



RETIREMENT BOARD CALENDAR SHEET
Retirement Board Meeting of September 12, 2018

To: Retirement Board

Through: Jay Huish *JH*
Executive Director

William J. Coaker Jr., CFA, MBA *WJC*
Chief Investment Officer

From: Kurt Braitberg – CFA, CAIA *KB*
Managing Director, Public Markets

Andrew Collins *AC*
Director of ESG Investing

Date: October 10, 2018

Agenda Item:

Update on Six Strategies to Address Climate Transition Risk

Background:

At the January 24, 2018 Retirement Board meeting, the SFERS Board approved six strategies to address climate risk in the SFERS portfolio. These are summarized as follows:

1. Adopt a carbon constrained strategy for \$1 billion of SFERS passive public markets portfolio;
2. Hire a Director of ESG Investing;
3. Partner with key public pension asset owners and other institutional investors to share resources and to develop and support collaborative initiatives to reduce carbon emissions;
4. Increase SFERS' company engagement activities under Level II of the Board's ESG Policies and Procedures including continued participation in initiatives coordinated by Ceres, PRI, and others; enhance proxy voting and engagement activities consistent with PRI Principle 2;
5. Pursue renewable energy and carbon-constrained investments; and
6. Define an approach to identifying the highest risk fossil fuel assets; establish procedures for a "Watch List" of high risk fossil fuel assets; establish goals and timelines for any engagements with fossil fuel companies under Level II engagement; outline options for a targeted, phased divestment process of high risk assets; identify options for replacing any divested assets with lower risk, cleaner assets.

Investment Staff's attached memorandum provides a summary of progress Investment Staff has made on Strategies Areas 1 through 5 and presents a set of recommendations to implement Strategy Area 6.

Recommendations:

1. Modify the first strategy approved by the Retirement Board on January 24, 2018 as follows:
Adopt a carbon constrained strategy for \$1 billion of SFERS ~~passive~~ public markets portfolio.
2. To fulfil the Board's request to being "prudently phased divestment", divest positions in five companies, restrict further investment in those companies as well as two additional companies that display high climate transition risk across key categories of the Framework
3. Engage with companies that are determined to be high climate transition risk according to the Framework, companies in the top 10 SFERS fossil fuel holdings that have at least one risk indicator, and companies engaged in tar sands activities.
4. Engage with thermal coal companies that receive between 10-50% of revenue from thermal coal. Considering divesting from any companies that do not make a commitment to exit the thermal coal business in the near term.
5. Engage with existing and potential external managers that hold positions in fossil fuel companies, beginning with those that are invested in high climate transition risk companies, to understand how they are including considerations of climate risk in their investment process.

Attachment:

Staff Memorandum



SFERS
San Francisco Employees' Retirement System

San Francisco Employees' Retirement System (SFERS) Update on Strategies to Address Climate Risk

October 10, 2018

Andrew Collins, Director of ESG Investing

SFERS Update on Strategies to Address Climate Risk

During the January 24, 2018 Retirement Board meeting, the SFERS Board approved six strategies to address climate risk:

1. Adopt a carbon constrained strategy for \$1 billion of SFERS passive public markets portfolio
2. Hire a Director of ESG Investing;
3. Partner with key public pension asset owners and other institutional investors to share resources and to develop and support collaborative initiatives to reduce carbon emissions;
4. Increase SFERS company engagement activities under Level II of the Board's ESG Policies and Procedures including continued participation in initiatives coordinated by Ceres, PRI, and others; enhance proxy voting and engagement activities consistent with PRI Principle 2;
5. Pursue renewable energy and carbon-constrained investments; and
6. Define an approach to identifying the highest risk fossil fuel assets; establish procedures for a "Watch List" of high risk fossil fuel assets; establish goals and timelines for any engagements with fossil fuel companies under Level II engagement; outline options for a targeted, phased divestment process of high risk assets; identify options for replacing any divested assets with lower risk, cleaner assets.

SFERS Update on Strategies to Address Climate Risk

Select Progress on Strategy Areas 1 – 5:

- Over \$1.3 billion invested and committed – 5% of plan assets – to strategies focused on low-carbon and climate transition opportunities, including:
 - \$500 million to a passive public equities strategy w/ 50% lower emissions than the Russell 1000; up to \$500 million to a global equity strategy w/ 70-80% lower emissions than the MSCI World Index; up to \$100 million in 2018 in private markets investments focused on solar, wind, energy storage, EV charging, and energy efficiency.
- Active participant in the Ceres Carbon Asset Risk (CAR) Working Group and the Climate Action 100+ Initiative, including engaging around climate-risk topics with two “supermajor” oil and gas companies, which are among the top 10 SFERS holdings in fossil fuel reserve owning companies.
- Voting in support of 65 climate-risk related shareholder resolutions during the 2018 proxy season, including key votes at Kinder Morgan, Anadarko Petroleum Corporation, and Range Resources Corporation that received majority shareholder support.
- Signatory to the Investor Agenda, launched at the September 2018 Global Climate Action Summit, and developed by the Asia Investor Group on Climate Change, CDP, Ceres, the Investor Group on Climate Change, the Institutional Investor Group on Climate Change, PRI, and UNEP Finance Initiative.
- Signatory to a letter to the G7 leadership in advance of their June 8-9, 2018 meeting, encouraging governments to: (1) Achieve the Paris Agreement’s goals; (2) Accelerate private sector investment into the low carbon transition; and (3) Commit to improve climate-related financial reporting.
- Became official supporter of the Taskforce for Climate-Related Financial Disclosure (TCFD) an initiative of the Financial Stability Board, which develops voluntary, consistent climate-related financial risk disclosures for use by companies in providing information to investors, lenders, insurers, and other stakeholders.
- Plan to participate in the newly launched C40 Divest/Invest Forum initiative, of which the San Francisco is a founding city.

