Goal for Total CalSTRS Fund***

Establishing an interim portfolio emissions reduction goal aligned with science: According to the Intergovernmental Panel on Climate Change (IPCC) in their [Sixth Assessment Report](#) released February 22, 2022, global greenhouse gas emissions must be halved by 2030 in order to reach net zero by 2050. Staff believes that aligning our overall investment activities with the time horizon for global, science-based goals to stabilize the climate will help protect the interests of CalSTRS beneficiaries. Additionally, the recommendation to target 50% emissions reduction by 2030 aligns with the intentions of CalSTRS net zero pledge by 2050 or sooner but establishes an interim target to guide CalSTRS strategies both regarding our own investment decisions and in influencing the orderly decarbonization of the broader economy where most reductions will have to occur.

Accelerating collective action: Countries, [including the U.S.](#), are aligning their [Nationally Determined Contributions \(NDCs\)](#) with 50% emissions reductions by 2030. According to the [Science Based Targets Initiative \(SBTI\)](#), 1605 companies have established science-based targets including near term targets that align with 50% emissions reduction by 2030. The likelihood of the global economy reaching its goals to stabilize the climate depends on many actors working together. While CalSTRS cannot control the pace at which the overall global economy decarbonizes, we can seek to be part of, and accelerate this global effort which supports the [Time Value of Carbon](#) concept. This concept supposes that greenhouse gas emissions cut today are worth more than future emissions cuts because emissions cut this year create a benefit for the climate system each year into the future.

### ***Recommendation 2: Adopt a Net Zero Investment Decision Making Process***

Agreeing on process components: Staff and the IC need to establish a robust and consistent process through which to analyze and make investment recommendations – decisions that we can control within the CalSTRS portfolio – relative to our net zero pledge. Going forward, staff believes that all net zero recommendations and decisions should be comprehensively analyzed by considering the impacts to risk, return, emissions and the [CalSTRS Funding Plan](#) in a systematic manner and with appropriate input from staff as well as external experts.

Adopting an annual review cycle to monitor progress: The process proposed by staff aligns with prudent processes currently used to make CalSTRS investment decisions (e.g., ALM framework) but expands to include a broader understanding of how investment decisions impact the emissions profile of the CalSTRS portfolio and how the CalSTRS portfolio is impacted by the global economy's emissions profile. The net zero decision-making process and progress – should be

reviewed on an annual basis with the IC to monitor the progress of CalSTRS net zero implementation strategy. Staff believes that an annual cycle would allow CalSTRS the flexibility to adapt the strategy as emissions data and information improves, and as the world's path to net zero (e.g., policy change, technology breakthrough) evolves.

Developing methods to 'track the transition': CalSTRS' success in achieving our net zero emissions pledge, and any interim goals, must be implemented at a pace that is prudent for the Fund. Our success in achieving the pledge is also dependent on the broader financial markets moving to net zero. Staff therefore believes it is important to establish a process through which staff can better understand the degree to which the global net zero transition is occurring (a 'transition tracker') to calibrate CalSTRS' own response and to monitor our progress and the progress of the broader market. Through our research, staff has found that many data points exist that signal the direction and speed of the transition, (e.g., renewable energy penetration or electric vehicle adoption or technological advances in energy storage). However, staff believes there is a need to bring together these data points into a more comprehensive analysis as to the speed and direction of the transition, as part of our net zero decision making framework. This 'transition tracker' will have to be integrated into CalSTRS' investment processes and evolve over time as decision-useful data and information improves.

***Recommendation 3: Reduce Emissions in Public Equity by Adopting a Target Allocation of 20% to a Low-Carbon Index***

Staff's recommendation regarding the allocation is based on the following four steps:

Prioritizing emissions reductions in Public Equity: 42% of the total CalSTRS portfolio is invested in Public Equity. Within the Public Equity portfolios, 74% is passively allocated. Given these statistics, and that the most accurate and broadly available carbon emissions data is for public equities, staff believes that the most meaningful way to reduce CalSTRS total portfolio emissions, in alignment with the net zero pledge, would be through phasing the integration of a low-carbon passive index that would be managed internally by staff in a cost-effective and risk-controlled manner.

