

10th
Annual Report

GREEN INITIATIVE TASK FORCE

.....
*2016 Annual Report
period ending June 30, 2016*

HIGHLIGHTING

CalSTRS environmental-themed
investments and environmental
risk-management efforts



MISSION

To manage the risks and capture the opportunities associated with global sustainability issues by identifying environmentally focused strategies intended to enhance the risk-adjusted returns of the CalSTRS Investment Portfolio.

–CALSTRS INVESTMENTS BRANCH

September 1, 2016

Dear Reader:

I am pleased to present the 10th annual report from the CalSTRS Green Initiative Task Force, "The Green Team," detailing the Investments Branch activities surrounding environmental risk management and opportunity capture. This report reflects CalSTRS' recognition that environmental issues affect the performance of the CalSTRS Investment Portfolio across companies, sectors, regions and asset classes. The increasing importance of environmental considerations in investing has rarely been more evident than it is today. We are routinely being made aware of environmental-related events that impact society and the economy.

CalSTRS has long advocated for the need for companies to provide integrated reporting to investors. It is important that corporate disclosure brings together information on both the financial and non-financial aspects of company operations. There is no question that many companies are still not providing a sufficient level of sustainability-related disclosure and that this disclosure is needed to comprehensively assess risk and properly value investments. However, simply providing more disclosure is not the solution. Companies need to provide the right disclosure—disclosure on environmental, social and governance issues that present significant, material risks to corporate value.

Earlier this year, CalSTRS staff formally commented to the U.S. Securities and Exchange Commission on its concept release surrounding Business and Financial Disclosure Required by Regulation S-K. CalSTRS staff emphasized that the SEC should focus on requiring industry-specific standardized metrics to disclose material ESG information, requiring robust discussion of an issuer's industry-specific, long-term ESG risks and opportunities. CalSTRS believes that the use of industry-specific sustainability accounting standards, such as those developed by the Sustainability Accounting Standards Board, will help public corporations simplify their ESG disclosures, while providing valuable information to investors.

CalSTRS believes that constructive engagement is a best practice means of influencing a company's behavior. For many years, CalSTRS has engaged companies on providing an appropriate level of ESG disclosure on issues such as greenhouse gas emissions, energy efficiency and water use management, and to provide that disclosure in a way that is most meaningful to investors. Going forward, CalSTRS intends to make integrated reporting a part of our engagement with companies on ESG issues and encourage them to look at the SASB standards and work to integrate material ESG information into their financial reporting.

I thank you for taking the time to consider this report, and I encourage you to join us and our collaborative partners as we promote environmental risk management and investment awareness throughout the global financial markets.

Sincerely,



Christopher J. Ailman
Chief Investment Officer
CalSTRS

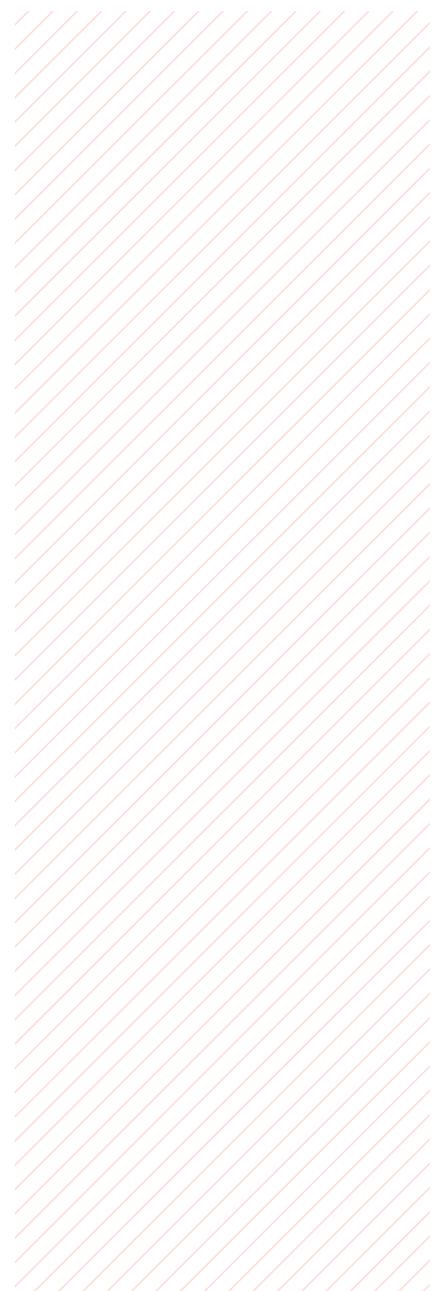
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CALSTRS INVESTMENTS COLOR GUIDE

 CalSTRS	 Real Estate
 Global Equity	 Private Equity
 Fixed Income	 Inflation Sensitive





RISK MANAGEMENT

As directed by the Teachers' Retirement Board, Investments Branch staff has developed techniques and tools designed to mitigate the level of environmental risk the CalSTRS Investment Portfolio faces. As a large, diversified global investor, CalSTRS needs to be mindful that it is exposed to a variety of environmental risks and therefore must engage financial market participants who might influence risk within markets that CalSTRS invests in.

CalSTRS works with its external managers to recognize and manage environmental risks. Direct engagement with portfolio companies is also an important and effective means of managing risk, and CalSTRS is very active in this area. CalSTRS also understands that working collaboratively with other investors is an excellent way to broaden engagement reach and strives to partner with others whenever possible.

Being active owners and voting proxies also helps reduce risk. CalSTRS routinely submits environmental-related shareholder proposals to companies held in its Public Equity Portfolio to raise their level of environmental risk awareness. Staff also considers and votes all environmental-related proposals in a manner that aligns with CalSTRS' objectives of improving disclosure and mitigating risk.

21 RISK FACTOR COMMITTEE

When any manager, internal or external, is making an investment decision on behalf of CalSTRS, the manager must consider the CalSTRS 21 Risk Factors. The risk factors are also part of the continuous diligence process staff undertakes with existing investments and investment managers. CalSTRS' external fund managers are regularly queried on how they are factoring these risk factors into investment decisions made on behalf of CalSTRS.

CALSTRS ENVIRONMENTAL, SOCIAL AND GOVERNANCE RISK CONSIDERATIONS

Environmental Risk Consideration

The risk associated with an investment's long-term profitability from activities and exposure to environmental matters, such as depleting or reducing air quality, water quality, land protection and usage, without regard for remediation. Consideration should be given to how a company is dealing with the impact of climate change, including whether the government is taking steps to reduce its impact or exacerbate the problem, or is oblivious to the risk.

CalSTRS staff recognized that developing a set of ESG risks and ESG risk management procedures was not enough to ensure an appropriate level of risk management. A process needed to be developed that would allow CalSTRS' ESG risk management procedures to be implemented.

To that end, Investments staff developed the 21 Risk Factor Review Committee. This committee, led by the CalSTRS Chief Investment Officer and composed of senior staff representatives from each asset class, help the CIO evaluate exposure to ESG-related risks, and take appropriate actions to ensure that external and internal managers adhere to CalSTRS policy surrounding the management of ESG risk exposure.



CALSTRS ENVIRONMENTAL, SOCIAL AND GOVERNANCE RISK MANAGEMENT PROCEDURES

When faced with a corporate decision that violates the CalSTRS 21 Risk Factors, at the direction of the Teachers' Retirement Board's Investment Committee or at the discretion of the CIO, the Investments staff will directly engage management to seek a change in that corporate behavior in the following manner.

1

CalSTRS will actively engage, in a constructive manner, corporate management whose actions are inconsistent with this policy. All forms of engagement are used, including letter writing, meetings, participation in advocacy groups, media campaigns and proxy voting.

2

After all reasonable efforts have been made to constructively engage corporate management and there is a clear nexus between the corporate behavior and the CalSTRS policy violation and, in the CIO's opinion, the corporate remedies are insufficient or nonresponsive, CalSTRS will inform its active investment managers that to the extent suitable alternate investments are available and their inclusion in the portfolio would result in no diminution in portfolio return or increase in risk, the managers will invest in these alternatives until the CalSTRS policy violations cease.

3

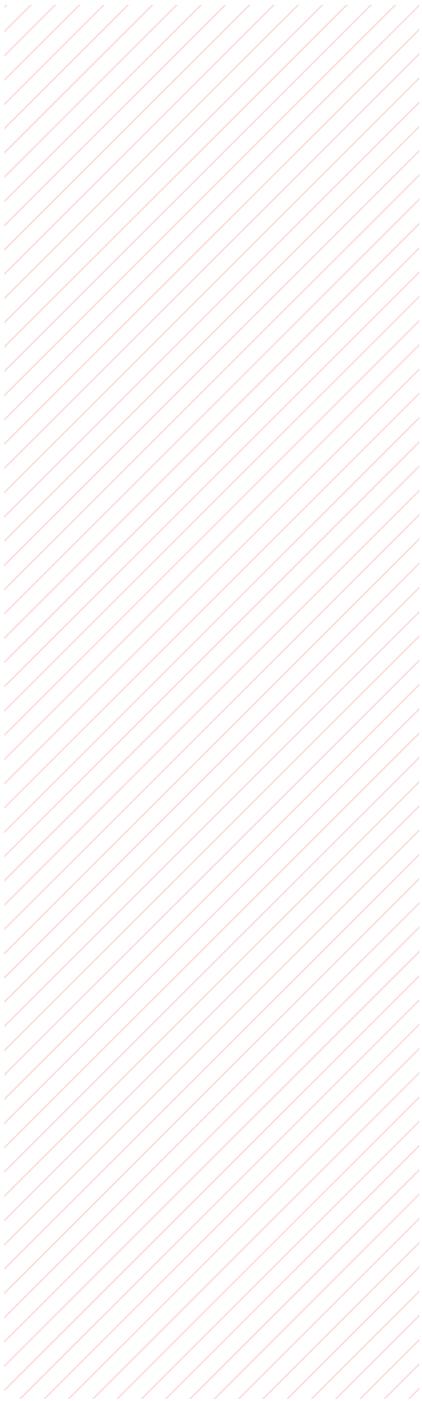
Upon remedy of the policy violation, CalSTRS will inform the active investment managers and passive managers that the securities can be purchased and report this action in writing to the Investment Committee.

Environmental risk consideration is part of the CalSTRS 21 Risk Factors and during fiscal year 2015–16, the committee considered environmental-related issues that potentially violated the 21 risk factors. The principal environmental issue staff considered was CalSTRS' exposure to fossil fuels

companies and if, or to what degree, the activities of these companies presented a material risk to the CalSTRS Investment Portfolio. Presently staff is still evaluating the portfolio's exposure to fossil fuels and continues to engage companies involved in fossil fuel exploration and production.



GLOBAL EQUITY EXTERNAL MANAGER ENGAGEMENT



Background and Responses

Since 2010, all of the Global Equity external investment managers have been polled annually to assess the level of climate considerations in their respective processes. From 2010 through 2012, the question asked was:

1. **Do you explicitly incorporate climate risk into your process?**

Beginning in 2012, the following additional question was asked of the Global Equity external managers:

2. **Have you taken steps to better incorporate climate risk into your investment process since last year?**

Starting in 2013, the Global Equity external managers were also asked:

3. **Is your organization a UNPRI Signatory?**

In 2016, the Global Equity external managers were also asked:

4. **Do you consider the carbon profile of a company when making investment decisions?**

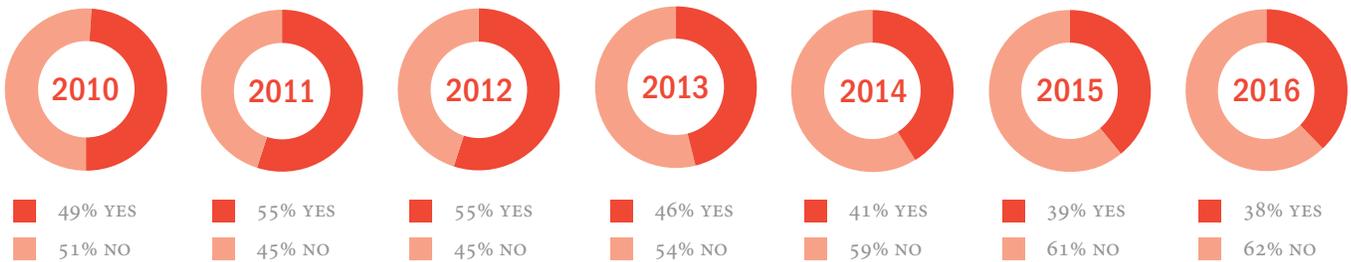
Also in 2016, the Global Equity external managers were asked the following questions that went beyond a binary (Yes/No) response:

5. **If you have better incorporated climate risk into your investment process, what steps have you taken?**
6. **If you do not consider a company's carbon profile, what might cause you to start considering it?**



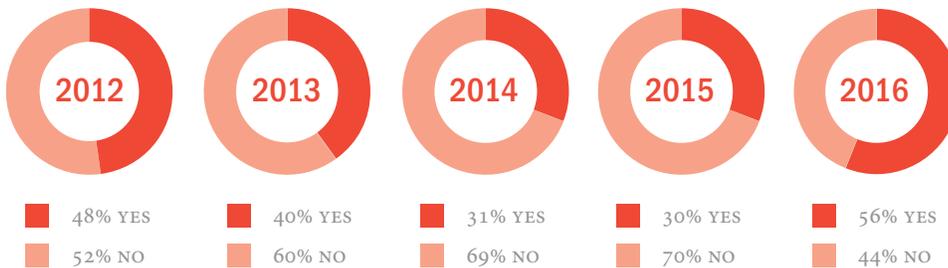
1. DO YOU EXPLICITLY INCORPORATE CLIMATE RISK INTO YOUR INVESTMENT PROCESS?

In response to the question of incorporating climate change into investment consideration, **for 2016, 38 percent of the Global Equity external managers indicated that they incorporated climate change into their processes.** The following chart provides a historical perspective of external manager responses to this question:



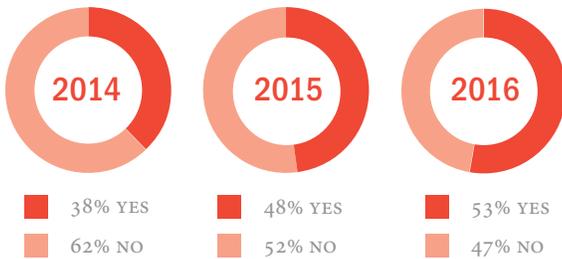
2. HAVE YOU TAKEN STEPS IN 2015-16 TO BETTER INCORPORATE CLIMATE RISK INTO YOUR INVESTMENT PROCESS?

In response to the question of whether managers had taken steps to better incorporate climate risk over the past year, **for 2016, 56 percent of the Global Equity external managers reported that they had.** The following chart provides a historical perspective of external manager responses to this question:



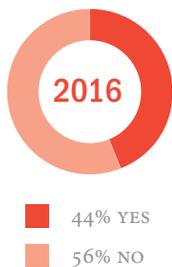
3. IS YOUR ORGANIZATION A UNPRI SIGNATORY?

In response to the question of whether external managers were signatories to the United Nations-supported Principles for Responsible Investment initiative **for 2016, 53 percent of external managers indicated that they were signatories.** The following chart gives a year-over-year comparison for this question:



4. DO YOU CONSIDER THE CARBON PROFILE OF A COMPANY WHEN MAKING INVESTMENT DECISIONS?

In response to the question of whether external managers considered the carbon profile of a company when making investment decisions, **for 2016, 44 percent of external managers indicated that they had.**



Analyzing the Results

Over the past four years, the percentage of managers who explicitly incorporate climate change risk into their investment process has dropped considerably, down to a low of 38 percent in 2016. This would seem to indicate that far fewer managers believe climate change is a material risk.