SFERS Update on Strategies to Address Climate Risk

We are now focused on addressing Strategy Area 6, which requests Staff:

Define an approach to identifying the highest risk fossil fuel assets; establish procedures for a "Watch List" of high risk fossil fuel assets; establish goals and timelines for any engagements with fossil fuel companies under Level II engagement; outline options for a targeted, phased divestment process of high risk assets; identify options for replacing any divested assets with lower risk, cleaner assets.

Staff surveyed the landscape of existing approaches without finding one that was suitable for the task. Therefore, Staff developed its own approach to assessing climate transition risk, innovating in key ways:

1. Forward Looking

While other approaches use lagging or static indicators, Staff focused on forward-looking, scenario based metrics

2. Multi-Dimensional

Many analytic tools focus on one metric, but climate risk is complex and varied; Staff focused on a multi-dimensional risk framework

3. Investment Relevant

Measuring only environmental impact does not give insight into investment risk, so Staff focused on also identifying measured of financial risk

4. Transparent and Replicable

Black box approaches make collaboration difficult, so Staff focused on accessing data that is transparent and widely accessible

SFERS Update on Strategies to Address Climate Risk

We began by asking:

What are the regulatory, technological, economic, and environmental forces that are shaping the future of global energy systems? How will these affect the long-term performance of fossil fuel companies?

1. Constraints on which fossil fuel reserves are brought to market

A 2°C constrained world necessitates up to 33% of oil reserves, 50% of gas reserves, and +80% of coal reserves remain unburned through 2050. At the same time, in such a scenario the IEA projects that fossil fuels will still account for 40% of global energy needs in 2040. Fundamentally there will be winner and losers in this transition.

2. A price on carbon and a premium for energy efficiency

The Oil & Gas sector contributes 10% of global GHGs and itself consumes 7% of fossil fuel supply. At least 67 jurisdictions – accounting for more than half of the global economy – currently put a price on carbon with more likely to come. Managing operational emissions is necessary to mitigate regulatory costs now and into the future.

3. Evolving and complex climate regulations around the globe

Lobbying and other political spending aimed at blocking climate policy can signal a shortsighted risk management approach. Companies that pursue this approach may not have a long-term strategy to manage their company's transition to a low carbon economy, whereas companies that are collaborative rather than obstructionist will be better positioned to navigate increasingly complex climate regulations and strategically manage the market shift to a low carbon economy

4. A need for capital discipline in uncertain times

Oil & gas companies often rely on debt to finance their capital intensive operations. Companies that are heavily levered and lack the cash to service debt obligations may have poor long term financial health. On the other hand, those companies with healthy balance sheets are likely to be better positioned in the long term to weather prolonged low oil prices. Given the changing energy landscape, companies with stable capital structures and capital discipline are likely better positioned to stay nimble and succeed in the future.

SFERS Update on Strategies to Address Climate Risk

1

Fossil Fuel Reserve Mix

What types of fossil fuel reserves does the company own – relatively cheap or expensive?

2

Operational Emissions & Efficiency

How carbon intensive are direct operations and is progress being made to operate more efficiently over time?

3

Climate Policy Approach

How does the company engage with regulators and policy makers around climate legislation – does it support climate regulation or actively oppose it?

4

Financial Health & Capital Discipline

How is cash being spent – to acquire new reserves for other purposes?

Does the company have a high debt burden, and can it service that debt going forward?



We distilled these trends into 4 key question areas



1

Fossil Fuel Reserve Mix

(1a) % of projected capex through 2025 stranded in SDS vs. NPS

(1b) % of projected capex through 2025 stranded in B2DS vs. NPS

2

Operational Emissions & Efficiency

(2a) Scope 1 + 2 CO₂e / SMM rev

(2b) Percentage change in Scope 1 + 2 CO₂e/ SMM rev over 1 year

3

Climate Policy Approach

(3a) InfluenceMap Total Score

4

Financial Health & Capital Discipline

(4a) Altman Z-score

(4b) Free Cash Return on Assets

We identified quantitative metrics for each area



SFERS
San Francisco Employees' Retirement System

SFERS Update on Strategies to Address Climate Risk

In addition to independent research, Staff consulted with experts in climate finance to:

- **Validate our views about impacts of the transition to a low-carbon economy;**
- **Better understand the drivers of risk for fossil fuel companies; and**
- **To vet the suitability of our proposed Framework.**

Key experts that Staff consulted with include:

- **Carbon Tracker Initiative** – think-tank of climate finance experts that invented the concept of “stranded assets”
- **World Resources Institute** – globally respected NGO with Finance Center that houses its Sustainable Investing Initiative
- **2° Degrees investing Initiative (2°II)** – think-tank whose research is used by 3 financial regulators and +200 financial institutions in Europe, the US, and elsewhere
- **InfluenceMap** – leading NGO in assessing, ranking and communicating the extent to which corporations are lobbying climate and energy policy worldwide