Selecting MSCI ACWI Low Carbon Target Index: After evaluating five different low-carbon passive indexes, staff determined that the MSCI ACWI Low Carbon Target Index (ACWI LCT) is the most appropriate. This index has the highest carbon emissions reduction per unit of active risk, internal staff has experience managing the portfolio<sup>1</sup>, and it has a long track record that has performed in-line with expectations. Furthermore, by continuing to provide broad sector and market exposure (but re-weighting exposures), the index supports CalSTRS integrated net zero

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<sup>1</sup> As of June 30, 2022, the Global Equity team was managing \$3.9B of investments in the MSCI ACWI Low Carbon Target Index as part of the Sustainable Investment & Stewardship Strategies (SISS) Public Portfolio. The \$3.9B represents approximately 44% of the SISS Public Portfolio and approximately 3% of CalSTRS' total public equity exposure.

strategy to leverage our proxy votes and engage companies across all economic sectors to reduce their emissions.

Integrating MSCI ACWI Low Carbon Target Allocation and Climate Scenarios into ALM Framework to Model Impacts on Risk, Return and Funding Plan: Staff modeled an allocation to the ACWI LCT index by integrating a set of climate scenarios into the CalSTRS Asset-Liability Modeling (ALM) Framework to provide insights into future risk and return dynamics and enhance staff's understanding of liability-related risks and their impacts on the [CalSTRS Funding Plan](#) and the goal of reaching full funding by 2046. Staff's modeling and analysis found that an allocation of 20% to the ACWI LCT Index could be introduced while maintaining a reasonable level of risk to the Fund. Staff recognize that the inputs to this analysis – both in terms of the data available and the degree of assumptions involved – will refine and improve over time and as such, should be reviewed annually and as part of CalSTRS' traditional ALM process.

Allocating 20% of Public Equity to MSCI ACWI Low Carbon Target Index: Staff analyzed a range of scenarios to increase CalSTRS' Public Equity allocation to the ACWI LCT index. Using the net zero investment decision making process (described above) staff considered the impacts on risk, return, emissions and the CalSTRS funding plan and determined that phasing in a 20% allocation to the ACWI LCT index would reduce portfolio emissions in a risk-controlled manner. In alignment with the process staff and the IC use with the ALM framework, staff will develop an implementation plan and report back to the IC on this plan, should the recommendation be accepted. Implementation details will include the anticipated costs of the transition to the ACWI LCT index from current indexes, as well as the potential impacts to benchmarks and the risk budgets of the two Public Equity portfolios (GE and SISS). Staff will review the implementation plan for the allocation with the IC on an annual basis, as proposed in Recommendation 2.

***Recommendation 4: Integrate Climate Scenarios into the CalSTRS Asset-Liability Management (ALM) Study***

As noted above, staff's modeling of an allocation to the ACWI LCT index integrated a set of climate scenarios into CalSTRS' traditional ALM Framework. Staff recognizes that the robust integration of climate risk and climate scenarios into an ALM process is a burgeoning field requiring significant assumptions with high levels of uncertainty and without widely established market practices. Nevertheless, staff expects that CalSTRS will gain ongoing insights into future risk and return dynamics, and an enhanced understanding of liability-related risks, by starting to integrate climate scenarios into the ALM process, and most importantly, evolving the practice over time.

**Next Steps**

Should the IC approve the recommendations, staff will develop a detailed implementation plan to target a 20% allocation of the Public Equity portfolio to the MSCI ACWI Low Carbon Target Index. The allocation would represent a tangible step towards the CalSTRS net zero portfolio emissions pledge by 2050 or sooner by actively reducing Public Equity portfolio emissions by

approximately 14% from the baseline level of [emissions reported](#) at the May 2022 Investment Committee Meeting.