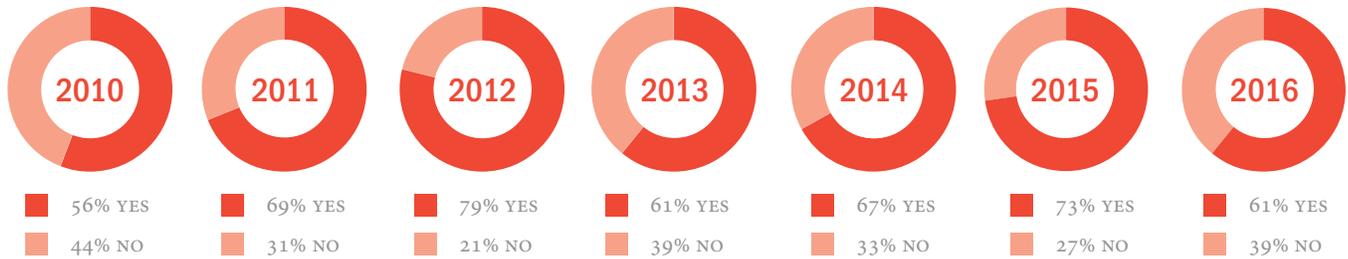
However, the responses to the question of whether managers had taken steps to better incorporate climate risk into their investment process rose considerably over the past year. Between 2014 and

2015, an average of 31 percent of the Global Equity external managers reported that they had. Remarkably, for 2016, 56 percent of the Global Equity external managers reported that they had. This dramatic increase may demonstrate that though Global Equity external managers are cognizant of climate risk, they believe that this risk is either not material or will not be realized soon enough to incorporate it explicitly into their investment process at this time.

Further analysis of these numbers shows that the recent decline in managers who incorporate climate change risk in their investment process continues to come from U.S.-based external managers.

NON-U.S. BASED MANAGERS INCORPORATING CLIMATE CHANGE RISK 2010-2016

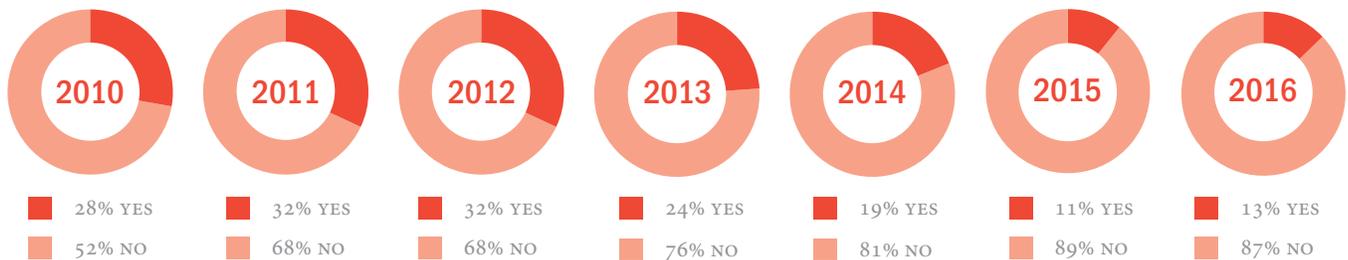
The following chart shows the percentage of non-U.S. based managers who were incorporating climate change risk between 2010 and 2016.



As the chart shows, the number of non-U.S. managers incorporating climate change risk has vacillated over the years but remained well above a majority of managers.

U.S. BASED MANAGERS INCORPORATING CLIMATE CHANGE RISK 2010-2016

The following chart shows U.S. manager response to the same question over the same time period.

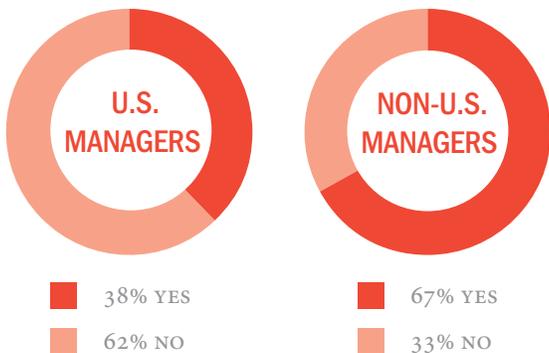


As the chart shows, the number of U.S.-based managers incorporating climate change considerations peaked at 32 percent in 2011 and 2012 before falling back to this year's 13 percent.

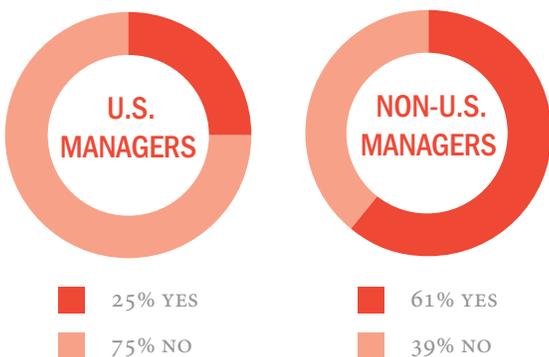
The response associated with question 2 demonstrates the greatest level of homogeneity across geographical orientation. Collectively, 56 percent of managers indicated that they had taken steps to better incorporate climate risk when making investment decisions over the past year. Breaking down this data, we find that about 44 percent of U.S. managers had taken steps to better incorporate climate risk while about 67 percent of non-U.S. managers had taken steps to better incorporate climate risk.

There appears to be significant regional variance surrounding questions 3 and 4. In 2016, two-thirds of non-U.S. managers surveyed indicated they were PRI signatories and 61 percent considered the carbon profile of a company when making investment decisions. Conversely, in 2016, just over one third of U.S. managers surveyed indicated they were PRI signatories while an overwhelming majority did not consider the carbon profile of a company when making investment decisions.

AS OF 2016, WERE YOU A PRI SIGNATORY?



DO YOU CONSIDER THE CARBON PROFILE OF A COMPANY WHEN MAKING INVESTMENT DECISIONS?



This regional variance in responses to questions 3 and 4 is likely explained by the variance in investor attitude associated with environmental risks, particularly climate change risk, in the U.S. and abroad. U.S.-based investors do not seem to put as much emphasis on environmental risk integration as their non-U.S. counterparts and this divergence of attitudes is likely reflected in the managers that serve each of these regions.

When viewed from a policy perspective, the variances in these responses are not surprising. U.S. reticence to adopt climate change-related policies and regulations likely lessen the perceived investment risks associated with climate change. Conversely, regions outside the U.S., particularly Europe, have adopted policies and regulations surrounding carbon emissions and clean energy generation, likely influencing the perceived risk levels associated with high carbon and clean energy investment. Another contributing factor to the variance between U.S. and non-U.S. managers can be due to the difference in investment strategy types between the different regions.

CORPORATE ENGAGEMENT



Carbon Risk Engagement

Much of CalSTRS' work on carbon risk during fiscal year 2015–16 was in collaboration with fellow members of the [Investor Network on Climate Risk](#), a Ceres-led investor group that focuses on managing climate change risks. This engagement effort focused on how fossil fuel producing companies were considering issues, such as expected future energy demand, anticipated future prices of oil and gas, introduction of new technologies and potential regulatory impacts, when making decisions on allocating substantial shareholder capital to new exploration projects that will take many years, if not decades, to achieve profitability.

CalSTRS joined many other institutional investors in this engagement, which was focused on approximately 45 companies held in the CalSTRS Global Equity Portfolio. CalSTRS' holdings in these companies have a combined portfolio value of approximately \$4 billion. During fiscal year 2015–16, staff led or participated in engagements with Exxon Mobil, Chevron and Apache Corporation.

Signatory of:



Hydraulic Fracturing Engagement

CalSTRS staff has been engaging portfolio companies involved in oil and natural gas exploration and production for many years because these companies are exposed to significant environmental risks. Staff believes it is important to engage these companies to ensure that their environmental risk exposure is being properly managed.

During fiscal year 2015–16, CalSTRS continued to be part of a [Principles for Responsible Investment](#)-led collaborative engagement of oil and natural gas producing companies that focused on the risks associated with hydraulic fracturing. CalSTRS is a signatory to the PRI and often joins PRI collaborative engagements that align with CalSTRS' long-term, value accretion philosophy.

This engagement focused on 56 companies held in the Global Equity Portfolio. CalSTRS' holdings in these companies have a combined portfolio value of approximately \$3.9 billion. Though this specific engagement and the development of a related report will conclude by the fall of 2016, staff expects to continue to engage a number of these companies throughout the 2016–17 fiscal year.



Energy Productivity Index for Companies

A new engagement [guide](#) developed by [ClimateWorks Australia](#) analyzes the energy productivity of industrial companies across six key sectors. The *Energy Productivity Index* measures the potential benefits, in terms of earnings growth, that are derived from improving energy efficiency and energy productivity. This tool allows investors to consider which companies in their portfolios might be best positioned to benefit from a conversation on energy use management.

Understanding the potential for energy productivity improvements to contribute to both the financial growth of investor portfolios and greenhouse gas emissions reduction, CalSTRS participated as lead investor in the project. Staff was able to bring an institutional investor perspective to the development of the index and use it to help frame engagement efforts around energy efficiency.

CalSTRS staff worked to engage seven companies in the airline, automobile, chemical, paper and steel sectors. The engagement proved beneficial as staff's intent was to develop long-term dialogues on energy use measurement and management efforts, disclosure of energy use management, and incorporation of efficiency considerations into executive planning and board oversight.

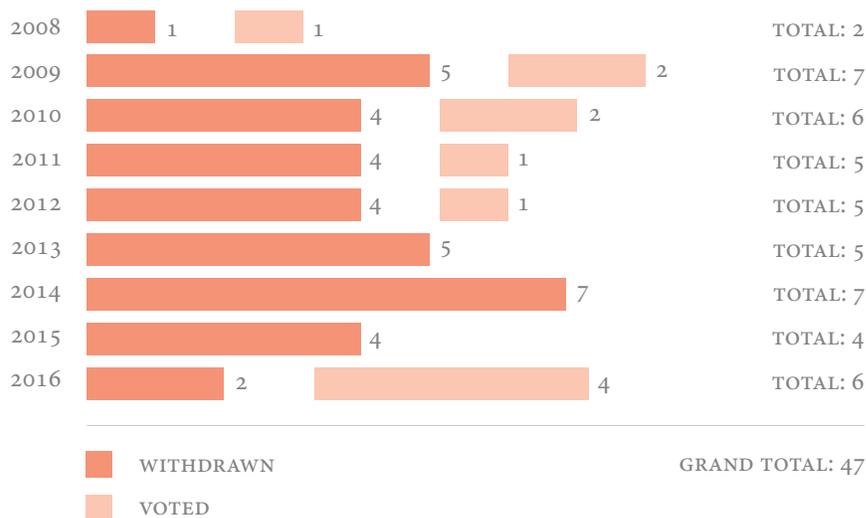
CALSTRS ENVIRONMENTAL RISK SHAREHOLDER PROPOSALS

When staff believes that a company is not willing to make the necessary progress toward managing environmental risks, staff will strongly consider exercising CalSTRS' equity ownership rights by filing a shareholder proposal with the company, calling on it to improve its environmental risk management efforts. The intent of the proposal is to bring CalSTRS' concerns to the company's shareholders and generate enough support from the investor base to convince the company to commit to CalSTRS' recommendations. Often times, the filing of a proposal will increase a company's willingness to engage further with staff and lead to a committal to improve risk management and disclose.

Since 2008, CalSTRS has filed 47 environmental-related shareholder proposals that called on companies to improve their environmental risk management disclosure efforts. Of those proposals, 36 were ultimately withdrawn before the annual meetings as staff was able to negotiate a mutually agreeable outcome with the company. The 11 proposals that have been voted on by shareholders have received, on average, approximately 28 percent support.

For the fiscal year 2015–16 proxy season, CalSTRS filed six shareholder proposals that called on selected oil and gas companies to report on how they are monitoring and managing the level of methane emissions from their operations. Companies in the oil and gas industry were targeted for engagement this year

CALSTRS ENVIRONMENTAL SHAREHOLDER PROPOSALS FILED 2008–2016



as the industry presents tremendous opportunities to strengthen its methane emissions risk management strategy. Engagement candidates were identified through an analysis of companies within the CalSTRS Russell 3000 Index that had a potentially material fugitive methane emissions risk. The level of disclosure of methane risk management strategy combined with an assessment of the potential leakage rate—the amount of methane leaked per unit of equivalent production—were the driving factors behind which oil and gas companies were ultimately engaged.

Staff identified 14 oil and gas companies that were believed to be most in need of engagement on implementing and disclosing their methane emissions risk management strategy efforts. Staff sent engagement letters to these 14 oil and gas companies which, at the time of the analysis, had a combined portfolio value of approximately \$653 million. The

engagement letters outlined CalSTRS' belief that companies need to be aware of evolving U.S. Environmental Protection Agency regulations, that incorporating methane emissions risk management initiatives into business plans would be beneficial from a financial and reputational perspective, and that disclosure surrounding the company's efforts at preventing fugitive methane emissions could be improved.

Ten of the 14 targeted oil and gas companies responded to staff's engagement letter and ultimately met and had a dialogue with CalSTRS staff. Eight of these 10 companies demonstrated a commitment to enhancing their risk management activities or at least improving their disclosure of their methane emissions risk management efforts.

The six oil and gas companies that received proposals were either those that did not respond to CalSTRS' engagement letter or those that were determined to be more

likely to respond positively to the receipt of a proposal. Staff's analysis proved correct as, subsequent to receiving our shareholder proposal, two additional companies chose to engage CalSTRS and demonstrated

a commitment to enhancing their risk management activities or at least improving their disclosure of their methane emissions risk management efforts. For this reason, two of the proposals were withdrawn and

four went to a vote, with two proposals receiving more than 40 percent of shareholder support.

PROXY VOTING

Voting corporate proxies is a fiduciary responsibility and an important way to manage the risks associated with public equity ownership. The responsibility for voting CalSTRS proxies has been delegated by the Teachers' Retirement Board to staff. The [CalSTRS Corporate Governance Principles](#) are guidelines that staff uses to assist in making proxy vote decisions. Appendix A to the principles is the Statement of Shareowner ESG

Responsibility, which provides direction in determining how ESG-related proposals should be considered. The board regularly reviews, revises and approves the CalSTRS Corporate Governance Principles.

Over the course of any fiscal year, staff considers dozens of environmental-related shareholder proposals that cover a variety of issues and ask for varying levels of action. Environmental proposals cover issues such as greenhouse gas emissions, energy efficiency, waste disposal and

recycling. These proposals request actions such as report preparation, establishing emissions targets, and setting waste reduction goals. During the 2015–16 fiscal year, CalSTRS considered 112 environmental proposals, supporting 40 of them and voting against 72. The table below provides a breakdown of the various issues considered and the votes cast per issue.

ENVIRONMENTAL PROPOSALS VOTED, JULY 1, 2014–JUNE 30, 2016

Issue Description	Votes per Issue	Votes For	Votes Against
Comprehensive Recycling Strategies	3	0	3
Bioengineering/Nanotechnology Safety	5	0	5
Formation of Environmental/Social Committee of the Board	6	0	6
Misc. Energy/Environmental Issues	14	5	9
Environmental Issue	9	0	9
Phase out of Nuclear Power	13	0	13
Report on Environmental Performance	1	0	1
Report/Action on Climate Change	18	9	9
Reporting and Reducing Greenhouse Gas Emissions	11	5	6
Review Energy Efficiency & Renewables	6	0	6
Review Nuclear Facility/Waste	1	0	1
Sustainability Report	25	21	4
Total	112	40	72
Percentage		36%	64%

The vote percentages in the preceding table reflect CalSTRS' desire to support proposals that staff believes will add value to the investment. The environmental proposals not supported were considered to be lacking shareholder value or were substantially involving the day-to-day management of the company. Traditionally,

CalSTRS supports proposals that call for improved environmental risk reporting, unless CalSTRS believes that the company already adequately discloses these risks. Generally speaking, CalSTRS does not support environmental proposals intended to substitute for management's operational judgments. CalSTRS believes

that companies should be managing environmental risk but also believes that companies should be the ones to decide how to design and implement risk management systems.