Understanding what the Framework does not measure is just as important as understanding what is does measure. Staff notes some key issues on its scope and limitations:

Scope

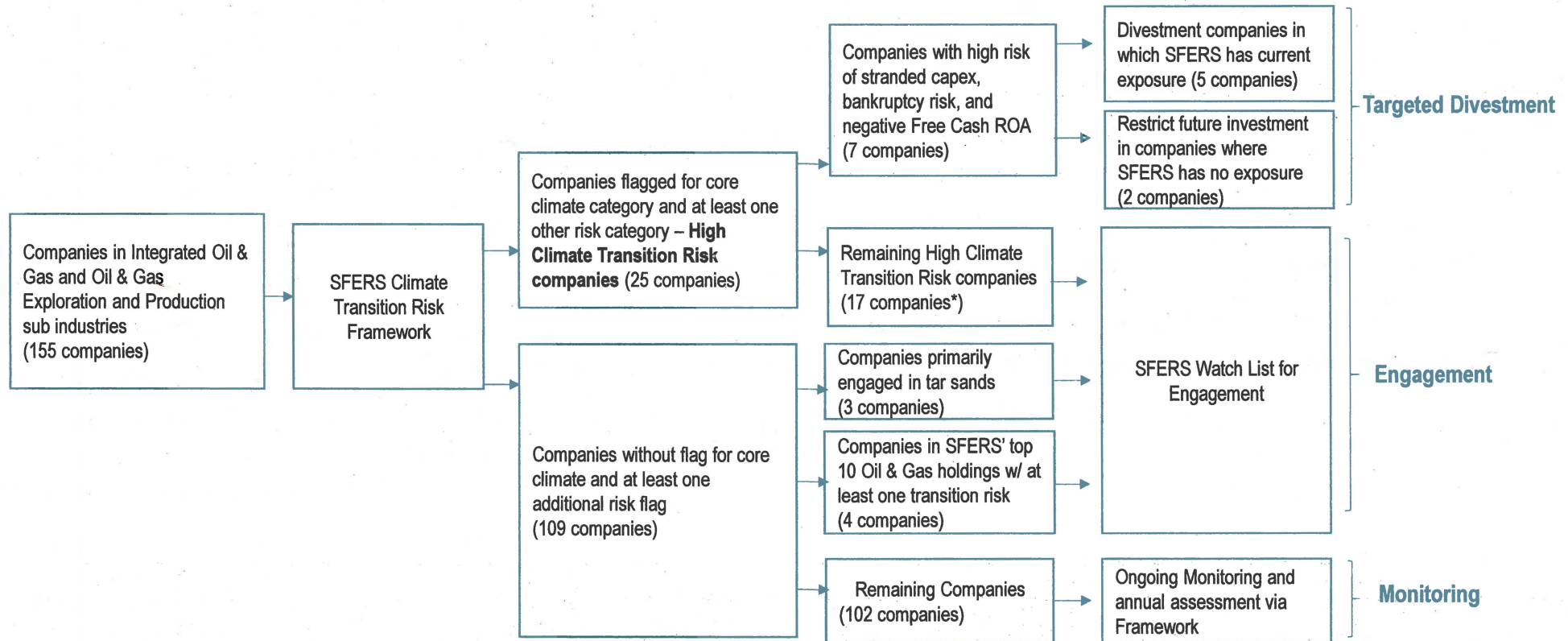
- Limited to public markets portfolios (public equity and debt investments)
- Limited to companies that own oil and gas reserves (i.e., does not address thermal coal companies)

Key limitations

- Framework is a tool to identify risks and not an investment decision making framework
- The quality, completeness, and time periods of data are not perfect
- Does not attempt to address full range of environmental, social, governance, or other risks that oil & gas companies face