The implementation plan would guide staff in phasing in the allocation incrementally to transition a significant amount of public equity assets in a prudent, strategic and cost-effective manner and would follow the traditional process that staff and the IC use when making asset allocation decisions under the ALM framework. The implementation plan would be evaluated on an annual basis as part of the IC's regularly scheduled net zero progress updates to allow for discussion regarding the allocation and its pacing. Staff suggests that these annual updates begin in May 2023 and cover additional updates to the following components of the emissions reduction strategy:

- Public markets carbon emissions exposure
- Emissions reduction progress
- Development of net zero 'transition tracker'
- Integration of climate scenarios into the ALM Study

## **Background**

As highlighted in the [May 2022 Investment Committee Net Zero Strategy item](#), staff has developed three core strategies for implementing the CalSTRS net zero portfolio emissions pledge: (1) reducing portfolio exposure to carbon emissions, (2) increasing exposure to low-carbon investments, and (3) using our influence to accelerate the integration of net zero considerations across global financial markets to promote an orderly and just transition.

While this Action item focuses on activities to reduce portfolio emissions, updates on our activities to grow investments in low-carbon solutions and drive net zero adoption in the financial markets are updated in a companion Information item that is part of the August/ September 2022 IC agenda.

Staff believes that there are two primary levers that CalSTRS can utilize to reduce portfolio emissions in alignment with our net zero pledge: (1) use our influence as a large global investor to accelerate meaningful integration of net zero considerations and emissions reductions across the global financial markets and the companies that we invest in and (2) make active investment decisions that reduce portfolio emissions. This Background section focuses on the second lever, specifically relating to the investment decision discussed in [Recommendation 3](#). Given the complexities involved and the multiple analyses that staff conducted to support it, the rationale and analyses have been broken into four distinct steps – and supporting attachments – for ease of navigation.

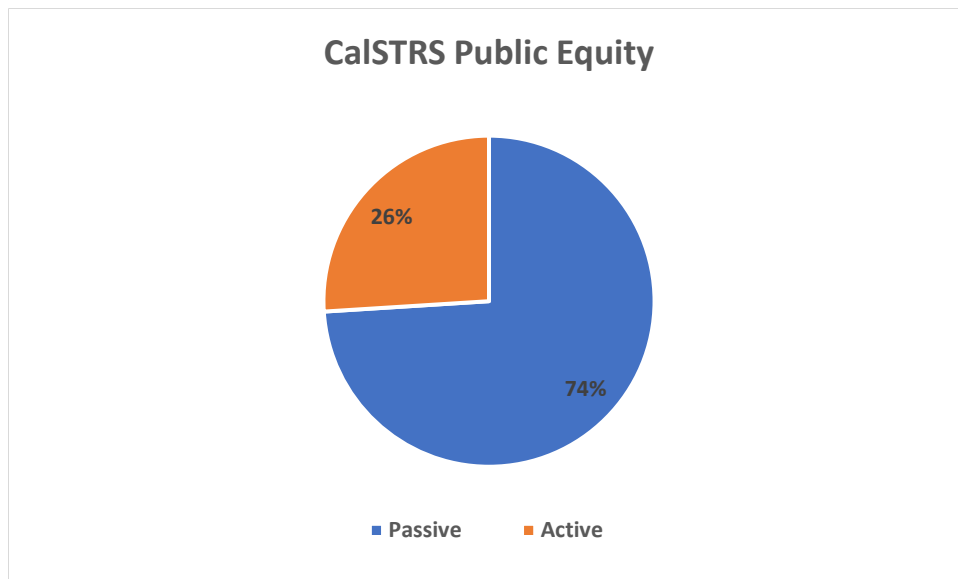
### **Step 1: Prioritizing Emissions Reductions in Public Equity**

As 42% of the total CalSTRS portfolio is invested in Public Equity, staff believes that the most meaningful way to reduce CalSTRS total portfolio emissions, in alignment with the net zero pledge, would be to focus initially on this asset class. Staff has also been evaluating strategies to reduce emissions in our Fixed Income portfolios and an update on these activities can be found in

the accompanying Information item. Staff also considered the availability of meaningful data across asset types and recognized that data on emissions measurement and management is far more developed in the Public Equity markets further supporting the decision to initially focus on emissions reduction opportunities within this asset type.

As a starting point, it is important to understand the current structure of the CalSTRS Public Equity portfolio. Chart 1 shows that as of June 30, 2022, most of CalSTRS Public Equity assets (74 %) are passively managed. CalSTRS invests passively in the global equity market segments that are highly efficient and are therefore difficult for active managers to outperform the index. This approach allows for significant cost savings of investment management fees for the Total Fund. Ninety-two percent of Public Equity assets are managed in the GE team and eight percent are managed in the SISS team.