MERCER CLIMATE CHANGE RISK ANALYSIS



Background

For more than a decade, the Teachers' Retirement Board has directed staff to make climate change risk management a major focus of their risk management efforts. CalSTRS has developed policies and programs that manage risks associated with climate change and allow staff to take advantage of investment opportunities associated with the movement toward a low carbon economy. Being a partner in the Mercer climate change asset allocation study allowed CalSTRS to expand its climate change risk management efforts to the asset allocation arena, an area historically not considered when analyzing climate change impacts.

Staff's efforts around climate change risk management have also included raising awareness of the potential impacts to investments from climate change and encouraging other investors to be integrating climate change awareness into their investment policies and processes.

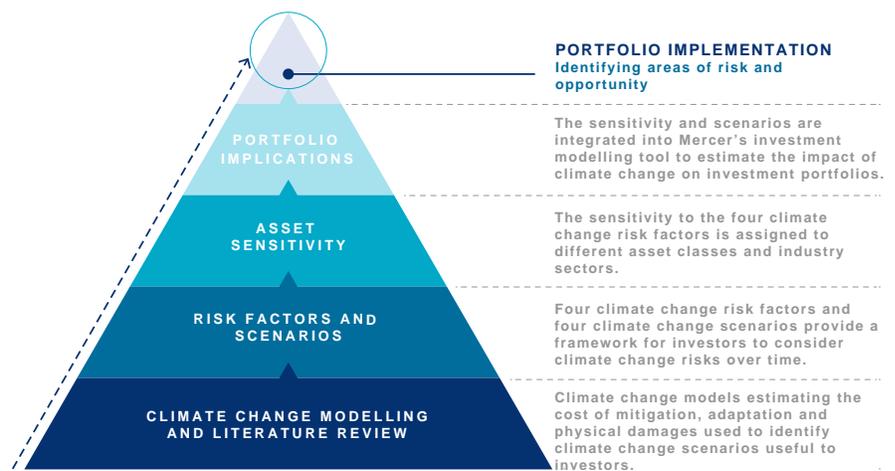
The Mercer study yielded a free-to-the-public report, *Investing in a Time of Climate Change*, that detailed the study's methodology and findings. As a study participant, CalSTRS was able to contribute to this unique analysis around potential climate change impacts on assets.

Additionally, CalSTRS was part of a similar climate change study conducted by Mercer in 2011. The conclusions raised in that study, particularly that the impacts to assets due to climate change would be better understood over time, encouraged staff to revisit the potential impacts on assets due to climate change.

Since 2011, more analysis around GHG emissions and climate change has been produced and more governments have implemented carbon emissions regulations and mandates.

Methodology

The analysis conducted by Mercer consisted of four parts: development of plausible climate change scenarios; determining climate change-related risk factors that impact assets; modeling the risk factors impacts on assets; and applying the impacts to an investment portfolio. The following graphic shows Mercer's climate change risk modeling process.



Source: Mercer

SCENARIO DEVELOPMENT

Four climate change scenarios were developed that were derived from existing climate change models and are largely based on the degree to which society responds to climate change through policy implementation and mitigation actions. The following table highlights these scenarios.

Scenario	Scenario Expectations	Expected Global Temperature Rise
Transformational	Swift change to low carbon economy Short-term market volatility Unaware investors caught offguard	2 degrees Celsius
Coordination	Mitigation efforts cohesive and aligned Well-defined policy actions Change more measured: time to respond	3 degrees Celsius
Fragmentation (Lower Damages)	Limited climate action Lack of policy coordination Impacts of climate change less severe	4+ degrees Celsius
Fragmentation (Higher Damages)	Limited climate action Lack of policy coordination Impacts of climate change more severe	4+ degrees Celsius

Determining Risk Factors

The risk factors developed in this study that were modeled across the four scenarios were **Technology**, **Resource Availability**, **Impact of Physical Damages** and **Policy**, otherwise known as the Mercer TRIP factors.

- **(T) Technology** risk considers the speed, scale and success of low carbon technologies and the extent to which transformation and disruption of existing sectors, or the development of new sectors, takes place.
- **(R) Resource Availability** identifies how climate change-related impacts to the physical environment might impact investments reliant on the use of natural resources. This risk factor focuses on energy, water and agriculture and recognizes that natural resources risk becoming more scarce, or in some cases, more abundant.
- **(I) Impact of Physical Damages** refers to risks associated with changes in the incidence and severity of extreme weather events. This risk factor is most associated with property damage resulting from flooding and hurricanes.
- **(P) Policy** risk refers to all regulation intended to reduce the risk of further man-made climate change. This risk factor concerns the level of coordinated effort that governments take to adopt and adhere to policies and regulations intended to limit greenhouse gas emissions.

ASSET SENSITIVITY TO RISK FACTORS

Once Mercer defined the scenarios to be considered and developed its risk factors, the next step in the analysis was to establish how sensitive asset classes and industry sectors were to the risk factors. The following table shows the various asset sensitivities to the TRIP risk factors that Mercer assigned.

				
Asset Class	T	R	I	P
Developed Market Global Equity	< 0.25	> -0.25	> -0.25	> -0.25
Emerging Market Global Equity	< 0.25	-0.25	-0.50	< 0.25
Low Volatility Equity	0.00	> -0.25	> -0.25	> -0.25
Small Cap Equity	< 0.25	> -0.25	> -0.25	> -0.25
Developed Market Sovereign Bonds	0.00	0.00	0.00	0.00
Investment Grade Credit	< 0.25	> -0.25	> -0.25	> -0.25
Multi Asset Credit	0.00	0.00	> -0.25	0.00
Emerging Market Debt	0.00	> -0.25	-0.25	< 0.25
High Yield Debt	0.00	> -0.25	-0.25	> -0.25
Private Debt	0.00	0.00	0.00	0.00
Global Real Estate	< 0.25	0.00	-0.75	< 0.25
Private Equity	< 0.25	> -0.25	-0.25	> -0.25
Infrastructure	0.25	> -0.25	-0.50	< 0.25
Timber	< 0.25	-0.75	-0.50	0.25
Agriculture	0.25	-1.00	-0.50	0.25
Hedge Funds	0.00	0.00	0.00	0.00

Negative



Positive

Source: Mercer

For **Technology** risk, Mercer concluded that public equity will be positively impacted by technological advancements, as would private equity and real assets, with debt assets experiencing neutral impacts.

When considering **Resource Availability**, Mercer determined that most asset classes will experience negative impacts, with timber and agriculture experiencing strong negative impacts.

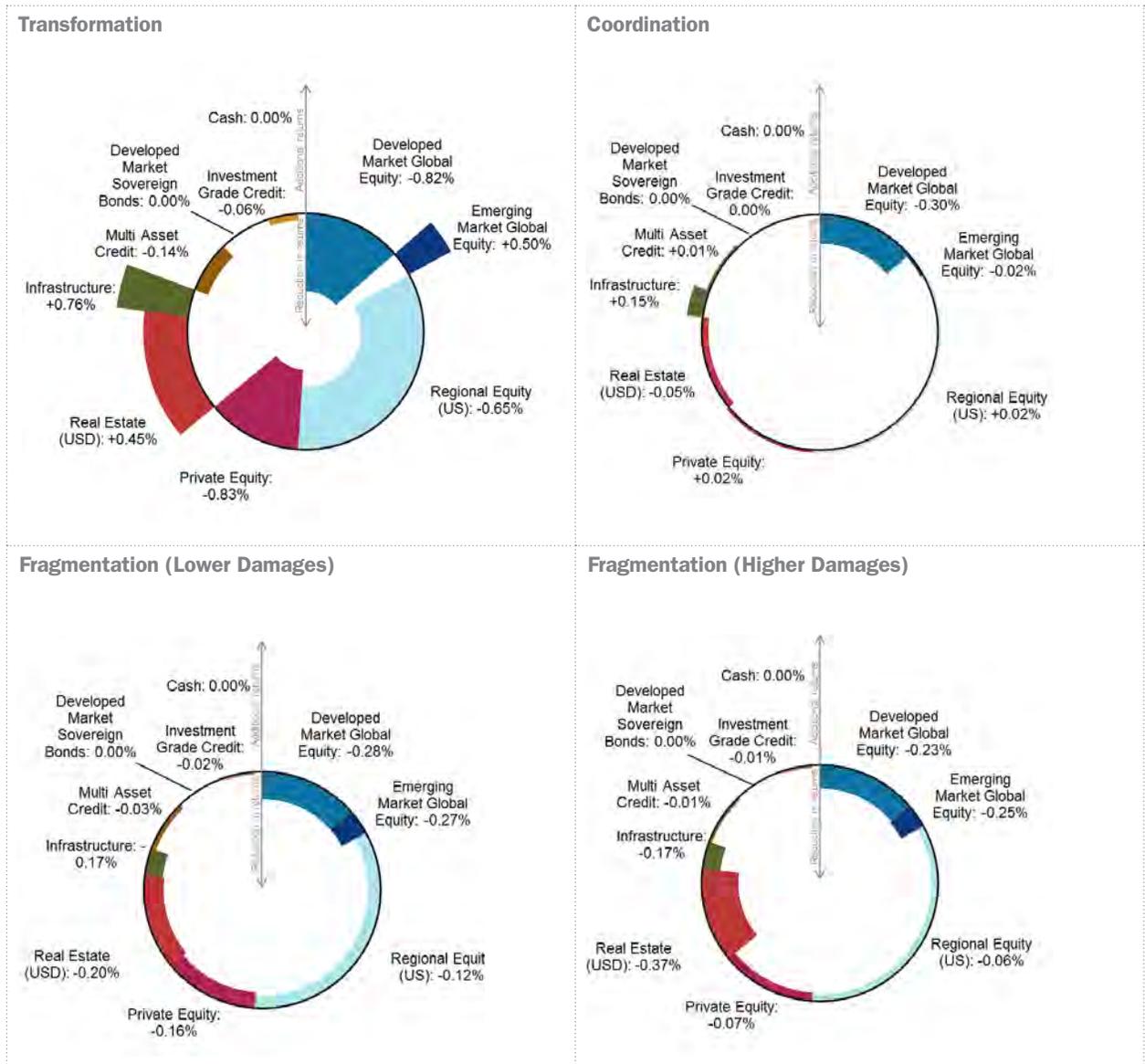
For the **Impact of Physical Damages** risk factor, most assets are again expected to experience negative impacts, with most real assets experiencing strong negative impacts.

Policy risk is expected to negatively impact most public securities markets while positively impacting real assets.

Portfolio Impacts

Having developed the scenarios, risk factors and asset impacts, Mercer then applied CalSTRS' asset allocation data, as of June 30, 2015, across the four scenarios to ascertain the potential impacts to the portfolio. The following charts highlight the impacts to asset classes, over 35-year time period, across asset classes.

TOTAL FUND (35-YEAR MEDIAN RETURN IMPACT)



Source: Mercer

According to Mercer, the Transformational scenario would be the most impactful. The scale of the response required to put the economy on a two-degree trajectory will, when considering all the risk factors in the aggregate, result in a negative impact to developed market equity, which makes up more than half of the CalSTRS Investment Portfolio. Mercer also concluded that the Fragmentation (Higher Damages) scenario would lead to the next biggest impact on the CalSTRS portfolio due to the large expected negative impacts on developed market equity and the negative impacts on real estate and infrastructure holdings. Finally, Mercer concluded that negative impacts under the remaining two scenarios, Coordination and Fragmentation (Lower Damages), would be modest due to the muted impact on developed market equity.

Recommendations

Based on its analysis of potential climate change impacts to the CalSTRS Investment Portfolio, Mercer provided a number of recommendations on how the fund could position itself to mitigate possible portfolio impacts. Some of those recommendations include:

- Develop “board-level” sustainability investment beliefs that articulate CalSTRS’ position on sustainability issues such as climate risk.
- Enhance engagement with external fund managers on sustainability-related issues such as climate change.
- Increase investment in sustainability-themed equity managers who focus on issues like climate change risk management.
- Shift passive public equity exposure to low-carbon themed indexes to mitigate climate change risk exposure.

- Consider increasing investment in real assets and assess the fund’s current real asset exposure to extreme weather events.

Going Forward

Many of the recommendations made by Mercer in this study have been adopted, are in the process of being adopted, or are being considered. The Teachers’ Retirement Board acknowledged climate change as a material investment risk many years ago and has been consistently working with staff to mitigate climate risk. This is reflected in efforts such as the ongoing board review of the CalSTRS 21 Risk Factors and the recent board decision to invest in low carbon indexes. Additionally, staff is regularly assessing and updating its external manager due diligence efforts and how ESG issues, such as climate change, can be better integrated into those diligence efforts. Finally, staff is in the process of performing a search for “sustainable” external public equity managers, another recommendation made in the Mercer report.

An important takeaway from this analysis is the level of uncertainty that still surrounds the direction and impacts associated with climate change. Most climate experts agree that climate change is occurring, and that this change will impact economies, but beliefs about the magnitude of climate change impacts vary. Uncertainty concerning the level of policy response to climate change also exists. While carbon regulations have been developed in some areas, most countries do not mandate greenhouse gas emissions, making the global coordinated policy response envisioned in the Transformational and Coordination scenarios seem unlikely at present.

This continued uncertainty surrounding climate change raises the importance of monitoring the TRIP risk factors identified in the Mercer study. Investors need to be aware of policy changes, such as carbon emissions regulation, carbon pricing and renewable energy standards regulation, and should be considering the implications of technological advancements around areas such as clean energy and energy storage. Investors should also be monitoring changes to the physical environment such as sea level rise, flooding and shifting weather patterns, and using this ongoing analysis to adjust risk management process and portfolio investment in a manner that aligns with the evolving risks and opportunities associated with climate change.



The Teachers’ Retirement Board acknowledged climate change as a material investment risk many years ago and has been consistently working with staff to mitigate climate risk.

MERCER TRIP RISK FACTOR ANALYSIS

According to the Mercer report, *Investing in a Time of Climate Change*, the key investment risks associated with climate change are Technology, Resource Availability, Impact of Physical Damages and Policy. After carefully reviewing and analyzing the methodology, outcomes and recommendations made in the Mercer report, staff determined that it would be appropriate to monitor the status of the risk factors identified by Mercer. The following graph explains these identified risks.