SFERS Update on Strategies to Address Climate Risk

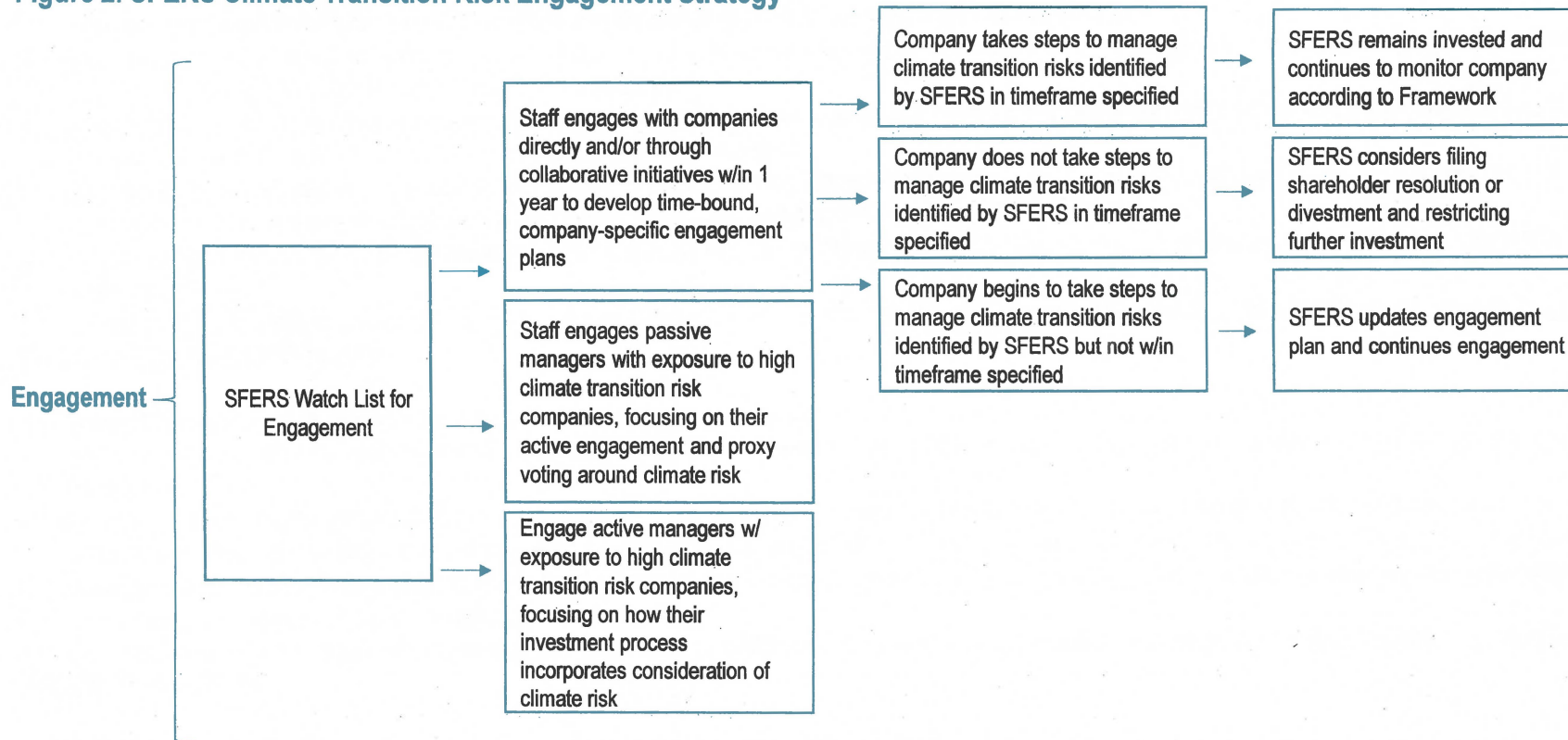
Step 1. Applying the SFERS Climate Transition Risk Framework



* Excludes one company in which SFERS does not have current investment; this company will be subject to ongoing monitoring via the Framework

SFERS Update on Strategies to Address Climate Risk

Figure 2. SFERS Climate Transition Risk Engagement Strategy



SFERS Update on Strategies to Address Climate Risk

Ultimately, this work results in a set of key next steps and series of recommendations:

Summary of Next Steps

- Continue to identify and prioritize investments consistent with Strategy Area 5 "Pursue renewable energy and carbon-constrained investments" and report annually on the amount and performance of these investments.
- Annually, re-run the Framework analysis for SFERS' investments in companies that own fossil fuel reserves; add and remove companies to the Watch List for engagement based on the process described herein; consider future companies for "prudent phased divestment" according to the process described herein.
- Continue to improve the robustness of the climate transition risk framework through evaluating additional categories of risk, improving data quality, and improving data coverage.
- Continue collaborating with other investors, collaborative initiatives, think-tanks, regulators, and others to manage the investment risks associated with climate changes, including through sharing and educating others on the SFERS' Framework.

Summary of Recommended Actions

1. Modify the first strategy approved by the Retirement Board on January 24, 2018 as follows: Adopt a carbon constrained strategy for \$1 billion of SFERS passive public markets portfolio.
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Questions & Discussion




SFERS

San Francisco Employees' Retirement System

City and County of San Francisco
Employees' Retirement System

To: Retirement Board

Through: Jay Huish 
Executive Director

William J. Coaker Jr. – CFA, MBA 
Chief Investment Officer

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This memorandum provides a summary of progress Investment Staff ("Staff") have made on Strategies Areas 1 through 5 and presents a set of recommendations to implement Strategy Area 6.

The progress Staff have made on Strategy Areas 1 through 5 is significant. In 2018 alone, SFERS has adopted a carbon constrained passive strategy, continued to invest in renewable energy and low carbon opportunities, hired a full-time Director of ESG Investing, partnered with global leaders on collaborative initiatives to address climate risk, engaged directly with oil & gas companies, supported key shareholder resolutions on climate risk, and engaged in advocacy around climate policy.

SFERS continues to establish itself as a national leader in taking measurable steps to align its management of plan assets in a way that prudently considers the risks posed by global climate change.

In total, SFERS investments and commitments to low-carbon, renewable energy, and related funds totals over \$1.3B or over 5% of plan assets. This places SFERS as a national leader in terms of investing a significant percentage of plan assets in a manner that considers climate risks and opportunities. Few other US public pensions with plans assets similar in size to SFERS have been as active.

Staff will continue to explore carbon-constrained, low-carbon, and renewable energy opportunities across asset classes, including passive and model-driven strategies that may be informed by the SFERS climate transition risk framework described here-in. In addition, Staff will report annually on the amount and performance of these investments.

SFERS Climate Risk Progress:

SFERS has taken a variety of significant and meaningful steps to address climate transition risk and opportunity in its investment portfolio. These actions, described below, are aligned with Strategy Areas 1 through 5, above.