**Chart 1: CalSTRS Public Equity Active-Passive Management**



Given CalSTRS existing large passive allocation, and the availability of data in Public Equity markets, a low-carbon passive index would be the most appropriate strategy for the Public Equity portfolio to achieve meaningful carbon emission reductions. A passive index portfolio could be managed internally by staff and would allow for a cost-effective integration and a transition that could be phased in appropriately over time. Additionally, as low-carbon index portfolios have been utilized by investors for many years, including within the CalSTRS portfolio, there is significant data and analytics that can be used to facilitate a measured, risk-controlled expansion of a low-carbon index portfolio.

**Step 2: Selecting the MSCI ACWI Low-Carbon Target Index**

After determining the need for a passive index solution, staff researched and evaluated the low-carbon index universe and chose to consider a variety of indexes that represent a broad range of

index construction options. Since the CalSTRS policy benchmark is based on the MSCI ACWI IMI, staff narrowed the evaluation to MSCI's suite of low-carbon indexes:

- **MSCI ACWI Low Carbon Target (LCT) Index**: Aims to achieve a maximum carbon exposure reduction, while minimizing the active risk relative to the parent index. This is CalSTRS' current low-carbon index within the SISS Public Portfolio. More details on the ACWI LCT Index can be found in the **Optional Reference Material** section of this item.
- **MSCI ACWI Climate Change Index**: Increases exposure to companies participating in opportunities associated with the low-carbon transition and decreases exposure to companies exposed to risks associated with the transition.
- **MSCI ACWI Climate Paris Aligned Index**: Designed to address climate change in a holistic way to minimize exposure to physical and transition risks of climate change and increase target exposure to sustainable investment opportunities.
- **MSCI ACWI ex Fossil Fuels**: Designed to represent the performance of the broad equity market, while excluding companies that own oil, gas and/or coal reserves.
- **MSCI ACWI ex Top 100 (custom)**: This index was created by the CalSTRS Global Equity unit to expand our analysis by excluding the top 100 global carbon emissions emitters from the MSCI ACWI index.

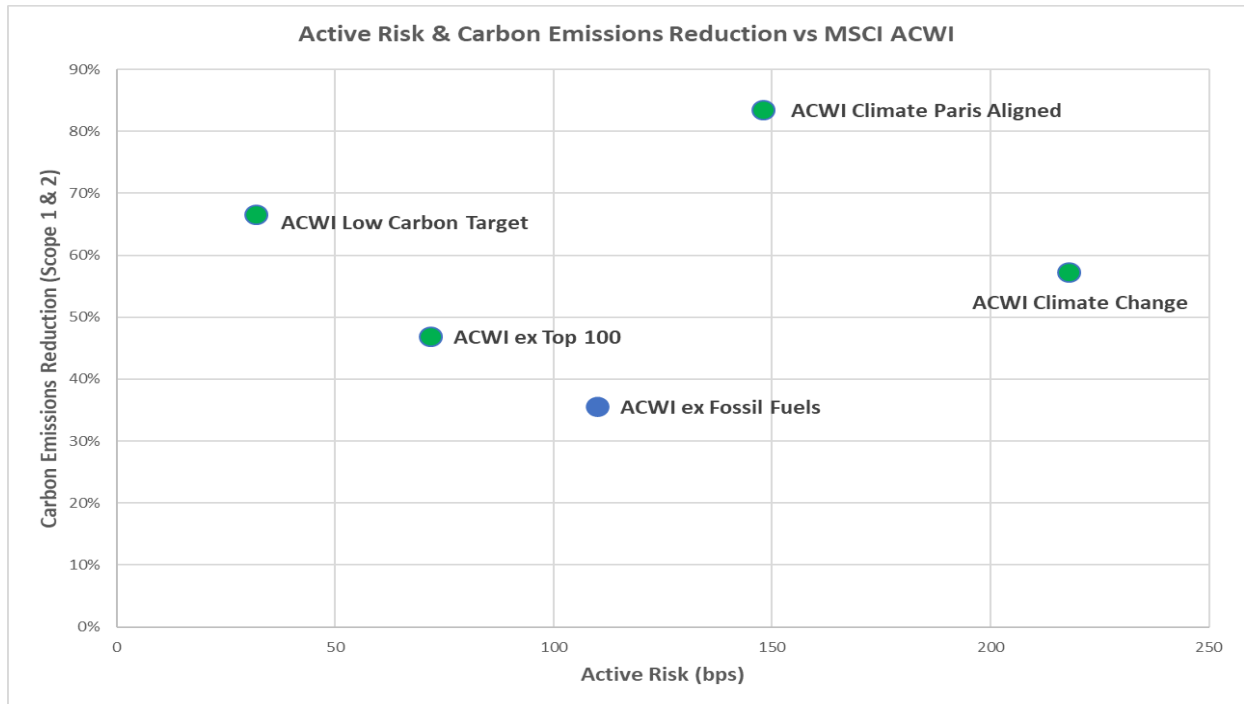
Using the GE team's risk management system (Barra on FactSet) and MSCI's carbon measurement platform, staff calculated the active risk<sup>2</sup> and carbon emission reduction (Scope 1 & 2; Scope 3 data remains too limited) for each index relative to its parent, MSCI ACWI. As shown in Chart 2, the five indexes exhibited different risk and carbon emissions profiles. Higher active risk means the index performance deviates more from that of the broader MSCI ACWI index.