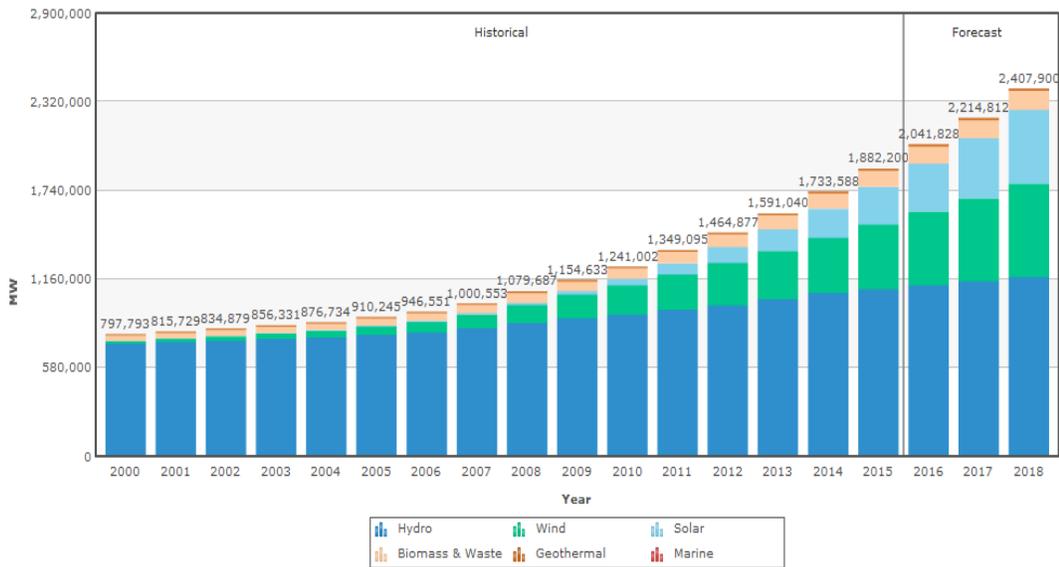
Technology (T)	Resource Availability (R)
 <p>The rate of progress and investment in the development of technology to support the low-carbon economy.</p> <p>The Technology factor captures technological advancement and the opportunity for increased efficiency through technological change.</p> <p>The speed, scale and success of low-carbon technologies of existing sectors, or development of new sectors, are key considerations for investors.</p>	 <p>The impact of chronic weather patterns (e.g. long-term changes in temperature or precipitation).</p> <p>Resource availability is a new aspect being added to the previous Mercer study to identify how changes to the physical environment might impact investments reliant on the use of resources, such as water and agricultural resources, at risk of becoming scarcer or, in some cases, more abundant over the long-term as a result of changes to weather patterns. The impacts on agriculture, energy and water are key.</p>
Impact of Physical Damages (I)	Policy (P)
 <p>The physical impact of acute weather incidence (i.e. extreme or catastrophic events).</p> <p>This factor can be interpreted as the economic impact of climate change on the physical environment caused largely by changes in the incidence and severity of extreme weather events.</p> <p>Examples include damage to property caused by flooding as a result of sea level rises, damage caused by hurricanes and damage caused by wildfire.</p>	 <p>Collectively refers to all international, national, and sub-national regulation, including legislation and targets, intended to reduce the risk of further man-made climate change.</p> <p>This factor can be interpreted as the level of coordinated ambition of governments to adopt and adhere to policies and regulations to reduce green-house gas emissions.</p> <p>Examples of climate-related policy include green-house gas emissions target, carbon pricing, subsidies and energy efficiency standards.</p> <p>Policies can be classified into those that focus on the supply side (by encouraging the substitution of high emission products with lower emission alternatives) and those that focus on the demand side (by reducing demand for high emission products).</p>

Source: Mercer

Technology

As the chart shows, new builds for renewable energy projects increased substantially from 2014 to 2015, rising just over 20 percent, with most of the new build occurring in the Asia-Pacific region.

NEW BUILDS FOR RENEWABLE ENERGY PROJECTS 2006–2018



Another barometer for clean technology uptake is electric vehicle sales. According to modeling done by Bloomberg New Energy Finance, electric vehicles could make up 25 percent of the global car fleet by 2040. In 2015, global electric vehicle sales rose to 440,000 vehicles, up from 270,000 in 2014. In the first quarter of 2016, global sales were 122,000 vehicles, approximately 50 percent more than the first quarter sales of 2015. However, electric vehicle sales represent less than 3 percent of total vehicle sales.

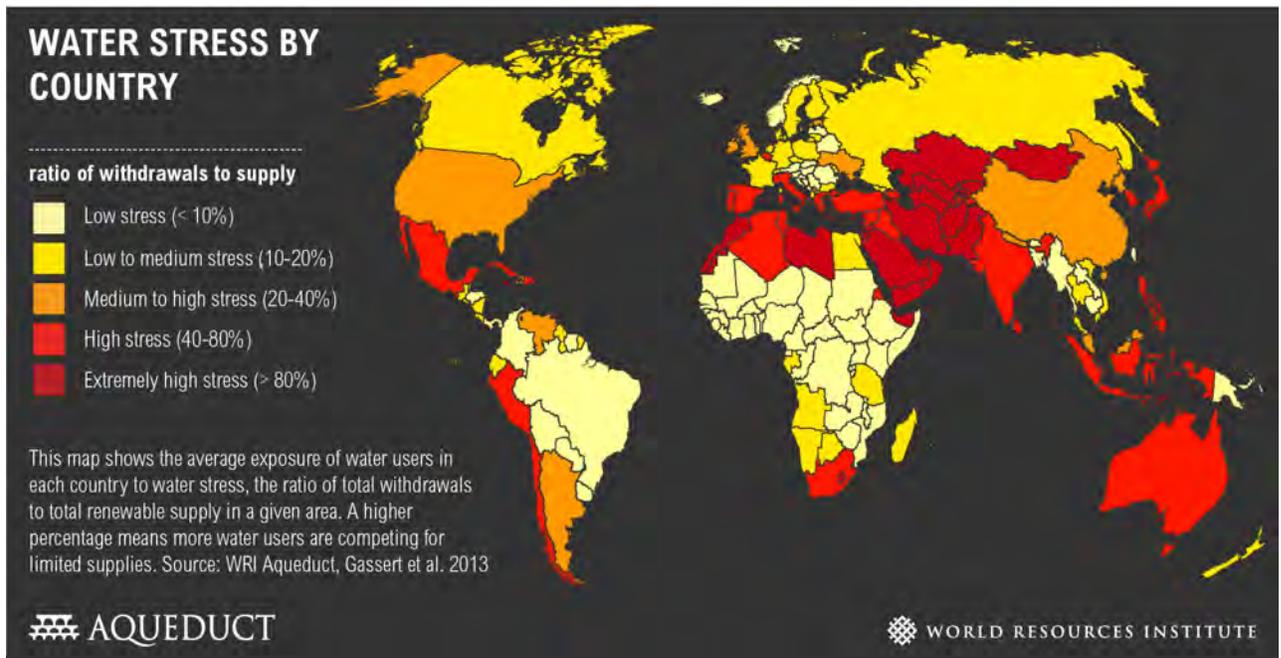
Affordable, reliable renewable energy storage is often cited as what is needed to properly accelerate the transition away from fossil fuel energy. According to BNEF, U.S. homes and businesses, mostly utilities, installed storage systems with 221 megawatts of capacity in 2015, which is triple the 2014 capacity installed. The U.S. now has 580 megawatts of energy storage installed, up from 80 megawatts in 2008.

The U.S. now has **580** megawatts of energy storage installed, up from **80** megawatts in 2008.

Resource Availability

The following map, provided by the World Resources Institute, shows which countries are facing water stress, defined as the ability or inability to meet human and ecological demand for water. As the map shows, significant portions of the Americas, Europe and Asia are experiencing medium to extremely high water stress.

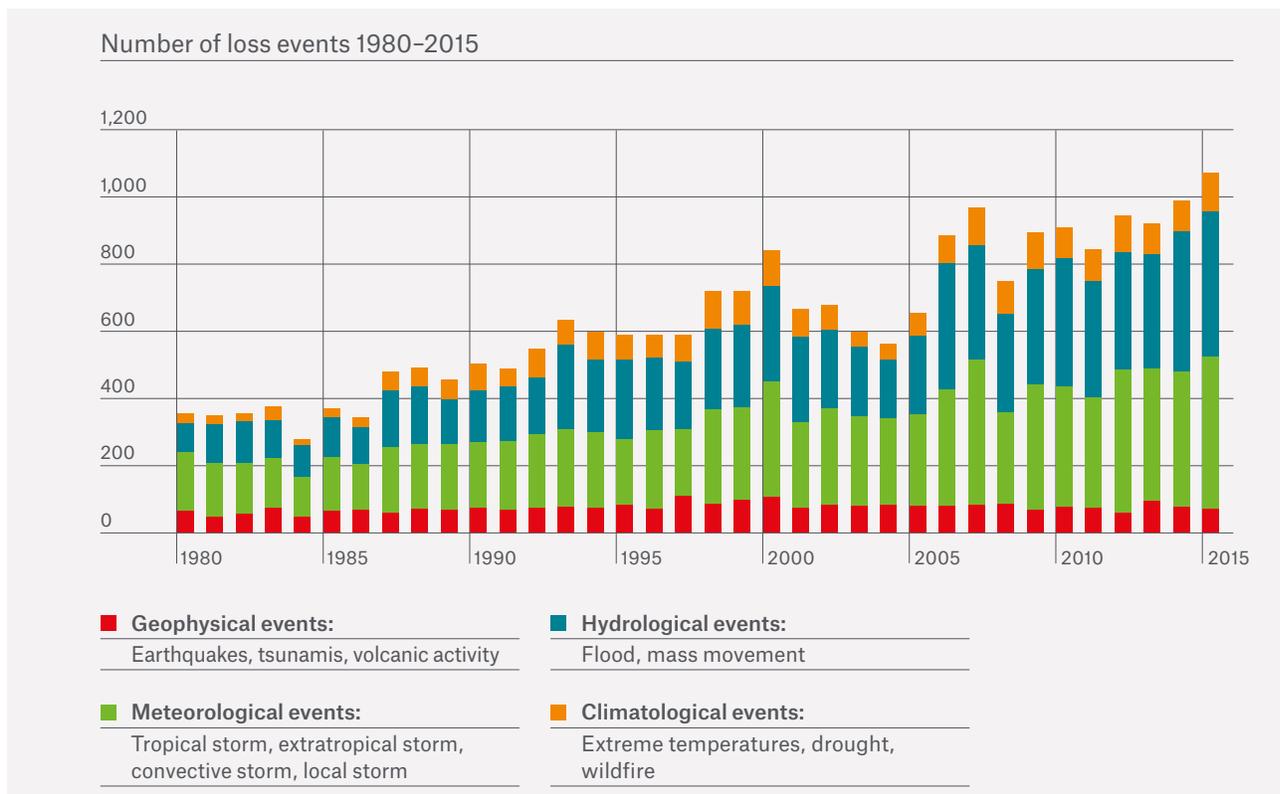
WATER STRESS BY COUNTRY



Impact of Physical Damages

As the following chart shows, over the past 35 years, the number of global natural catastrophes has been increasing, with much of this increase manifested through meteorological and hydrological events.

WORLD NATURAL CATASTROPHES, 1980-2015



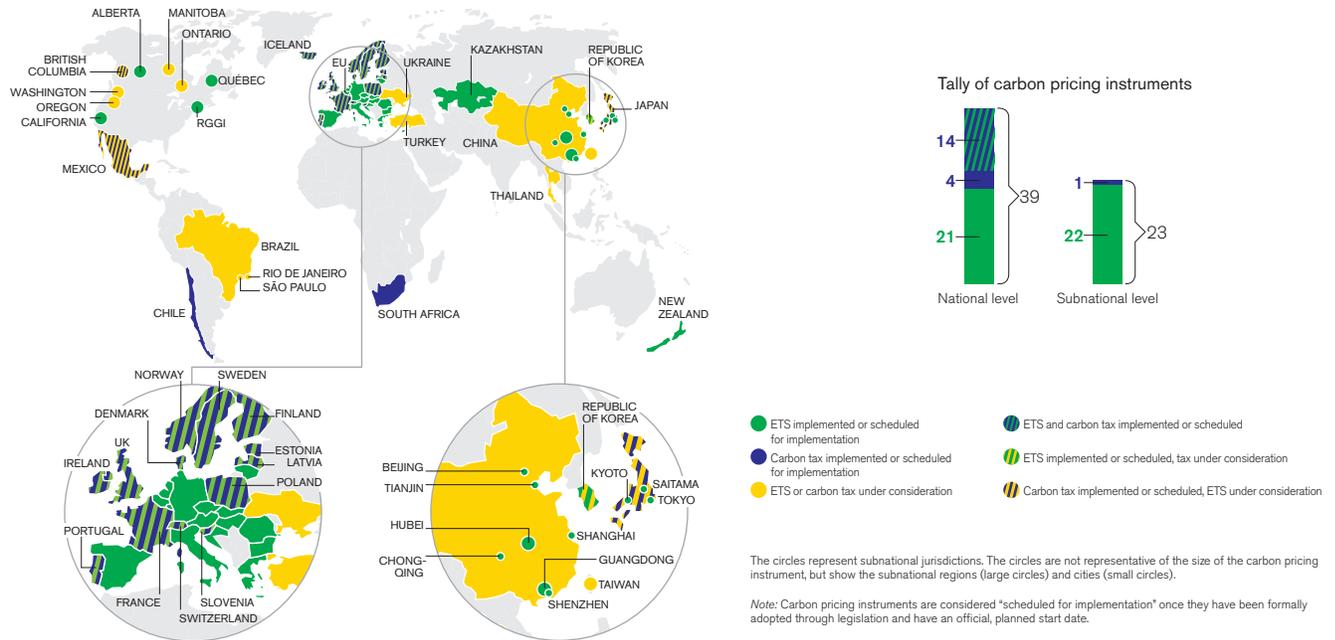
Source: Munich Re

2015 also saw a significant number of natural catastrophes around the globe. According to Munich Re, there were 1,060 natural catastrophes in 2015, with 42 percent being hydrological events, 41 percent being meteorological events, 11 percent being climatological events and 6 percent being geophysical events.

Policy

The following chart shows global carbon emissions schemes as of January 2015.

EXISTING & EMERGING EMISSIONS TRADING SYSTEMS & CARBON TAXES



As illustrated, while most of the world has not implemented, scheduled or considered carbon emissions regulation, many countries and regions around the world do have some type of emissions reduction program.

Fiscal year 2015–16 saw several advances on the policy front. In December, at the UN climate summit in Paris, 195 countries adopted by consensus language that promised carbon emissions reductions, as specified in each country's self-determined reduction goals. These goals, if implemented, would likely limit global

temperature rise to 2 degrees Celsius. As of August 2016, only 22 countries had ratified their reduction goals.

Also in fiscal year 2015–16, the Environmental Protection Agency announced first-ever standards to cut methane emissions from new, modified and reconstructed sources. The EPA also announced that it would be developing standards to reduce methane emissions at existing sources. It is expected that these emission reduction standards will face strong legal opposition.

Analysis

After considering the current profiles of the TRIP risk factors, it would seem as if we are not facing a Transformational scenario. Despite the Paris climate change summit outcome and recent EPA efforts, ambitious and stringent climate policy and mitigation action does not seem forthcoming. It is also debatable whether existing policy and mitigation efforts are aligned and cohesive, as outlined in the Coordination scenario. When considering the existing levels of water stress and growing number of meteorological and hydrological catastrophes, a Fragmentation scenario outcome also needs to be considered.



INVESTMENT MANAGERS & MANAGER INVESTMENTS

GLOBAL EQUITY INVESTMENT MANAGERS

The following are overviews from some of the managers in the Global Equities Sustainable Investment Program, along with a summary of a company from each portfolio.



AGF Investments America Inc.

AGF Investments America Inc. is a global equity manager that invests in securities that fit its proprietary environmental concept of sustainable development to meet its sustainable global equity strategy. AGF believes that companies focused on innovative products and services that use resources more efficiently are being increasingly rewarded by investors. AGF's investment strategy employs thorough due diligence on company fundamentals and emphasizes companies with viable business models derived from sustainable competitive advantages. The portfolio focuses on four themes within which

market relevant subthemes are identified. The four themes are energy and energy efficiency, water and waste water solutions, waste management and pollution control, and environmental, health and safety. The portfolio will contain early-stage to mature-stage companies.

AGF is a pioneer in sustainable development investment in Canada, having launched the AGF Clean Environment Fund in 1991. Martin Grosskopf, the portfolio manager for this strategy, is responsible for sustainable investing at AGF and has more than 20 years of experience in financial and environmental analysis. His prior experience includes work as an environmental scientist at Acres International Limited.