The steps that SFERS has taken, at the Board's direction, establish SFERS as a global leader in reducing its exposure to future climate risks and finding investment opportunity in the transition to a low carbon economy.

Progress in 2018

- SFERS has committed \$500MM to a passive public equities strategy managed by Goldman Sachs Asset Management (GSAM), the "Risk Aware Low Emissions" strategy that has at least 50% lower emissions than the Russell 1000.
- SFERS has committed up to \$500MM to the Global Equity Strategy fund managed by Generation Investment Management which is 70-80% less carbon intensive than its benchmark, the MSCI World Index.
- SFERS has committed \$50MM to Sustainable Asset Fund II managed by Vision Ridge Partners, which invests in sustainable real assets including solar, EV charging, energy efficiency, and others
- SFERS has committed \$50MM to New Energy Capital Infrastructure Credit Fund II, L.P. managed by New Energy Capital Partners, which invests in clean energy or clean infrastructure projects including, solar, wind, energy storage, and energy efficiency among other renewables.
- SFERS has been a participant in the Ceres Carbon Asset Risk (CAR) Working Group and the Climate Action 100+ Initiative.

- SFERS Staff has engaged around climate-risk topics with two “supermajor” oil and gas companies, which are among the top 10 SFERS holdings in fossil fuel reserve owning companies.
- SFERS voted in support of 65 climate-risk related shareholder resolutions during the 2018 proxy season, including key votes at Kinder Morgan, Anadarko Petroleum Corporation, and Range Resources Corporation that received majority shareholder support. An important narrative of this year’s proxy season was the significant number of climate resolutions that were withdrawn by filers (nearly half of those tracked by Ceres) due, in most cases, to management’s agreement to address the topics included in the resolution through dialogue, commitment, or some other means.
- SFERS became a signatory to the Investor Agenda, launched at the September 2018 Global Climate Action Summit, and developed by the Asia Investor Group on Climate Change, CDP, Ceres, the Investor Group on Climate Change, the Institutional Investor Group on Climate Change, Principles for Responsible Investment and UNEP Finance Initiative.
- SFERS was a signatory to a letter to the G7 leadership in advance of their June 8-9, 2018 meeting, encouraging governments to: (1) Achieve the Paris Agreement’s goals; (2) Accelerate private sector investment into the low carbon transition; and (3) Commit to improve climate-related financial reporting.
- SFERS has become an official supporter of the Taskforce for Climate-Related Financial Disclosure (TCFD), an initiative of the Financial Stability Board which develops voluntary, consistent climate-related financial risk disclosures for use by companies in providing information to investors, lenders, insurers, and other stakeholders.
- SFERS will participate in the C40 Divest/Invest Forum initiative, of which the City of San Francisco is a founding city. This initiative places San Francisco alongside peers from New York, London, and others in sharing information and best practices around managing investment risk due to climate change. Mayor Breed said about the initiative, “As a founding city of the C40 Divest/Invest Forum we are ready to work with mayors around the world to accelerate global fossil fuel divestment and to ensure our investment strategies support a climate resilient, clean energy future.”
- SFERS Staff have spoken publicly on ESG investing and climate risk at conferences hosted by the Principles for Responsible Investing (PRI), Carbon Tracker Initiative, the Sustainability Accounting Standards Board (SASB), CFA Society of New York, CleanTechIQ, and others.

Progress Prior to 2018

- In 2017, SFERS committed up to \$100MM to Denham Capital Management’s International Power fund, which invests in solar, wind, hydro and efficient gas-fired generation in developing countries.
- In 2015, SFERS invested \$100MM invested in a passive public equities strategy that has tracked the MSCI US Ex-Fossil Fuel Index.
- Across its private markets portfolio SFERS has committed over \$40 million to a wide range of funds that invest in solar energy, wind energy, solar manufacturing, and energy efficiency opportunities.

Other General ESG Actions

- In 2017, SFERS became an official signatory to the Principles for Responsible Investing (PRI) which commits SFERS to upholding the six PRI principles: Principle 1 – We will incorporate ESG issues into investment analysis and decision-making processes; Principle 2 – We will be active owners and incorporate ESG issues into our ownership policies and practices; Principle 3 – We will seek appropriate disclosure on ESG issues by the entities in which we invest; Principle 4 – We will promote acceptance and implementation of the Principles within the investment industry; Principle 5 – We will work together to enhance our effectiveness in implementing the Principles; Principle 6 – We will each report on our activities and progress towards implementing the Principles.
- In July 2018, SFERS committed up to \$300M to Cartica Investors, LP an emerging markets-focused public equity manager that actively engages with companies in its portfolio to improve performance on environmental, social, and governance (ESG) issues.
- In December 2017, SFERS committed up to \$100M to the TPG Rise Fund (A), a growth-focused impact investing fund that seeks to achieve social and environmental impact alongside competitive financial returns.
- SFERS has made \$900 million of investments in the life sciences, a sector that meaningful positive social impact through improved health, wellness, and quality of life, and at the same time inherently has a low-carbon footprint. In its public markets portfolio SFERS has committed up to \$200M to BVF Partners' Biotechnology Value Fund and up to \$200M to Rock Springs Capital Fund. In its absolute return portfolio, SFERS has invested \$100M in Perceptive Capital LLC's Perceptive Life Sciences Qualified Fund. In its private markets portfolio, SFERS has invested over \$400M in the life sciences, including health care equipment, pharmaceutical, biotechnology, and health care services.