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<sup>2</sup> Active risk is being used synonymously with tracking error. Tracking error is the standard deviation of excess return.



## Chart 2: Comparison of Active Risk and Emissions Reductions



Sources: FactSet, Barra, MSCI ESG Manager as of 6/30/2022

These different index profiles can be summarized with the following observations:

- MSCI ACWI Low Carbon Target (ACWI LCT) – staff’s recommended index – has the lowest active risk and the second highest carbon emissions reduction.
- MSCI ACWI Climate Paris Aligned provides the most significant reduction in emissions, but with an elevated level of active risk.
- MSCI ACWI ex Fossil Fuels is the least effective in reducing carbon emissions.
- Out of the five indexes, MSCI ACWI Climate Change has the highest active risk and has the median carbon emissions reduction.

Another way to compare and evaluate these different low-carbon indexes is to calculate the **emissions reduction per unit of active risk**. Staff believe that this is an essential metric in determining the most effective investment strategies for CalSTRS to meet both our risk-return and emissions reductions goals. As shown in Table 1, the ACWI LCT index has a significantly higher ratio (more carbon emissions reduction per unit of risk), relative to the other indexes.

**Table 1: Emissions Reductions per Unit of Active Risk**

Index	Carbon Emissions Reduction (%)	Active Risk (bps)	Ratio
ACWI Low Carbon Target	67	32	2.1
ACWI Climate Paris Aligned	83	148	0.6
ACWI Climate Change	57	218	0.3
ACWI ex Fossil Fuels	36	110	0.3
ACWI ex Top 100	47	72	0.7

Sources: FactSet, Barra, MSCI ESG Manager as of 6/30/2022

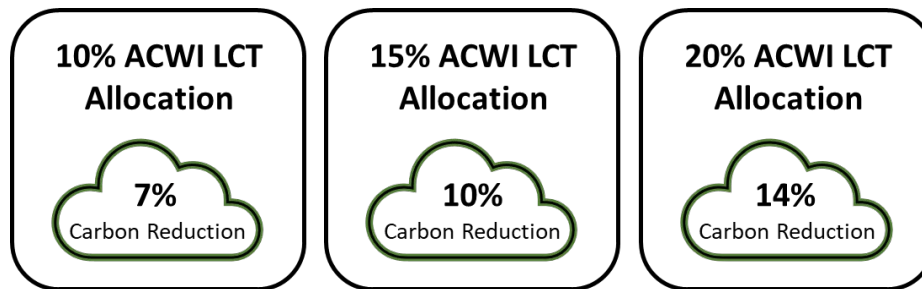
Out of the five indexes examined, staff views the ACWI LCT index as the most attractive low-carbon index choice for CalSTRS, since it has the highest carbon emissions reduction per unit of active risk, internal staff has experience managing a portfolio that replicates the index, and it has a long track record that has performed in-line with expectations. Furthermore, by continuing to provide broad sector and market exposure (but re-weighting exposures), the index supports CalSTRS integrated net zero strategy to leverage our proxy votes and engage companies across all economic sectors to reduce their emissions.