Acuity Brands

Acuity Brands is a provider of lighting solutions for commercial, institutional, industrial, infrastructure and residential applications throughout North America and select international markets. The company's lighting solutions include devices such as luminaires, lighting controls, power supplies, prismatic skylights, LED lamps and integrated lighting systems for indoor and outdoor applications using a combination of software-controlled light sources. Acuity Brands has operations throughout North America, Europe and Asia.

One of Acuity Brands' customers is the city of Elk Grove, the second largest city in Sacramento County and located just south of CalSTRS headquarters. Elk

Grove purchased more than 9,800 LED luminaires from Acuity Brands' American Electric Lighting to replace high pressure sodium fixtures and achieve energy savings of 60 to 70 percent. The LED system is expected to operate 20 years without maintenance compared to five to seven years for the HPS units. Combined energy and maintenance savings are estimated at \$400,000 annually. The city invested \$3 million to purchase the LED system and an additional \$500,000 to install it, which translates into a payback of approximately nine years.

Acuity Brands has enjoyed strong near-term performance. For fiscal year 2015–16, net sales grew 13 percent to more than \$2.7 billion while adjusted operating profit jumped to \$421 million, providing a 15.6 percent margin that substantially exceeded the previous three years' margins. Additionally, Acuity's stock returned more than 35 percent during the 2015–16 fiscal

year and more than 220 percent over a three-year look back. As a market leader with strong operating and financial leverage combined with favorable market trends and a history of innovative products and leadership, Acuity Brands sets itself as a compelling long-term investment.



Combined energy and maintenance savings from the new LED system for the City of Elk Grove are estimated at **\$400,000** annually.

generation

Generation LLP

Generation LLP was established in April 2004. Former Vice President Al Gore, co-founder and chairman, has long been a leading advocate for confronting the threat of global warming. David Blood is a senior partner and previously served as CEO of Goldman Sachs Asset Management. Mr. Blood's current role is focused on Generation's commitment to long-term investing and integrated sustainability research. Generation is one of CalSTRS' non-U.S. sustainable managers.

Generation uses a global investment strategy to identify public equity companies that fit its concept of sustainable investments. Generation believes investment results for equity strategies are maximized by taking a long-term investment horizon. Furthermore, it believes that sustainability issues can impact a company's ability to generate returns and therefore must be fully integrated into its investment process, along with rigorous fundamental equity analysis, to achieve optimal long-term investment results. Generation uses the term "sustainability research" as the analysis of shareholder value implications of long-term environmental as well as economic, social and geopolitical challenges.



Linear Technology

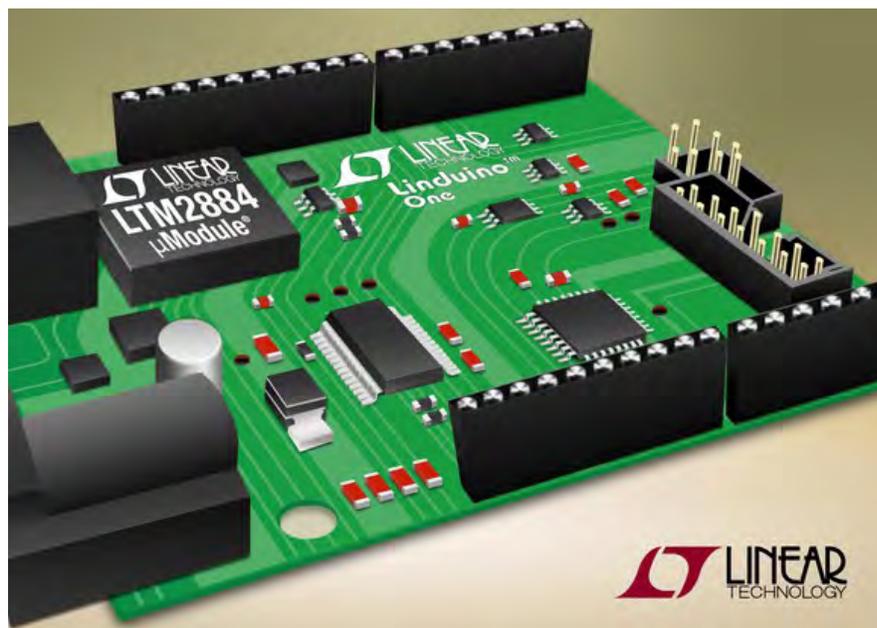
Linear Technology Corporation, a member of the S&P 500, has been designing, manufacturing and marketing a broad line of high performance analog integrated

circuits for major companies worldwide for three decades. The company's products provide an essential bridge between analog and digital electronics in most sectors and industries.

As today's electronic designs continue to grow in complexity, managing power consumption and optimizing overall efficiency become even more important. Accurate power supply voltage and current monitoring is crucial to conserving power and guaranteeing reliability in everything from industrial and telecom applications, to automotive and consumer electronics. Measuring power consumption and optimizing overall efficiency can be challenging. Linear Technology's products provide solutions to these challenges. There is an increasing market for low power electronic devices located in remote locations, away from the power grid. Ideally, the power for these devices should be generated on-site using renewable energy sources such as solar power. Converting this solar energy into electrical energy is easily done using Linear Technology's products, which allow for the extraction of maximum power from a solar cell under varying sunlight conditions.

As of June 30, 2016, Linear Technology was one of Generation's largest positions. Just following the end of 2015–16 fiscal year, Linear Technology saw an increase in its stock price by more than 25 percent based on the news that the company has entered into a definitive agreement to be acquired by Analog Devices in a deal valuing Linear at \$14.8 billion. This contributed to Linear having a positive 49 percent one-year performance from the end of July.

Measuring power consumption and optimizing overall efficiency can be challenging. Linear Technology's products provide solutions to these challenges.



FIXED INCOME— GREEN BOND GROWTH

Green bond issuance had another record year in 2015, with more than \$42 billion in bonds issued, and the possibility of reaching \$100 billion in 2016. As of May 2016, \$28 billion has already been issued. Additional green bond facts, according to the *Bonds and Climate Change the State of the Market in 2016* report, include:

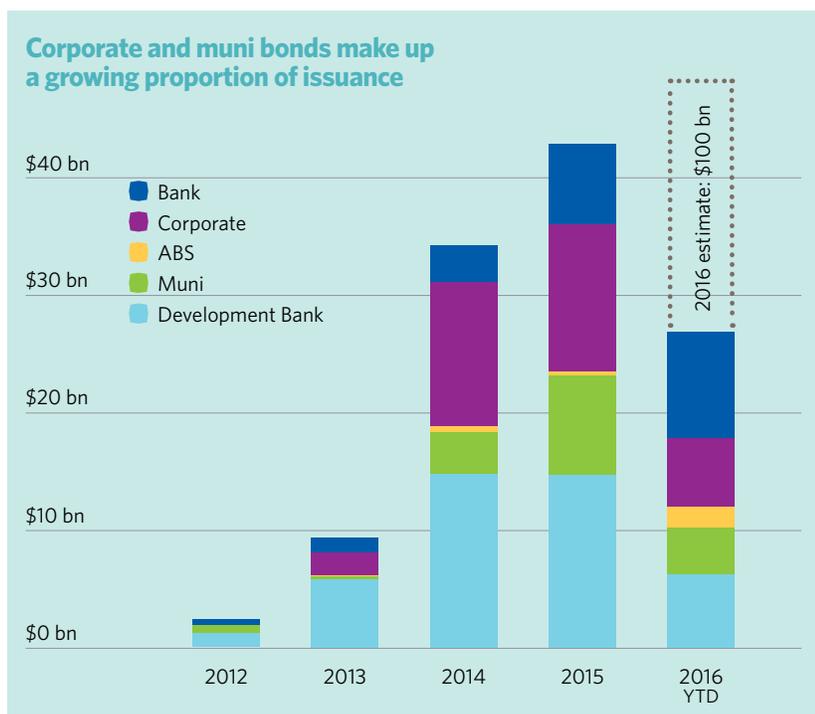
- 17 percent of climate-aligned universe is comprised of green bonds
- 82 percent of the green bond market is investment grade
- 43 percent of green bonds outstanding are rated AAA

- 80 percent of green bond issuance is comprised of USD and EUR currencies
- The green bond market currently has \$118 billion outstanding
- Average tenor of green bonds is between five and 10 years

A positive trend for the green bond market has been the increase of green Corporate and Municipal bond issuance, in addition to the normal issuance by development banks. As this trend has occurred, the Fixed Income Unit has also diversified its green bond investments with purchases over the last year in the following fixed-income sub-asset classes: banks, 6 percent; asset-backed securities, 9 percent; corporates, 35 percent; and development banks, 50 percent. Though development banks are still a vital part of the market, it is essential for other fixed-income classes to issue green bonds in order for the green bond market to grow and succeed.

The fixed-income market has continued to grow and those issuing green bonds continues to diversify.

For more information or to read the entire report, visit [Bonds and Climate Change the State of the Market in 2016](#).



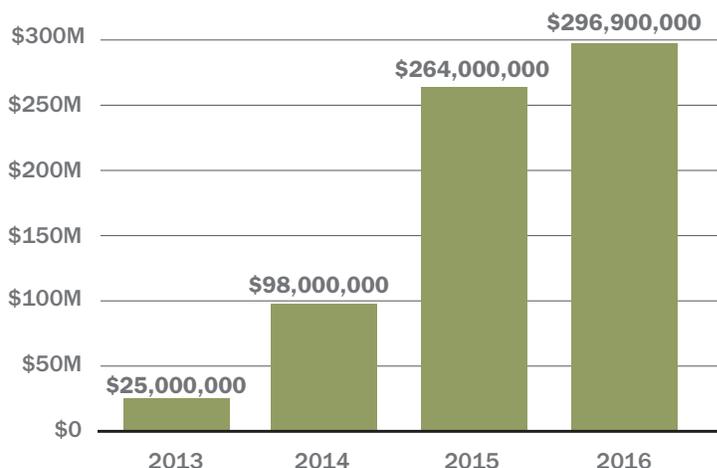
Source: *Bonds and Climate Change the State of the Market in 2016*
Prepared by Climate Bonds Initiative/Commissioned by HSBC

A positive trend for the green bond market has been the increase of green Corporate and Municipal bond issuance, in addition to the normal issuance by development banks.

The growth of the green bond market is reflected in the growth in green bonds held in the CalSTRS Fixed Income Portfolio. The following chart shows the tremendous increase in CalSTRS' exposure to this type of investment.

As shown, CalSTRS' exposure to green bonds has grown more than tenfold in just the past few years. More information on CalSTRS' green bond investments can be found in the Investment Portfolios & Performance section of this report.

CALSTRS GREEN BOND HOLDINGS



Green Bond Memberships

The CalSTRS Fixed Income Unit continues to be guiding members of climate related groups such as the Climate Bonds Initiative and the International Capital Market Association's Green Bond Principles.



CalSTRS is on the Climate Bond Standards Board of the [Climate Bonds Initiative](#), which is a multidisciplinary and multimember nonprofit organization that seeks to establish standards along with a certification schedule for issuers and underwriters interested in issuing green bonds. A number of technical and working groups are attempting to establish rigorous

standards in areas ranging from solar energy to biofuels. The Fixed Income Unit continues to work closely with Corporate Governance on this initiative.



In January 2014, the Green Bond Principles were developed through guidance from issuers, investors and environmental groups and serve as voluntary guidelines on the recommended process for the development and issuance of green bonds. The 2016 edition of the Green Bond Principles was released in June 2016, after a consultation period with members and observers active in the green bond market. 2016 marked the second

Green Bond Principles Annual Green Meeting in London, which CalSTRS staff attended. During the meeting, the CalSTRS Fixed Income Unit was re-elected to its executive committee and will serve for the next two years. Executive committee membership is based on a rotating election. Additional information on the group and the Green Bond Principles can be found at icmagroup.org/Regulatory-Policy-and-Market-Practice/green-bonds/.

The CalSTRS Fixed Income Unit will continue to expand its leadership role in the green bond market and to work with peers, bankers and issuers to better define the green bond space. The unit will also serve as a resource to others looking to enter the field as an investor or issuer.

Green Bond Investments

Reporting is essential to the green bond market—issuers may send out periodic updates on projects or update their websites annually or as needed with project status information. Below is a sample of projects that have been funded or will be funded by green bonds as well as information regarding the issuer's green bond program.



The [African Development Bank](#) has the overall objective to increase sustainable economic development and social progress in its regional member countries. In December 2015, AfDB issued \$500 million green bonds due in 2018. CalSTRS participated in the deal and bought \$4.5 million bonds. This was its second USD green bond deal to date. Its green bond framework has been reviewed by Cicero and follows AfDB's Ten Year Strategy. One of the projects included in its green bond portfolio is the Turkana Wind Power Project in Kenya. The project will add 300MW to Kenya's power generation capacity and provide clean and affordable energy that will reduce energy costs to consumers. The 300MW wind farm includes 365 turbines, which should reduce/mitigate approximately 736 thousand tons of greenhouse gas emissions/CO₂-equivalent annually while creating 750 jobs. A second project in its green bond portfolio is the Project to Improve the Quality of Treated Water in Tunisia. The project will improve the quality of treated water used in the irrigation of approximately 8,500 hectares of farmland and open land. Four million people and 4,000 farmers will benefit from the project.

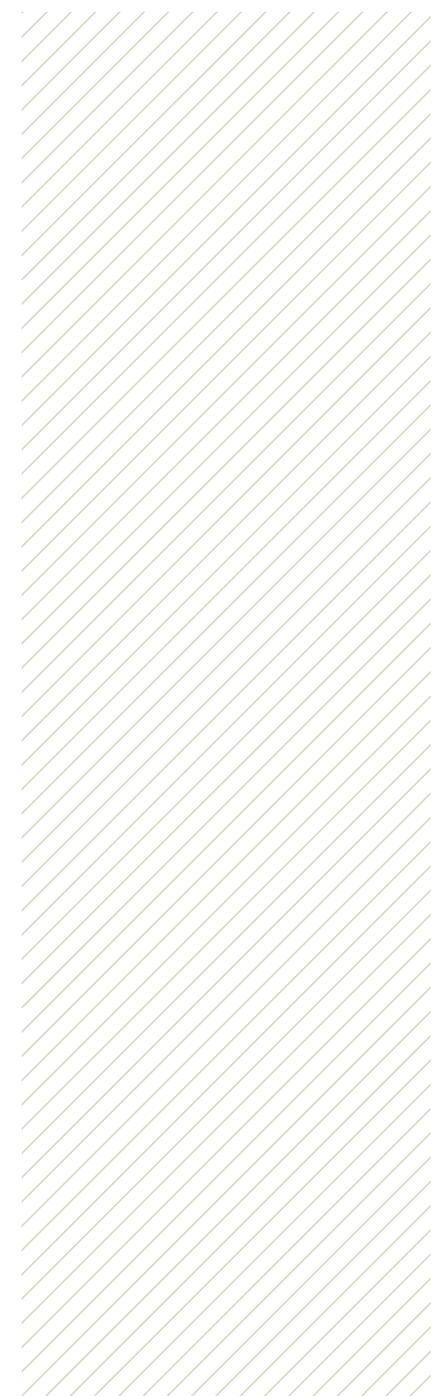


[Kommuninvest](#) is the Swedish local government debt office whose mission is to support Swedish municipalities and county councils in their financial operations. Kommuninvest issued its inaugural USD green bond in March 2016, issuing \$600 million due in 2019. CalSTRS participated in the deal and bought \$4 million bonds. One of the projects included in its portfolio is electric buses for public transport in the city of Umeå in northern Sweden. In 2016, there will be nine electric buses and two fast charging stations—10 minutes of charging for 30 minutes of driving. These electric buses replace diesel buses, reducing both noise and the emission of carbon dioxide, nitrogen dioxide and particulate matter. The city is hoping to have an additional 24 buses in operation by 2020. A second project is the Blaiken Wind Farm, one of Europe's largest onshore wind farms. Once completed in 2017, the wind farm will have the capacity for 247.5MW from 99 wind turbines. This should translate to 700 GWh in annual production, which is equivalent to the annual electricity use of 161,500 apartments.