Other Public Funds' Actions

SFERS continues to learn best practices from others taking steps to manage climate risk and pursue opportunities created by the transition to a low carbon economy. Following is a representative, but non-exhaustive, list of actions that peers have taken:

New York State Common Retirement Fund

- The \$207 billion fund has \$4 billion committed to the Goldman Sachs Asset Management "Risk Aware Low Emissions (RALE)" strategy. It has at least \$3 billion in ESG investments across asset classes, including \$400 million with Generation Investment Management; \$300 million with the Rockefeller Asset Management Global Sustainability and Impact Strategy; \$150 million with the TPG Rise Impact Fund; LEED Gold real estate investments; investments green bonds; and a variety of private equity investments.
- In total, NYCRCF has at least 3% of plan assets invested in low-carbon and/or climate opportunities.

New York City Pension Funds

- The City Comptroller who oversees the five funds that collectively have \$195 billion in assets, announced a three-year plan to double holdings in renewable energy, energy efficiency, and other climate-change solutions to \$4 billion.

- If the funds collectively achieve this goal, it would amount to approximately 2% of plan assets up from approximately 1% of plan assets.

CalSTRS

- CalSTRS' \$225 billion fund has invested and committed approximately \$5.5 billion to low-carbon, renewable energy, and energy efficiency investments across its portfolio. This includes over \$280 million with AGF Investments, over \$750 million with Generation Investment Management, \$254.7 million in green bond holdings, and over \$200 million in wind, solar, and green real estate assets.
- CalSTRS has implemented a \$2.5 billion MSCI ACWI Low-Carbon Target Index, \$1.3 billion of which was funded with US market in July 2017 with \$1 billion to non-US Developed Markets and \$200 million to Emerging Markets to follow.
- In total, CalSTRS has at least 2% of plan assets invested in low-carbon and/or climate opportunities.

CalPERS

- CalPERS' \$350 billion fund has a private equity portfolio with at least \$850 million in clean tech and renewable energy investments and integrates ESG considerations in its manager selection and internal investment process. It recently terminated a \$500 million allocation to an internally managed environmental index fund modeled on the HSBC Global Climate Change Index.
- CalPERS is highly active in engaging with companies around climate risk, carbon emissions, and the transition to a low carbon economy. Following CalPERS commitment to the UN Montreal Pledge, it conducted a carbon footprint of its portfolio and identified a small portion of companies responsible for the majority of carbon emissions. As a result, it launched the Climate Action 100+ (CA100+), a coalition currently with over 230 investors representing \$28T+ in assets that are systematically engaging over 150 companies on this topic over a five-year period.

CLIMATE RISK STRATEGY AREA 6

While more work can and will be done in Strategy Areas 1 through 5, this memo primarily focuses on Strategy Area 6, which requests that Staff:

- *Define an approach to identifying the highest risk fossil fuel assets;*
- *Establish procedures for a "Watch List" of high risk fossil fuel assets;*
- *Establish goals and timelines for any engagements with fossil fuel companies under Level II engagement;*
- *Outline options for a targeted, phased divestment process of high risk assets; and*
- *Identify options for replacing any divested assets with lower risk, cleaner assets.*

Investment Staff fundamentally believes that (1) there are long term, mounting future risks to the conventional energy sector not being captured in the markets today, and (2) that investment risks and environmental risks of fossil fuel firms are more nuanced than captured by the current prevailing approaches.

While there are numerous publicly available and commercial tools that have data related to climate risk and the environmental impact of the fossil fuel sector, Staff believe these existing approaches paint an incomplete picture of risk. They are typically focusing on one facet of risk, such as the amount of fossil fuel reserves ownership, the primary industry classification of a company, or the carbon emissions profile. Others lack transparency in their methodology, rely on highly qualitative assessments of risks, and/or do not include considerations of financial risk alongside climate impact.

SFERS is seeking to identify which companies may be relatively higher climate transition risk and which ones are relatively lower risk from an investment perspective, consistent with our fiduciary duty. Therefore, Staff has sought to develop a methodology that looks at multiple factors in a manner that provides a more holistic view of climate transition risk.

Staff has sought to build upon existing approaches in several important ways:

Forward-Looking

Climate transition risks are expected to become increasingly impactful in the future, and these risks are without direct historical precedent in financial markets. Therefore, a forward-looking view is essential. Staff has sought to develop a forward-looking approach rather than one that is backwards looking and reliant on static or lagging indicators.

Multi-Dimensional

Climate change presents a variety of challenges for businesses across the economy, including physical risks, regulatory risks, technology and low-carbon transition risks, and potentially legal liability risks. Because of such diversity, Staff believes (1) each company is positioned differently relative to its peers, and (2) that understanding each company's positioning requires the use of multiple measures of risk.

Investment Relevant

In addition to identifying metrics that measure risk and impact from an environmental perspective, Staff has focused on identifying relevant measures of financial risk. In understanding the ability for fossil fuel companies to navigate the complex set of climate risks, it is essential to understand their financial

positioning. The transition to a low carbon economy will likely exacerbate challenges for those that are poorly positioned from a financial health perspective.

Transparent and Replicable

Like other investors, Staff understands the challenges with obtaining comparable, robust, and material environmental data. Fortunately, many organizations both for-profit and non-profit focus on generating high quality data of this nature, and many focus specifically on fossil fuel companies. Collective action amongst investors is essential to address the investment risks associated with climate changes.