**Step 3: Allocating 20% of Public Equity to MSCI ACWI Low Carbon Target Index**

Staff’s next analyses involved determining possible allocations to the ACWI LCT index. Considerable time was spent analyzing the appropriate ACWI LCT allocation percentage range with the CIO ultimately recommending a 20% allocation. Staff’s analyses centered around two fundamental principles: (1) the range should represent an allocation that meaningfully reduces portfolio emissions, and (2) it is very difficult to forecast market behavior and how securities will be priced in the future is uncertain. Despite considering an up to 40% allocation, staff analysis showed that a 20% allocation to the ACWI LCT created a meaningful reduction in emissions yet still provided reasonable expectations that Public Equity returns could be preserved if low-carbon portfolios are not rewarded in the short run.

Using MSCI’s ESG Manager carbon emissions management platform, staff calculated the emissions reductions to Public Equity associated with three different allocations to the ACWI LCT index. As seen in Chart 3, by allocating 10%, 15%, and 20% to the ACWI LCT index, the estimated emission reductions are 7%, 10% and 14%, respectively, in the Public Equity portfolio.

**Chart 3: Emissions Reductions Resulting from Different Allocation Scenarios**



Source: MSCI ESG Manager as of 6/30/2022

Staff analyzed allocations up to 40%, and while those do not significantly change Public Equity’s overall active risk exposure, they do significantly change the composition of active risk within the portfolio. In other words, staff’s current *intentional* portfolio tilts to factors (such as value, size, and volatility) will be impacted and distorted. As such, the ACWI LCT allocation could override staff’s active decisions to generate excess return versus the policy benchmark which would be a negative consequence. Any allocation to the ACWI LCT would skew Global Equity’s portfolio characteristics, however, staff views allocations up to 20% to be manageable. Allocations greater than 20% would create undesirable exposures that would be sub-optimal for the GE portfolio.

**Step 4: Integrating MSCI ACWI Low Carbon Target Allocation and Climate Scenarios into ALM Framework to Model Impacts on Risk, Return and Funding Plan**

A material increase in the allocation to the ACWI LCT index is a long-term strategic decision. Staff therefore believe it is appropriate to use CalSTRS’ Asset-Liability Modeling (ALM) framework to analyze the costs and benefits of such an allocation in a way that aligns with CalSTRS’ approach to strategic asset allocation and the ALM Study completed every four years. ISR staff conducted an extensive analysis summarized in the following four steps and detailed further in Attachment 3, to determine that an allocation of 20% to the ACWI LCT index could be introduced while maintaining a reasonable level of risk to the CalSTRS Funding Plan and the goal of reaching full funding by 2046.

**4.1 CalSTRS ALM Framework and Climate Scenarios**

ALM Framework<sup>3</sup>: The Investments Branch and Actuarial Resources have developed a comprehensive framework to integrate strategic asset allocation decisions made by the Investment Committee with the [CalSTRS Funding Plan](#). This framework uses capital market assumptions – assumptions about risk and return of the portfolio – to determine liability-related risks, including the chance of reaching full funding by 2046 and the risk of higher contribution rates. These assumptions rely on a combination of models built by CalSTRS and a wide range of assumptions

<sup>3</sup> Refer to Attachment 1 for a brief overview of the CalSTRS ALM Framework.

developed by broader market participants. Staff modeled allocations to the ACWI LCT index using the same ALM process that is part of our traditional ALM study.