[Nederlandse Waterschapsbank N.V.](#) provides financial services to the Dutch public sector. Green bonds issued by NWB Bank are dedicated to the Dutch water authorities responsible for flood protection, water management and water quality in the Netherlands. NWB Bank issued its first USD green bond in March 2016, issuing \$1 billion due in 2026. CalSTRS participated in the deal and bought \$5 million bonds. An example of a green bond eligible project is the use of dyke pins. As dykes cannot always be

widened due to their surroundings or other environmental factors, dyke pins can be inserted into the existing dykes to handle more pressure and make the dykes stronger. The use of dyke pins is less expensive, more environmentally friendly and less disruptive to the dyke when compared to actual "dyke widening."



PRIVATE EQUITY INVESTMENT MANAGERS

The following is a brief overview of one of Private Equity's investments.



Enviva Partners, LP¹ is a portfolio company investment that was made in March 2010 by Riverstone/Carlyle Renewable and Alternative Energy Fund II. Riverstone/Carlyle Renewable and Alternative Energy Fund II is a joint collaboration between two general partners, Riverstone Holdings and The Carlyle Group. In 2008, CalSTRS committed \$300 million to Riverstone/Carlyle Renewable and Alternative Energy Fund II.

Enviva is one of the largest suppliers of sustainably sourced wood pellets and other processed woody biomass in the world. Enviva's products are used by industrial customers seeking to decrease their dependence on fossil fuels and reduce their carbon footprint. Enviva has been supplying wood chips and wood pellets to customers in the U.S. and Europe since 2007. Enviva owns and operates six plants located in the southeastern United States that produce about 2.3 million



Enviva's deep water marine terminal at the Port of Chesapeake

metric tons of wood pellets annually. The company exports pellets primarily to power plants in the United Kingdom and Europe that previously were fueled by coal, enabling them to reduce their carbon footprint by about 80 percent. The pellets are manufactured by using sustainable practices. Enviva Partners owns a deep-water marine terminal at the Port of Chesapeake, Virginia, which is used to export wood pellets. Enviva Partners also exports pellets through the ports of Mobile, Alabama, and Panama City, Florida.

Under Riverstone/Carlyle's ownership, in April 2015, Enviva listed on the New York Stock Exchange as the first master limited partnership of its kind. The general partner continues to develop an inventory of growth projects with long-duration contracts, which provide long-term distributable cash flows to the MLP.

Enviva owns and operates six plants located in the southeastern United States that produce about **2.3** million metric tons of wood pellets annually.

¹Adapted from materials provided by Riverstone/Carlyle and Enviva

REAL ESTATE: BUILDING GREEN

The following is an overview of an efficiency project that one of the managers in the CalSTRS Real Estate Portfolio has successfully completed.



CBRE Global Investors has been a Separate Account Real Estate advisor to CalSTRS since September, 1987. CBRE currently manages office properties for CalSTRS that are valued at \$2.46 billion and located across the United States. Most of the office buildings are located in primary, gateway cities such as New York, Boston, Los Angeles, San Francisco, Seattle, Houston and Denver. CBRE is Real Estate's second largest manager and is one of its oldest standing relationships.

Corporate responsibility is at the heart of CBRE's business practices and the firm seeks to be recognized as much for its commitment to responsible business as for the quality of the commercial real estate services. CBRE has an environmental strategy that leverages key areas of environmentally sound performance in its operations and client services.

Most of CalSTRS' office property investments with CBRE are through the separate account mandate, which means

CalSTRS owns the assets 100 percent outright and CBRE collects an annual asset management fee based on the appraised gross asset value of the building.

Featured below is a case study on the renovations to one of CalSTRS' Real Estate investments.

Investment—Metropoint I and II

Challenge

Metropoint I and II, constructed in 1986 and 1999 respectively, make up a Class A multitenant office campus in Denver's Tech Center. CBRE assumed management of the buildings in December 2006 and immediately established challenging energy and sustainability goals, and earned the buildings' first Energy Star labels in 2008, followed by LEED EB O+M Gold Certification in 2011. The challenge then became to show continued improvement over time, with a specific focus on recertifying both buildings to the Gold level under a more stringent version of the LEED EB rating system.

METROPOINT I



Metropoint I and II are located in Denver, Colorado, and together boast more than 450,000 square feet.

METROPOINT II



Solution

- Installed variable speed drives on all air handling units and cooling towers at Metropoint I and all rooftop units at Metropoint II.
- Upgraded the building automation system for the central plant located at Metropoint I and for the entire HVAC system at Metropoint II.
- Completed BAS programming modifications to provide maximum energy savings while improving tenant comfort.
- Implemented full service recycling and composting programs at both buildings, increasing the diversion rate of everyday waste to nearly 60 percent at Metropoint I and 45 percent at Metropoint II, and durable goods waste (electronics and furniture) to more than 75 percent at both buildings.
- Converted all parking garage lighting from fluorescent to LED, saving an annual 46,000 KWH at Metropoint I and an additional 8,095 KWH at Metropoint II.
- Implemented janitorial day cleaning program in June 2011, which has cut both cleaning and lighting costs.
- Continually improved restroom fixture efficiency with upgrades including:
 - » Converting all water closets at Metropoint I from 3.6 gallons per flush to a high efficiency 1.28 gallons per flush model (108 total closets) saving nearly 40 percent in water consumption annually.
 - » Converting all restroom faucets from 1.5 gallons per minute to a high efficiency hands free solar unit at .5 gallons per minute.

- Conducted retrocommissioning studies during the LEED EB Recertification effort which resulted in the identification and implementation of several energy conservation measures, resulting in the following annual energy reductions:

- » Metropoint I: 373,890 KWH
- » Metropoint II: 145,600 KWH

Results

As a result of CBRE's efforts, Metropoint I's overall energy consumption has decreased 25.3 percent and Metropoint II's overall energy consumption has decreased 16.2 percent since 2009. This reduction in energy consumption has allowed both buildings to raise their Energy Star ratings significantly, reaching 92 and 94, respectively.

Metropoint I and II earned independent LEED EB Gold certifications in 2011 and completed LEED EB O+M Recertification applications to retain Gold certification in July 2016. Both buildings upgraded to the more challenging 2009 version of the rating system during this recertification attempt, requiring additional points to retain Gold level certification.

Metropoint I and II earned the Building Owners and Managers Association 360 designation in 2014, and Metropoint I was a TOBY award runner-up in 2015 for the 250,000–499,999 SF category. Metropoint II was honored with the Watts to Water award in 2012 for improved water savings by the City of Denver.

Metropoint I and II

Quick Facts

- **Energy Star for 9 consecutive years, current rating of 92 and 94**
- **Cut energy usage at Metropoint I by 25.3% and Metropoint II by 16.2%**
- **Reduced restroom water consumption by nearly 40%**
- **BOMA 360 performance building**
- **LEED EB Gold Recertification 2016**
- **459,736 square feet**

INFLATION SENSITIVE: GREEN INFRA-STRUCTURE

The following are two examples of green investments currently held in the Inflation Sensitive Portfolio.

FIRST RESERVE CORPORATION

FIRST RESERVE
CORPORATION



Investment: Kingfisher Wind Investment

Kingfisher Wind is a 298 megawatt wind power project located in Oklahoma that reached commercial operation in March 2016. [First Reserve](#) made its initial investment in the project in January 2015. [Apex Clean Energy](#), an independent renewable energy developer, managed the construction and is managing operations.

Kingfisher is connected to the southwest power pool electricity market and will generate enough clean energy to power approximately 100,000 homes.



Investment: Lekela

Lekela Power is a 1,000 megawatt renewable energy platform that will develop, construct and operate wind and solar assets across multiple African countries, including South Africa, Egypt and Ghana. Reliable energy is critical to the growth of Africa's economy. Blackouts are routine and demand is forecast to grow.

In February 2015, [Actis](#), in partnership with [Mainstream Renewable Power](#), an independent renewable energy developer, created Lekela to provide reliable, clean energy to African markets. Through July 2016, Lekela has more than 1,340 megawatts of projects in its pipeline.

The first project, [Noupoort Wind Farm](#), reached commercial operation in July 2016 and will produce 80 megawatts of electricity, enough to power 69,000 homes. Two other South African projects are scheduled to reach completion by the end of 2017 and will provide 280 megawatts of electricity, enough to power 120,000 homes.

INVESTMENT PORTFOLIOS & PERFORMANCE



All the investments listed in this report were made as part of the normal course of business, received the same level of due diligence as any investment made by CalSTRS, and were made with the primary objective of receiving a maximum rate of return commensurate with an acceptable level of risk.

1. PUBLIC EQUITY SUSTAINABLE INVESTMENT PROGRAM

Within the active components of the Non-U.S. Public Equity Portfolio, the CalSTRS Corporate Governance team is pursuing the “double bottom line” goals of both competitive returns and sustainable investing through allocations to two investment managers.

Program Summary

In 2007, CalSTRS initiated the Global Equity Sustainable Investment Program with \$500 million aggregate commitment to the strategy. In July 2016, responsibility over this portfolio was transferred to the Corporate Governance Unit. As of June 30, 2016, the aggregate value of this portfolio was more than \$827.8 million. Since inception, the existing managers in the Non-U.S. Sustainable Portfolio have enhanced the return of the portfolio by generating 2.98 percent of excess return. Staff will continue to evaluate allocations to and within the sustainable investment program.



Since inception, the existing managers in the Non-U.S. Sustainable Portfolio have enhanced the return of the portfolio by generating **2.98** percent of excess return.

PROGRAM ASSETS

Manager Name	Funded	Market Value (In Millions)	Benchmark	Comments
AGF Investments America	2007	\$243.5	CalSTRS Custom MSCI World	AGF Investments invests in companies with viable business models categorized as environmental innovators, environmental leaders and environmentally benign companies.
Generation Investment Management	2007	\$584.3	MSCI World Custom Index	Generation believes sustainability issues can impact a company's ability to generate returns; and therefore must be fully integrated with rigorous fundamental equity analysis to achieve optimal long-term investment results.
Total		\$827.8		
<i>Source: State Street as of June 30, 2016</i>				

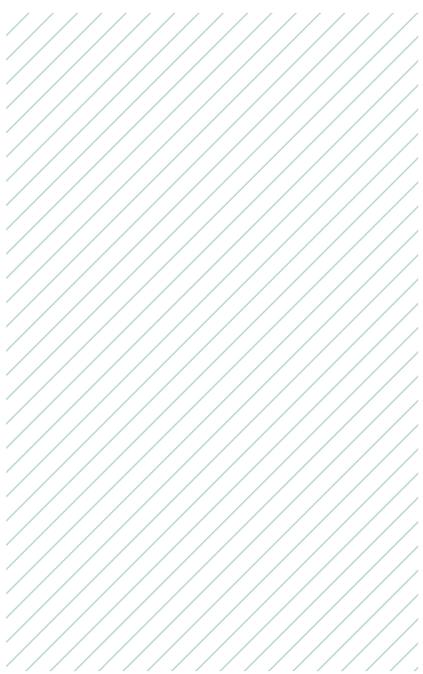
PROGRAM PERFORMANCE

Annualized Performance Since Inception				
Manager Name	Inception Date	Portfolio Return	Benchmark Return	Net Excess Return
AGF Investments America	August 1, 2007	1.74	2.64	-0.90
Generation Investment Management	June 1, 2007	7.51	2.25	5.25
Non-U.S. Sustainable Composite	June 1, 2007	5.23	2.25	2.98
<i>Source: State Street as of June 30, 2016</i>				

These managers are mandated with a “double bottom line” goal, which includes both a dedication to sustainable investing as well as competitive returns. Evaluating these managers on traditional benchmarks is problematic as these mandates intentionally overweight sustainable stocks that may face short-term headwinds. While this mismatch is noted, these managers are expected to contribute to the excess return target over the policy benchmarks in the long term.

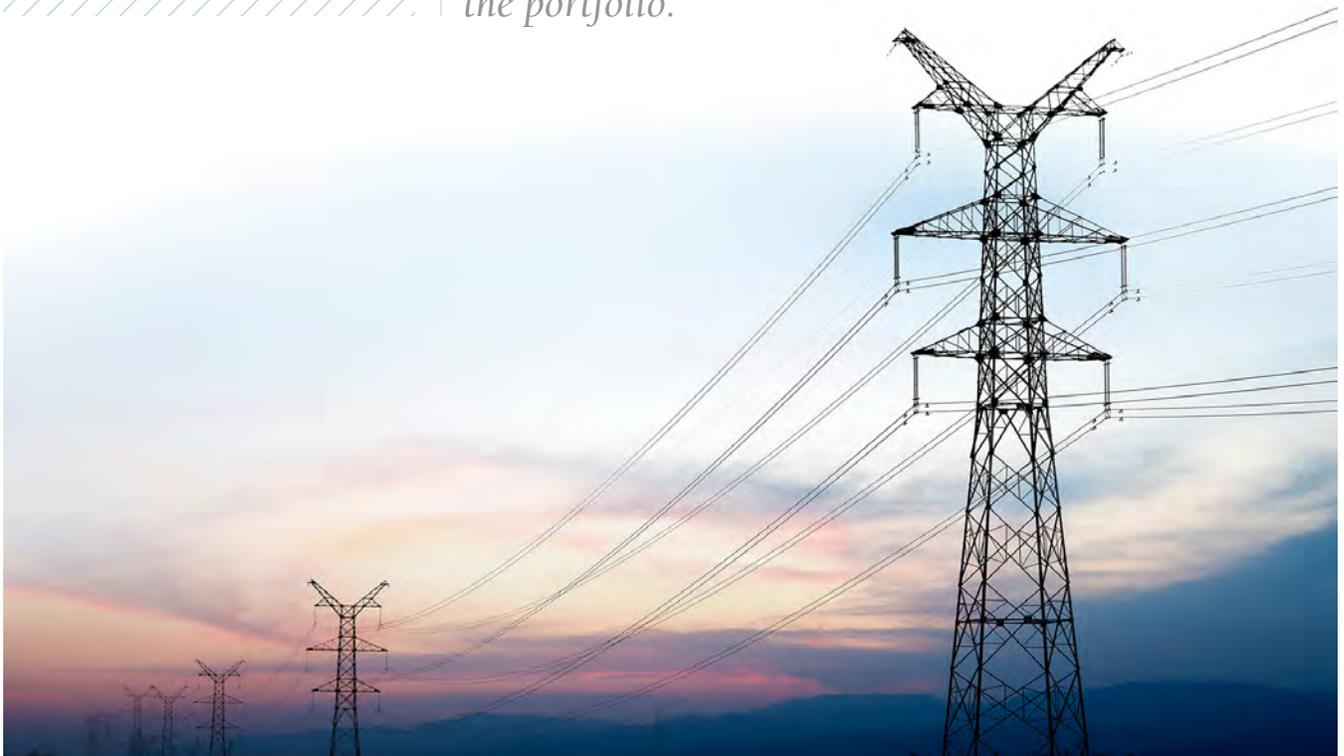


2. PRIVATE EQUITY CLEAN TECHNOLOGY AND ENERGY PROGRAM



The Private Equity Clean Technology and Energy Program began in 2005, with the objective of making selective investments with the best risk-adjusted return potential within the clean technology and energy sector. To date, the program has made nine fund investments and four co-investments, representing \$692.7 million in committed capital.