Therefore, SFERS prioritizes data that is transparent, widely available (and often free), and quantitative in nature, such that others could learn from and/or replicate SFERS' work in this space.

Taking these factors into consideration, Staff has developed a data-driven methodology to:

- (1) Rank and prioritize fossil fuel companies based on the degree of long-term risk they likely face as the world transitions to a low-carbon economy.
- (2) Utilize that methodology to guide action that reduces our exposure to the highest climate transition risks, including engagement with companies, engagement with SFERS' external asset managers, and divestment when necessary.

Scope and Limitations:

The scope of this assessment has been limited to SFERS' public markets portfolios (public equity and debt investments) and is limited to assessing companies that own oil and gas reserves.

This initial scope has been guided by the assumption that:

- Public markets are where SFERS' biggest exposures to the largest impact companies reside; where we have transparent data to assess risks; where we have most liquidity and ability to exit positions should we choose to; and where we have the ability to influence corporate behavior as shareholders. Other asset classes could be explored and assessed at a later phase.
- Direct owners of fossil fuel (specifically oil and gas) reserves – those with risk of stranded reserves – face the significant impacts in the low-carbon transition. Staff is aware, however, that electric utilities, downstream oil companies, pipeline operations, and oil & gas services companies face similar climate risks, and nearly all companies across the economy face some degree of climate risk. SFERS' exposure to climate risks in other sectors could be explored and assessed at a later phase.

Key limitations of the Framework include, but are not limited to:

- Lack of complete datasets that cover every company in the analysis due to either: (1) lack of disclosure by certain companies, or (2) lack of coverage by data providers.
- Lack of temporal overlap of datasets (i.e., certain datasets relate to different periods in time than others).
- Lack of consideration of the relative valuation of companies; the framework does not utilize traditional financial ratios to provide insight in whether companies are considered relatively expensive or cheap.

- Lack of consideration of companies outside of the sub-industries "Integrated Oil & Gas" and "Oil & Gas Exploration and Production" that may own significant oil and gas reserves. While the number of these companies is likely small, and it is likely that oil & gas contributes a relatively small portion of these companies' revenues, Staff will continue to explore access to robust data sources that can identify reserve ownership regardless of industry classification.
- Lack of consideration of the specific types of oil and gas reserves that a company owns (e.g., conventional oil and gas versus unconventional hydrocarbons like oil sands), location of reserves (e.g., ultra-deepwater or Arctic), or ownership of coal reserves. These factors may indicate additional climate, ecological, social, reputational, regulatory, and financial risks for companies.

Framework Development:

Staff began development of its Framework by furthering our understanding of the regulatory, technological, economic, and environmental forces that are shaping the future of global energy systems (i.e., "the transition to a low-carbon economy"). Staff then outlined the core dimensions of risk for fossil fuel reserve owners in the transition to a low-carbon economy and developed a set of a priori assumptions of why each transition risk is material to SFERS' investments in those companies.

Four key trends were identified:

1. Constraints on which fossil fuel reserves are brought to market

A 2°C constrained world necessitates up to 33% of oil reserves, 50% of gas reserves, and +80% of coal reserves remain unburned through 2050 (Source: Nature 517, 187-190, 08 January 2015). At the same time, in such a scenario the IEA projects that fossil fuels will still account for 40% of global energy needs in 2040.

This likely means that fossil fuel reserves that are cleaner, easier to access, and less expensive to extract will fill this demand. Dirtier, more remote, and more expensive reserves will likely stay in the ground (this includes tar sands, Arctic reserves, and deepwater reserves); companies holding those types of reserves could face long-term risks.

2. A price on carbon and a premium for energy efficiency

The Oil & Gas sector contributes 10% of global greenhouse gas emissions and itself consumes 7% of fossil fuel supply (Source: US EPA, IEA). At least 67 jurisdictions – representing more than half of the global economy – put a price on carbon; emissions reductions efforts are only set to increase as Nationally Determined Contributions proposed through the Paris Agreement are enacted (Source: World Bank Group – Climate Change, Ecofys, vivid economics). Of particular concern is fugitive methane emissions from natural gas transport, which represent outsized environmental impact and lost revenues.

This likely means that energy efficient companies will be better positioned in an evolving regulatory landscape. At the same time, these companies should see better cost management through operational efficiencies.

3. Evolving and complex climate regulations around the globe

Lobbying and other political spending aimed at blocking climate policy can signal a shortsighted risk management approach. Companies that pursue this approach may not have a long-term strategy to manage their company's transition to a low carbon economy.

These companies may lack the proper governance structures to navigate increasingly complex climate regulations, strategically manage the market shift to a low carbon economy, and/or appropriately address legal liabilities related to climate change that may arise.

4. A need for capital discipline in uncertain times

Oil & gas companies often rely on debt to finance their capital intensive operations. Companies that are heavily levered and lack the cash to service debt obligations may have poor long term financial health. On the other hand, those companies with more favorable financial health are likely to be better positioned in the long term to weather prolonged periods of low oil prices.

In addition, how oil & gas companies are spending their cash is receiving more investor scrutiny. Some argue that returning cash to investors through buybacks or dividends is prudent. Concerns exist around deploying capital to acquire new fossil fuel reserves due to uncertainty about the future price of oil.