Climate Scenarios: To better understand the potential impacts to returns and funding associated with an increased allocation to the ACWI LCT index, staff integrated a range of future climate-related scenarios into our traditional ALM framework. After surveying the market and as a starting point, staff determined that the climate scenarios developed by the [Network for Greening the Financial System](#) (NGFS)<sup>4</sup> are currently the most referenced within the financial industry (despite the range of possible climate scenarios available to investors remaining very limited and there being multiple perspectives on how different scenarios are constructed). The NGFS describes its climate scenarios as a tool for better understanding risk:

*The NGFS partnered with an expert group of climate scientists and economists to design a set of hypothetical scenarios. They provide a common reference point for understanding how climate change (physical risk) and climate policy and technology trends (transition risk) could evolve in different futures. Each scenario was chosen to show a range of higher and lower risk outcomes.*

The NGFS scenarios comprise a range of outcomes that are broadly categorized as ‘Orderly’, ‘Disorderly’, and ‘Hot House World’.

**Chart 4: Overview of Six NGFS Climate Scenarios**

Category	Scenario	Physical risk		Transition risk		
		Policy ambition	Policy reaction	Technology change	Carbon dioxide removal	Regional policy variation <sup>+</sup>
Orderly	Net Zero 2050	1.5°C	Immediate and smooth	Fast change	Medium use	Medium variation
	Below 2°C	1.7°C	Immediate and smooth	Moderate change	Medium use	Low variation
Disorderly	Divergent Net Zero	1.5°C	Immediate but divergent	Fast change	Low use	Medium variation
	Delayed transition	1.8°C	Delayed	Slow/Fast change	Low use	High variation
Hot House World	Nationally Determined Contributions (NDCs)	~2.5°C	NDCs	Slow change	Low use	Low variation
	Current Policies	3°C+	None – current policies	Slow change	Low use	Low variation

- The ‘Orderly’ scenarios assume a quicker transition to net zero through policy action and investment. They also generally assume a higher degree of global policy coordination and that policies are developed across sectors of the global economy. These scenarios are assumed to result in lower physical risks from climate change.

<sup>4</sup> The NGFS is a network of 114 central banks and financial supervisors that aims to accelerate the scaling up of green finance and develop recommendations for central banks' role for climate change.

- The ‘Disorderly’ and ‘Hot House World’ scenarios assume a later transition (Disorderly) or no further transition beyond current policies (Hot House World). These scenarios tend to have much less global coordination and may affect certain industries differently. The ‘Hot House World’ scenarios result in much higher physical risks from climate change.

Source: NGFS

#### ***4.2 Integrating Climate Scenarios into ALM Assumptions***

The CalSTRS ALM framework uses capital market assumptions about risk and return in the future to model and understand liability-related risks related to the [CalSTRS Funding Plan and CalSTRS ability to reach full funding by 2046](#). These assumptions rely on a combination of models built by CalSTRS staff and a wide range of assumptions developed by broader market participants. They help staff simulate an enormous range of possible outcomes about the future to inform our asset allocation.

Staff determined that integrating the NGFS climate scenarios into our assumptions about the future (on top of traditional capital market assumptions), would further enhance our understanding of how climate change – and the world’s response to it – might impact risk and return. However, while the NGFS scenarios include a wealth of information about potential macroeconomic effects in each climate scenario, they do not include the types of granular return assumptions that staff traditionally use in the ALM framework.

To meet our need for more granular risk and return assumptions, that are absent in existing models, staff developed a set of risk and return assumptions to capture potential market outcomes in each climate scenario. For this analysis, staff used a mix of qualitative and quantitative tools to construct risk and return assumption for the different climate scenarios. These tools are discussed in Attachment 3.

#### ***4.3 Modeling ACWI LCT Allocations into ALM Framework with Climate Scenarios***

After integrating the NGFS climate scenarios into CalSTRS’ traditional ALM assumptions about the future (to the best of staff’s ability), staff analyzed the impacts of allocating 10%, 15% and 20% of the Public Equity portfolio to the ACWI LCT index to understand the possible impacts on risk, return, and liability metrics relating to the funding plan from these allocations.

Historically, CalSTRS has used a broad-market equity index as a strategic benchmark for Public Equity in the ALM. Targeting a specific allocation to the ACWI LCT enables a direct comparison of the benefits and opportunity costs associated with allocating to the ACWI LCT index relative to the prior practice of using a broad-market equity index. Staff developed a set of assumptions around the risk and return of the ACWI LCT index and climate risk scenarios, described further in Attachment 2.