The current Clean Energy Portfolio accounts for 3 percent of the overall Private Equity Portfolio in terms of total market value (\$503 million). Eighty percent of the current Clean Energy Portfolio is committed to buyout and the remaining 20 percent is committed to venture capital. Partnerships account for 87 percent and co-investments account for 13 percent of the overall contributed capital of the portfolio.



PORTFOLIO STATUS AS OF MAY 31, 2016

Investments in the clean technology and clean energy sector follow:

Investment Name	Year	Commitment (In Millions)	Type	Comments
Co-investment #1	2005	\$30.0	Co-investment	Start-up company provides financing to small-scale alternative energy projects throughout the U.S.
NGEN Enable Technologies Fund II	2005	\$15.0	Venture Capital Fund	Materials sciences focus; headquartered in Santa Barbara.
VantagePoint Cleantech Partners	2006	\$15.2	Venture Capital Fund	New practice group for longtime venture capital partner of CalSTRS; headquartered in San Bruno.
Craton Equity Investors I	2006	\$30.0	Venture Capital Fund	Los Angeles-based firm specializing in clean technology growth companies.
Carlyle-Riverstone Renewable Energy Infrastructure Fund	2006	\$50.0	Buyout Fund	Specialty product for mainline energy investment firm. Finances renewable energy projects globally but primarily in the U.S.
Hg Renewable Power Fund	2006	\$60.8	Buyout Fund	Specialty product for London-based buyout firm. Finances renewable energy projects, primarily wind assets in Europe.
Co-investment #2	2006	\$12.5	Co-investment	Company installs and operates facilities to convert landfill gas to electrical power.
USRG Power & Biofuels Fund II	2007	\$60.0	Buyout Fund	Focus on small renewable power and biofuels projects in North America; headquartered in Santa Monica and White Plains, NY.
Co-investment #3	2008	\$6.0	Co-investment	Waste to energy company that utilizes a proprietary plasma technology to convert municipal solid waste into syngas, an energy-rich fuel.
Riverstone/Carlyle Renewable & Alternate Energy Fund II	2008	\$ 300.0	Buyout Fund	Focus on worldwide buyout and growth capital control investments involving renewable and alternative energy companies.
Co-investment #4	2010	\$ 36.0	Co-investment	Company is a developer of utility-scale solar thermal power plants.
Hg Renewable Power Fund II	2010	\$62.9	Buyout Fund	Specialty product for London-based buyout firm. Finances renewable energy projects, primarily wind assets in Europe.
Craton Equity Investors II	2012	\$15.2	Venture Capital Fund	Los Angeles-based firm specializing in clean technology growth companies.
Total		\$692.7		

Portfolio Performance

All data is based on first quarter 2015, cash-flow adjusted as of May 31, 2016.

The overall performance of the Clean Energy Portfolio has declined from a 0.89x multiple of invested capital as of June 2015 to a 0.82x MOIC as of May 2016. Approximately 89 percent of total commitments have been called to date. Nearly all (82 percent) of the unfunded capital is in two buyout funds, Riverstone/ Carlyle Renewable and Alternative Energy II and Hg Renewable Power Partners II.

The performance of the Clean Energy buyout funds, representing 80 percent of committed capital, has declined from a 0.94x MOIC as of June 2015 to a 0.85x MOIC as of May 2016. The buyout portion of the Clean Energy Portfolio represents \$409 million of remaining market value. Since inception, we have received \$198 million in distributions.

The performance of the Clean Energy venture capital funds, representing 20 percent of committed capital, has declined from a 0.73x MOIC as of June 2015 to a 0.69x MOIC as of May 2016. The venture capital portion of the portfolio represents \$94 million of remaining market value. Since inception, the CalSTRS Private Equity Portfolio has received \$56 million in distributions.

Most (85 percent) of the portfolio investments were made prior to the global financial crisis of 2008. Unlike other sectors that rebounded after the global crisis, the clean energy sector has struggled to recoup losses due to high purchase prices paid before the crisis, declining government interest in funding clean energy initiatives, and the steady fall of oil prices over the last 18 months. As expected, these macro-economic factors have negatively impacted the overall performance of Private Equity's Clean Energy Portfolio. Staff continues to monitor the portfolio of funds to full exits, with a goal to maximize returns over the coming years.

Unlike other sectors that rebounded after the global crisis, the clean energy sector has struggled to recoup losses due to high purchase prices paid before the crisis, declining government interest in funding clean energy initiatives, and the steady fall of oil prices over the last 18 months.



3. REAL ESTATE SUSTAINABLE RETURNS PROGRAM

The goal of the CalSTRS Real Estate Green Program is to increase the risk adjusted returns by incorporating conservation and sustainability in the development and management of the Real Estate Portfolio.

STEPS TO SUSTAINABLE RETURNS

1	Incorporate conservation and sustainability into the planning cycle for the existing portfolio.
2	Establish benchmarks to track energy use, develop capital improvement plans, make energy efficiency upgrades and measure the benefits by reduced consumption of energy. By reducing resource consumption, value is added to the portfolio.
3	Include sustainability measures in investment decisions, including new development projects.
4	Practice conservation and sustainability within the CalSTRS-occupied facilities.

PROGRAM SUMMARY

Incorporate conservation and sustainability into the planning cycle for the existing portfolio.

In 2003, CalSTRS Real Estate staff directed all Separate Account investment managers to include a “Conservation/ Sustainability Assessment” in the annual planning/budgeting process. The goal was to enhance value, create awareness and become more socially responsible investors. The planning process challenges managers to assess strategies relating to “green buildings.” Green buildings are defined as “A structure that is designed,

built, renovated, operated or reused in an ecological and resource-efficient manner.”

While green-related programs in the planning/budgeting process are encouraged, all capital expenditures must be supported by appropriate return on investment measures and payback periods. A detailed list of Separate Account, building-specific green projects is available on request.

Establish benchmarks to track energy use, develop capital improvement plans, make energy efficiency upgrades and measure the benefits by reduced consumption of energy. By reducing resource consumption, value is added to the portfolio.

THE RATING SYSTEMS: ENERGY STAR AND LEED



The Energy Star Rating System

In 2005, CalSTRS entered into a partnership with the EPA's Energy Star program. Energy Star is widely accepted and used by leaders within the real estate industry and the partnership has provided CalSTRS with a tool to take control of energy use by providing the best information, and resources for improving energy and environmental performance. More specifically, the partnership has provided CalSTRS with a tracking and audit tool to benchmark and measure energy consumption.

Energy Star, a voluntary labeling program for commercial and industrial buildings, is sponsored by the U.S. Department of Energy and the U.S. Environmental Protection Agency, and managed by the EPA. It uses a scale of 1–100 to rate the relative energy performance of new and existing buildings. The rating, which is certified by a professional engineer, is based on the amount of energy the building uses over a 12-month period (as evidenced by utility bills), the amount of CO2 it emits, the nature and intensity of its occupancy, and its location.

A score of 75 or more qualifies a building for an Energy Star label. This means the building is in the top 25 percent of like structures in energy efficiency for the year rated.

82
percent
of CalSTRS' Separate Account office buildings are Energy Star-certified and ranked in the top quartile of energy-efficient buildings.

Energy Star Rating System Results

As of June 30, 2016, 82 percent of CalSTRS' Separate Account office buildings are Energy Star-certified and ranked in the top quartile of energy-efficient buildings.

ENERGY STAR RATING SYSTEM RESULTS

Report Date	Number of Separate Account Properties	Number of Buildings With an Energy Star Rating at or Above 75	Percentage of Buildings With an Energy Star Rating at or Above 75
2008	28	22	79%
2009	28	23	85%
2010	33	28	85%
2011	31	28	90%
2012	28	26	93%
2013	33	27	82%
2014	43	37	86%
2015	40	31	78%
2016	38	31	82%

The LEED Certification Green Building Rating System



The LEED, Leadership in Energy and Environmental Design, Green Building Rating System is the nationally accepted benchmark in the U.S. for the design, construction and operation of high performance green buildings. Established by the U.S. Green Building Council, LEED addresses different types of development with distinct rating systems, among them LEED for New Construction and Major Renovation, LEED for Commercial Interiors, and LEED for Existing Buildings: Operations and Maintenance.

The LEED rating systems and the four levels of LEED recognition—Certified, Silver, Gold, and Platinum—reflect projected or actual performance beyond certain prerequisites in five critical areas of environmental sustainability: sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality.

The rating systems for the various types of development—and from property to property—require and reward somewhat different technologies and strategies and give different relative weight to the sustainability categories, as well. Consistently, however, almost 50 percent of the points are at stake in the areas of energy and water conservation.

THE LEED CERTIFICATION GREEN BUILDING RATING SYSTEM

The table below displays the CalSTRS assets in this Separate Account Portfolio that have achieved the LEED certification as of June 30, 2016.

Report Date	Number of Separate Account Properties	Number of Buildings With LEED Certification	Percentage of Buildings With LEED Certification
Fall 2007	28	0	0%
Fall 2008	28	1	4%
Fall 2009	28	9	32%
Fall 2010	33	13	39%
Fall 2011	31	22	71%
Summer 2012	28	22	79%
Summer 2013	33	24	73%
Summer 2014	43	31	72%
Summer 2015	40	27	68%
Summer 2016	38	21	55%

Though the percentage of buildings with LEED certification has increased over the last decade, ebb and flow, to a degree, is expected as the Real Estate Portfolio is refreshed. New or newly acquired buildings may be under re-development work and this will prevent them from being eligible for LEED certification for that particular year. After the re-development work is done, the buildings will be submitted for certification and the improvements will certainly help them achieve LEED certification standards.

After the re-development work is done, the buildings will be submitted for certification and the improvements will certainly help them achieve LEED certification standards.

4. FIXED INCOME GREEN PROGRAM

As of
June 30, 2016,
the Fixed Income
Unit purchased
bonds from
29
different issuers
compared to
20
different issuers
from the
previous year.

In keeping with CalSTRS' commitment to sustainability, the Fixed Income Unit continues to manage risks and seek investable opportunities around environmental issues, such as climate change, across the portfolio.

Program Summary

The CalSTRS Fixed Income Unit continues to screen and monitor its holdings for companies involved with sustainability initiatives. As more companies accept climate change and realize the potential for cost savings in their organizations, the adoption of sustainability architecture as part of a company's business operations becomes more commonly observed and accepted in the marketplace. Additionally, the Fixed Income Unit continues to put an emphasis on investments in green bonds.

Green Bond Portfolio

The Fixed Income Unit continues to purchase green bonds as part of its Investment Grade, High Yield and Short-Term portfolios. As of June 30, 2016, Fixed Income held \$296.9 million in green bonds, which is an increase of 12.3 percent from the previous year. As of June 30, 2016, the unit purchased bonds from 29 different issuers compared to 20 different issuers from the previous year.

The Fixed Income Unit bought green bonds from Terraform Power, Electricite De France, Sumitomo Mitsui, Nacional Financiera, Southern Power, IFC, ING Bank, Export Development Canada, African Development Bank, Export-Import Bank of Korea, Apple, Georgia Power, Hyundai Capital, Kommuninvest, Nederlandse Waterschapsbank, European Investment Bank, Toyota, Westar Energy and KFW. Fixed Income staff has been fortunate to meet with many of these issuers throughout the year as part of due diligence for green bond investments.

Though not included in its green bond totals, Fixed Income also bought its first "sustainability" bond when Starbucks came to market in May 2016. The Starbucks sustainability bond is not considered a green bond as it is a mix of both green and social projects, but CalSTRS is supportive nonetheless and encourages other corporations to consider sustainability bonds if more feasible to issue than pure green bonds.

Though not included in its green bond totals, Fixed Income also bought its first "sustainability" bond when Starbucks came to market in May 2016.

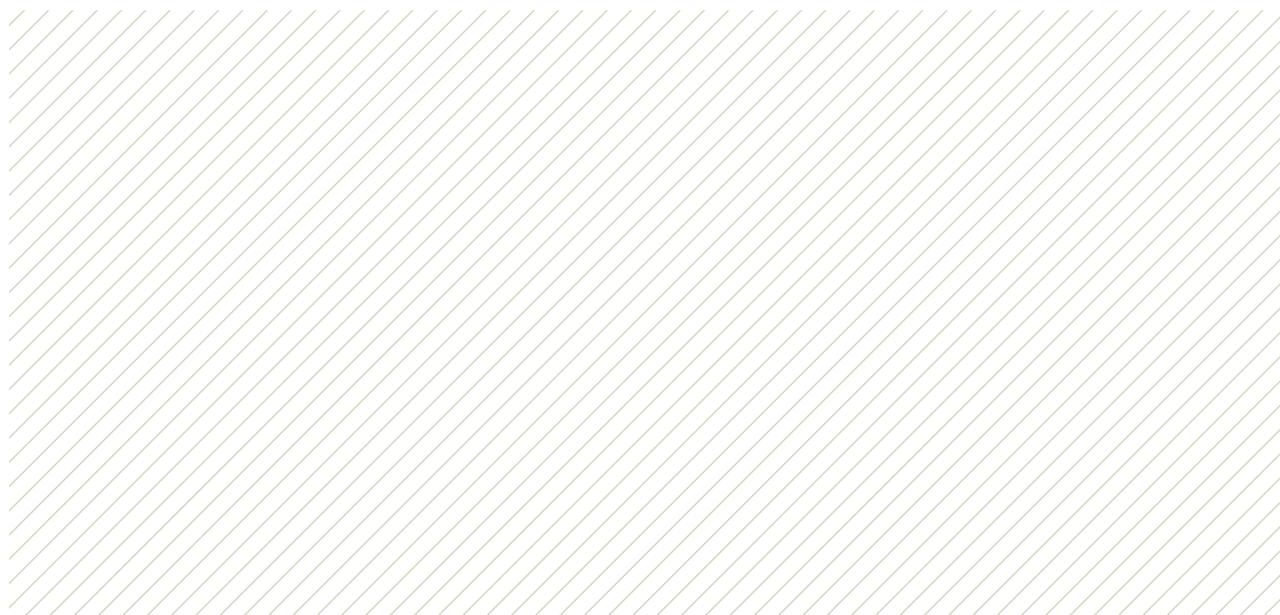
CALSTRS GREEN BONDS ISSUERS AS OF JUNE 30, 2016

The table below illustrates the issuer diversity in Fixed Income's green bonds holdings.

Issuer	Year Issued	Percent of Green Bond Portfolio	Use of Proceeds
Export-Import Bank of Korea	2013 & 2016	10.10%	Renewable energy projects
Solar Star Funding	2013	1.68%	Solar generating facilities financing
European Bank for Reconstruction and Development	2013	2.69%	Energy efficiency, clean energy, water management, environmental services and public transport, waste management
Regency Centers	2014	1.68%	Eligible green projects
Vornado Realty Trust	2014	1.68%	Eligible green projects
NRG Yield, Inc.	2014	0.13%	Renewable energy projects
Nordic Investment Bank	2014	2.14%	Environmentally sustainable projects
KFW	2014 & 2015	5.73%	Renewable energy projects
European Investment Bank	2014 & 2016	5.05%	Renewable energy and energy efficiency
African Development Bank	2015	1.52%	Climate change adaption and mitigation
International Finance Corporation	2015 & 2016	2.86%	Renewable energy, energy efficiency and other climate-smart projects in developing countries
Bank of America	2015	2.36%	Renewable and energy efficiency projects
Export Development Canada	2015	2.02%	Climate change mitigation
Toyota Motor Corporation	2015 & 2016	22.38%	Financing hybrid/electric vehicles
Swedish Export Credit	2015	3.37%	Transition to low-carbon and climate resilient growth
International Bank for Reconstruction and Development (World Bank)	2015	11.79%	Mitigation of climate change and/or adaption
Terraform Power Operating	2015	0.25%	Renewable energy projects
Electricite De France	2015	1.01%	Renewable power generation projects

CALSTRS GREEN BONDS ISSUERS AS OF JUNE 30, 2016 (CONTINUED)

Issuer	Year Issued	Percent of Green Bond Portfolio	Use of Proceeds
Sumitomo Mitsui Banking	2015	1.68%	Renewable energy, energy efficiency and resource productivity
Nacional Financiera SNC	2015	1.68%	Renewable energy
Southern Power Company	2015	4.04%	Renewable energy generation projects
ING Bank	2015	1.01%	Renewable energy, green buildings, public transport, waste, water and energy efficiency
Morgan Stanley	2015	1.35%	Renewable energy and energy efficiency projects
Apple	2016	4.04%	Environmentally sustainable projects
Georgia Power	2016	1.35%	Renewable energy generation projects
Hyundai Capital Services	2016	2.36%	Financing hybrid/electric vehicles
Kommuninvest	2016	1.35%	Climate mitigation and adaption
Nederlandse Waterschapsbank	2016	1.68%	Climate mitigation and adaption, biodiversity
Westar Energy	2016	1.01%	Renewable energy projects



5. INFLATION SENSITIVE

The CalSTRS Infrastructure Program targets essential service assets that primarily are operating and cash generating. Some late-stage development assets are considered per policy. The side letter of a fund's closing documents specifies that the manager is required to consider the CalSTRS 21 Risk Factors. The fund documents also encourage the adding of green features/technologies to new builds and existing assets. Solar energy projects, wind energy projects, hydropower and other energy efficiency-based assets are part of the current Infrastructure Portfolio.



GREEN INVESTMENTS IN INFLATION SENSITIVE PORTFOLIO AS OF MARCH 2015

The following table highlights the green investments held in the Inflation Sensitive Portfolio.

Investment Name ^A	Year of Investment ^B	Approximate Investment Value (In Millions) ^C	Investment Description
Aela Energia	2013	\$3.6	Wind power in Chile
Atlantic Energia Renováveis	2013	\$22.4	Wind and hydro power in Brazil
Eneo	2014	\$1.5 ^D	Power generation (includes ~79% hydro) and transmission in Cameroon
Zuma	2014	\$2.9	Wind power in Mexico
Ostro	2014	\$11.3	Wind power in India
Lekela Power	2015	\$3.2	Wind and solar power in Africa
McEwan Power	2013	\$17.9	Solar power in the U.K.
SunEdison Reserve	2010	\$10.6	Solar power in Europe and North America
Renovalia Reserve	2011	\$20.6	Wind power in Europe and Mexico
Dublin Waste-to-Energy	2014	\$13.1	Waste-to-Energy in Ireland under construction
Kingfisher Wind	2015	\$5.4	Wind power in Oklahoma
FR Warehouse Holdings	2015	\$1.3	Renewable power in United States
La Bufa Wind	2015	\$2.1	Wind power in Mexico
Mariah North Wind	2016	\$1.8	Wind power in Texas
Acciona Energia International	2014	\$2.1	Renewable power in North America, Europe and Australia
X-ELIO	2015	\$9.7	Solar power Europe, South America and Asia
Long Beach Courthouse	2010	\$9.2	LEED Gold-certified courthouse in California
Montreal University Hospital Research Centre	2010	\$2.1	LEED Gold-certified healthcare research facility in Canada
Presidio Parkway	2012	\$4.1	LEED Gold-certified O&M Center & pursuing Greenroads certification for the highway
Total Investment		\$144.9	

^A Includes asset where a minimum of 25 percent of value is derived from green assets.

^B Year fund made initial investment—may predate CalSTRS' investment in the fund.

^C All valuations as of March 31, 2016. Only the value of the green portion of an asset is reported.

^D Eneo's value of investment is based on hydro representing approximately 78.5 percent of power generation and power generation representing approximately 45 percent of total asset base.



ISSUES, OUTLOOKS & INITIATIVES

CURRENT INDUSTRY OVERVIEW AND FUTURE INVESTMENT OUTLOOK FOR PRIVATE EQUITY

According to Bloomberg’s New Energy Finance database, new investments in renewable energy gradually increased in 2015 from the lows of 2013 (see chart on next page). However, the overall level of private investment (\$3.4 billion) in 2015 was still one-third of the highest level (\$9.9 billion) at the peak of 2008. The largest gain was in private equity expansion capital, while venture capital investments made modest gains, albeit from low bases for each. Underlying data reveals that the

solar sector rose to its highest level for seven years, partially due to the substantial number of deals involving U.S. residential photovoltaic firms. The steadily falling cost of solar panels over the years has significantly accelerated market adoption of solar PV technology. Private equity players have been active in this market segment and have funded many residential solar companies. Other sub-sectors like biofuel, biomass and waste-to-energy, small hydro, geothermal and marine trailed behind solar meaningfully.

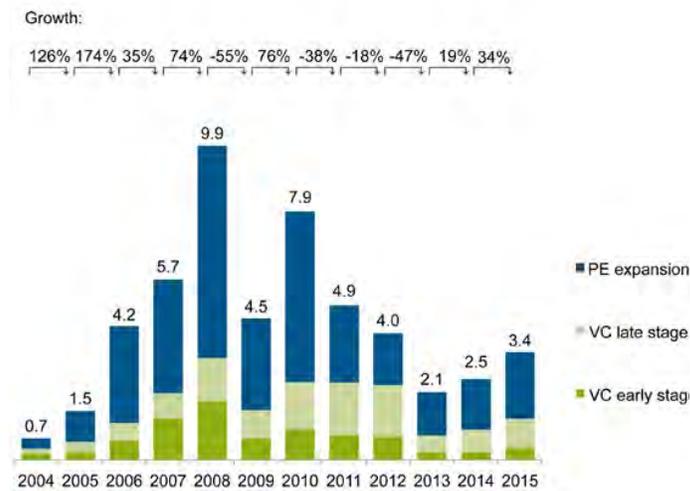
Globally, the U.S. has maintained its leadership in venture capital and private equity investment, accounting for 65 percent of the global total in 2015, a 38 percent increase on the year before (see chart on next page). Europe, on the other hand, had a marked decline since 2012. Notably, the increase in venture investing

in Asia has helped the region gain market share over the last two years. For the first time ever, Greater China recorded more deals in a year than Europe. India, meanwhile, produced 927 deals, according to Preqin, almost twice the number seen in 2014.

Despite the upward trend in renewable energy investment dollars, public market investment in renewable energy was down 21 percent on the previous year’s figure, totaling \$12.8 billion in 2015. Overall, clean energy shares trailed down 0.6 percent in 2015, in line with the U.S. S&P 500 index. As countries emerge from the recession, policy support for renewables has remained uncertain in different parts of the world. While Asian economies, backed by government support, have ramped up renewable energy investments, developed economies have struggled to sustain historical levels

of feed-in tariffs and subsidies. For example, post-election in May 2015, the new UK government decided to halt subsidies for new onshore wind and solar projects, bringing new renewable investments in the country to a standstill. Also, the big fall in coal, oil and gas prices for the last year may have a two-fold effect—making cost competitiveness of renewable energy projects less attractive for developed economies and, at the same time, enticing some developing countries to keep relying on fossil-fuel capacity for longer.

VC/PE NEW INVESTMENT IN RENEWABLE ENERGY BY STAGE, 2004-2015, \$ IN BILLIONS



Buy outs are not included as new investment. Total values include estimates for undisclosed deals.
Source: Bloomberg New Energy Finance, UNEP

VC/PE NEW INVESTMENT IN RENEWABLE ENERGY BY REGION, 2004-2015, \$ IN BILLIONS



Buy outs are not included as new investment. Total values include estimates for undisclosed deals.
Source: Bloomberg New Energy Finance, UNEP

The big fall in coal, oil and gas prices for the last year may have a two-fold effect—making cost competitiveness of renewable energy projects less attractive for developed economies and, at the same time, enticing some developing countries to keep relying on fossil-fuel capacity for longer.

Sophisticated tenants are expecting a higher level of tenant experience and health and wellness aspects are becoming more and more sought as tenants understand the role that “space” plays in their ability to attract and retain talent in a competitive marketplace.

Real Estate: Looking Forward

David Pogue, CBRE Global Director of Corporate Responsibility, provided the following state of the industry:

“For the past couple years we have been noting the high proliferation of buildings with environmental or sustainability certification. Nearly all high profile assets in first-tier markets now display either an Energy Star or USGBC LEED certification, or more commonly both. More and more cities are considering or have passed energy usage disclosure legislation while at the same time more and more local building departments are adopting building codes that either directly mandate LEED certification or liberally borrow from their standards. Most new construction of any size or quality everywhere is now nearly certain to be certified.

“So what is next? How do the most sustainable, greenest buildings in the market now differentiate themselves when everyone is also green? The answer may be found in a widening understanding that occupancy itself in a sustainable building or space may actually enhance a company’s bottom line far in excess of any financial savings from energy

efficiency programs alone. Also to note, most energy efficiency and LEED-related elements are primarily structural or building system in nature. Most improvements in energy usage are gained through capital improvements to energy consuming systems or processes like lighting, mechanical or building controls. Further, most aspects of LEED are structural, site or materials centric. Engineers and architects have heretofore played a dominant role in defining, designing and specifying sustainable building characteristics and certification standards. Less attention has been paid to either tenant demands and interests, or perhaps more importantly, occupant outcomes. But this may be changing as a new focus is being placed on these two aspects.

“There are at least three streams of activity examining this factor. They include academic studies in improvements in occupant performance, and a new understanding of tenant preferences, as well as an enhanced reporting protocol for measuring institutional real estate performance in providing healthy work places.

“In the first study, Harvard researchers have determined that when optimum levels of fresh air are introduced in a laboratory setting, test subjects demonstrate significant improvement in cognitive function in a wide range of performance indicators, including focus, task orientation, and strategic thinking. The Harvard researchers have now conducted a companion field study following the procedures of the laboratory work. Those results will be released this fall. If they corroborate the earlier findings, a larger study will be launched. This work has the potential to dramatically change the way occupants and landlords both approach indoor air quality going forward and is being closely watched by the industry.

“The second academic work was aimed at discovering tenants’ actual preferences for sustainable building features. This study, sponsored and supported through a grant by CBRE through the Real Green Research Challenge, interviewed dozens of office building owners, gathered data from hundreds of office buildings



and surveyed thousands of office tenants. The results determined that the two features most sought and valued by tenants were access to natural light and improved indoor air, proving that all green features are not equal in the eyes of the tenant! This study will also be released this fall.

“And finally, the Global Real Estate Sustainability Benchmark (GRESB) has also introduced a Health and Wellness module to their annual performance survey this year. Although it is only a beta this year, it is expected that in future years institutional investors reporting through this popular protocol will increasingly be judged on their ability to demonstrate actions in this area.

“Sophisticated tenants are expecting a higher level of tenant experience and health and wellness aspects are becoming more and more sought as tenants understand the role that “space” plays in their ability to attract and retain talent in a competitive marketplace. The office building of the future must understand that and provide an “experience.” Location, location, location is being replaced by “outcome, outcome, outcome.”

Infrastructure: Looking Forward

Globally, concern over climate change continues to grow as does the need to replace older, fossil fuel burning power generation with cleaner solutions. Against this backdrop, governments throughout the world are instituting policies to reduce greenhouse gas emissions by increasing both renewable power generation capacity and the efficiency of existing power plants. To achieve these goals, there will need to be increased infrastructure investment within the power industry.



Significant investment in infrastructure will be required to meet the increasing demand for clean power. Increased investment in wind and solar power generation will be necessary to expand zero-emission energy capacity. Additional capital will be required to expand and upgrade the electric power grid so that the additional wind and solar power loads can be accommodated. Investments in existing plants will be necessary to reduce their carbon emissions or, in some cases, replace them entirely. The need for capital to expand and improve the power sector will likely increase the number of infrastructure investment opportunities.

With these changes, also comes increased risk. Changes to law or regulatory regimes can directly and indirectly alter the return profile of existing and future infrastructure investments. Governments may modify incentives and taxes causing decreased revenues and increased expenses for currently operating projects or those under consideration. As the energy mix changes to include a greater share of renewables, with their near-zero marginal cost of production, the price of energy may fluctuate more dramatically

depending on when the sun is shining and wind is blowing. As these risks increase, they become a larger factor in investment decisions.

The Infrastructure staff continues to monitor the infrastructure market for investment opportunities while monitoring energy policy and its effects within the power sector. Climate change and operational efficiencies toward green/sustainable investing is a key focus during investment due diligence and asset management. Infrastructure staff is proactively reviewing the market for a strategic partner to manage an investment vehicle designed to take advantage of the current market for renewable power generation assets. Such an investment would capitalize on the transformation taking place in the power generation markets.

GREEN TEAM STRATEGIC PLAN

The CalSTRS Green Team has identified several initiatives that it believes will allow the team to achieve its goals of incorporating environmental considerations into investment risk management and opportunity capture. Over the past few years, team members have been working on the following:

- 1 Continued education on environmental risk issues and environmental-themed investment opportunities.
- 2 Integration of environmental risk factors into manager procurement processes and ongoing due diligence efforts.
- 3 Improving ability to consider increased allocations to environmental-themed investments.
- 4 Integration of environmental considerations into asset allocation processes.

During the past fiscal year, initiative one was substantively undertaken as staff brought in several environmental experts to discuss risk management and investment opportunity capture. Representatives from CalSTRS' external investment managers, [Cartica Management](#) and [Actis](#), spoke with Green Team staff during fiscal year 2015–16. Also, three members of the Green Team attended the Sustainable Innovation CDP Spring Workshop 2016 at Google's Tech Corners campus. For fiscal year 2016–17, staff will continue to seek educational opportunities and work to grow its knowledge base.

Consideration of initiative two was also seen during fiscal year 2015–16. The CalSTRS Global Equity Unit continued to engage external managers on environmental issues, and environmental consideration is part of manager selection efforts. Additionally, staff enhanced the reporting mechanism through which external managers affirm they are considering environmental risks.

Commitment to initiative three was also seen during fiscal year 2015–16. The CalSTRS Fixed Income Unit continued to grow its green bonds holdings and the Inflation Sensitive Unit, through its infrastructure program, added new green investments to the CalSTRS Investment Portfolio. For fiscal year 2016–17, Green Team staff will continue to consider additional green investments that meet CalSTRS risk and return requirements.

Progress was also seen in terms of support for initiative four. As discussed earlier, CalSTRS was a participant in Mercer's climate change asset allocation study which analyzed how various asset classes would be expected to perform under differing climate change scenarios. For fiscal year 2016–17, Green Team staff will continue to consider ways in which the results of the Mercer study can be further integrated.

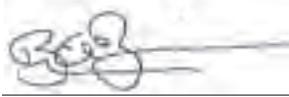
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CONCLUSION

Consistent with CalSTRS' commitment to manage environmental risks and take advantage of appropriate environmental-themed investments, the Green Initiative Task Force will continue to work at identifying environmentally focused strategies intended to enhance the risk-adjusted returns of the overall CalSTRS portfolio and will continue to search for new investment opportunities while providing leadership and maintaining CalSTRS' position at the front of the green movement.

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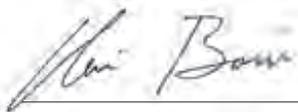
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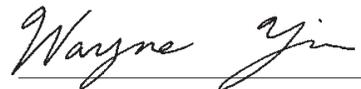
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CALSTRS
HOW WILL YOU SPEND YOUR FUTURE?