Key takeaways from using the ALM framework, including the integration of the climate scenarios, to analyze the impacts of allocating to the ACWI LCT index include:

**Table 2: Allocation Impacts on Liability Metrics**

Liability Metric	Key Findings for a 20% Allocation
Assumed Rate of Return	No material changes to the assumed rate of return
Portfolio Growth Rates	Marginal increase in the risk for portfolio growth rates, especially for disorderly transitions and hot-house scenarios
Funding Levels	<p>Marginal risk to both the ability of reaching full funding by 2046 and the likelihood of seeing low funding levels</p> <p>* A more orderly transition, that takes place sooner, tends to be positive for funding risks with lower risk of low funding and lower risk of reaching full funding</p> <p>* Delayed or disorderly transitions and hot-house scenarios tend to be more negative for funding risks with higher risk of low funding and some risk to full funding under certain scenarios</p>
Contribution Rates	<p>No anticipated impact to the contribution rate for teachers</p> <p>None to minimal impact to the contribution rate for school districts</p> <p>Marginal risk to contribution rate levels for the State</p> <p>* A more orderly transition, that takes place sooner, tends to have less risk of changed contribution rate for the State</p> <p>* A delayed or disorderly transition tends to have more risk for increasing the State contribution rate with more near-term risk in a disorderly scenario and more long-term risk in hot-house scenarios</p>

Given the size of the recommended allocation, the risk-controlled nature of the ACWI LCT index, and the mechanics of the CalSTRS funding plan, staff concluded that allocating 20% of the Public Equity portfolio to the ACWI LCT index introduces modest benefits and opportunity costs to the Fund. Additional details are provided in Attachment 3.

#### **4.4 Risk Analysis Summary**

The six NGFS climate scenarios that staff considered represent a broad range of possible climate outcomes and provide a useful structure for analyzing portfolio impacts associated with possible paths of the transition to a low-carbon economy.

However, the robust integration of climate risk and climate scenarios into an ALM process like CalSTRS' is a burgeoning field without widely established market practices. As a result, this analysis relies on multiple assumptions with high levels of uncertainty about future levels of risk, return, the pace of transition to a low-carbon economy, market innovations and adaptation (transition risks), and physical climate risk, among other sources of uncertainty.

Staff is confident that the process used to analyze risk and return from expanding an allocation to the ACWI LCT index – by combining judgement about how the market might react under these different climate scenarios with the robust and well-established analytical framework of the ALM – is sound. Staff's conclusion is that an allocation of 20% to the ACWI Low Carbon Target Index could be introduced while maintaining a reasonable level of risk to the Fund. Furthermore, staff believes that adopting an annual cycle to review all items of the net zero strategy (including this recommended allocation) would allow CalSTRS the flexibility to adapt the strategy as emissions data and climate scenarios information improve, and as the world's path to net zero (e.g., policy change, technology breakthrough) continues to evolve.

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#### **Strategic Plan Linkage:**

One of the five objectives of the current CalSTRS Strategic Plan is to operationalize sustainable investment beliefs to create long-term value. A three-year progress indicator is that CalSTRS defines appropriate portfolio carbon measurements and sets interim emission reduction targets that meet the Fund's risk-return profile.

#### **Board Policy Linkage:**

The development of the Investment Committee Work Plan and setting annual objectives/projects is covered by the [Board Governance and Administration Policy](#), Teachers' Retirement Board Policy Manual, Section 500, page 17. CalSTRS net zero emissions pledge by 2050 or sooner, and the accompanying timeline and activities are part of the Investment Committee Work Plan.

This item is also covered as part of the CalSTRS Low-Carbon Investment Belief:

*Investment risks associated with climate change and the related economic transition—physical, policy and technology driven— materially impact the value of CalSTRS' investment portfolio.*

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**Optional Reference Material:**

**Attachment 1:** CalSTRS Asset Liability Management (ALM) Study Fact Sheet

**Attachment 2:** Low Carbon Index Modeling Assumptions

**Attachment 3:** Low Carbon Index Modeling Risk Analysis

Primers/ Background on the MSCI ACWI LCT Index:

- [MSCI Low Carbon Indexes](#)
- [MSCI ACWI Low Carbon Target Index Factsheet](#)
- [MSCI ACWI Low Carbon Target Index Methodology](#)