As energy markets continue to change over time due to climate policies, the rise of alternative energy sources, and the emergence of low carbon technologies, companies with stable capital structures and capital discipline are likely better positioned to succeed.

These four trends translate into a four-part framework to measure climate transition risk for fossil fuel reserve owners – one that seeks to use data points to answer fundamental questions around companies' business resilience and climate risk exposure in a forward-looking manner.

The framework categories and key questions are shown in Table 1.

Table 1. SFERS Climate Transition Risk Framework – Four Parts and Key Questions

1. Fossil Fuel Reserve Mix <i>What types of fossil fuel reserves does the company own – relatively cheap or expensive?</i>	2. Operational Emissions & Efficiency <i>How carbon intensive are direct operations and is progress being made to operate more efficiently over time?</i>
3. Climate Policy Approach <i>How does the company engage with regulators and policy makers around climate legislation – does it support climate regulation or actively oppose it?</i>	4. Financial Health & Capital Discipline <i>How is cash being spent – to acquire new reserves for other purposes?</i> <i>Does the company have a high debt burden, and can it service that debt going forward?</i>

Staff then worked to identify one or more quantitative data points to measure risk exposure in each part of the framework. Tables 2a-2d outline the assumptions behind each risk category and the quantitative data points that Staff identified to measure each risk.

Table 2a. Framework Part 1 – Fossil Fuel Reserve Mix

A priori assumption	Higher cost fossil fuel projects are at higher risk given a decline in price and demand. Higher cost reserves often have higher carbon content (e.g., oil sands, extra heavy oil) and may be in more remote and environmentally sensitive areas (e.g., deepwater, Arctic).
Metrics	% of projected capex through 2025 stranded in SDS vs. NPS % of projected capex through 2025 stranded in B2DS vs. NPS
Data Source	Carbon Tracker Initiative
Description of Metrics	<p>The percentage of projected capex at risk of being stranded is determined by comparing demand pathways for oil and gas under different scenarios with cost curves of potential supply.</p> <p>The demand pathways identify the total demand for oil and gas (or “budget”) in three scenarios defined by the International Energy Agency (IEA):</p> <ol style="list-style-type: none"> (1) New Policies Scenario (NPS), which is aligned with 2.7°C of global warming (2) The Sustainable Development Scenario (SDS), aligned with 2°C of warming and consistent with the aims of the Paris Agreement, and (3) The Beyond 2 Degrees Scenario (B2DS), aligned with a 1.75°C global warming outcome. <p>Cost curves of potential supply (based on underlying data sourced from industry databases) are overlaid to these demand scenarios to determine which potential fossil fuel projects – and their associated investments or capex – would fall outside of the maximum allowed budget. This determination is based on the assumption that the highest cost (or lowest returning) projects would be outcompeted by lower cost supply sources under the demand-constrained scenarios that are outlined.</p> <p>This results in the identification of upstream projects that appear to be outside the budget in a given demand scenario. The ranking of projects is based on the breakeven oil/gas/coal price required to meet a 15% IRR hurdle rate. The NPS level of demand serves as an upper limit to the potential supply curves which assumes that companies are already aligned with this scenario, and focuses on the differentials down to the SDS and B2DS demand levels. A full methodology is described in the report <i>Mind The Gap: the \$1.6 trillion energy transition risk</i>, Carbon Tracker Initiative, 08 March 2018</p>

Table 2b. Framework Part 2 – Operational Emissions & Efficiency

A priori assumptions	<p>Companies operating more efficiently in the energy intensive exploration and production industry will be better positioned for carbon pricing and could see operational cost reductions.</p> <p>Companies demonstrating improvements in emissions intensity demonstrate a clear strategy to reduce operational costs and manage potential future carbon pricing risks.</p>
Metrics	<p>Scope 1 + 2 CO₂e / \$MM rev</p> <p>Change in Scope 1 + 2 CO₂e/ \$MM rev over one year</p>

Data Source	CDP
Description of Metrics	<p>Scope 1 greenhouse gas emissions are greenhouse gas emissions measured in tons of carbon dioxide equivalents that result from the direct combustion of fossil fuels by the company on-site. This includes combustion for the production of energy and fuel use in vehicles.</p> <p>Scope 2 emissions are greenhouse gas emissions measured in tons of carbon dioxide equivalents that result from the combustion of fossil fuel for the generation of electricity, heat or steam purchased by the company from a utility provider. These emissions are summed and then expressed as a figure normalized to millions of dollars of revenue. This metric is an adjustment for company size to measure efficiency of emissions rather than measuring the absolute magnitude of emissions.</p> <p>The change in Scope 1 and Scope 2 CO₂-e/\$MM revenues is measured as the percentage change in emissions intensity over a one-year period.</p>

Table 2c. Framework Part 3 – Climate Policy Approach

A priori assumption	Companies asserting influence against climate regulations may be unprepared to transition their business model to a low carbon economy.
Metric	InfluenceMap Total Score
Data Source	InfluenceMap
Description of Metric	<p>InfluenceMap measures and scores corporate influence on climate change policy by looking at publicly available information to test a set of queries across data sources. The final score calculated is a performance value, expressed as a percentage, that is composed of the organization score (1) and the relationship score (2).</p> <ul style="list-style-type: none"> ▪ For the organization score, InfluenceMap draws from various publicly available data sources to assess transparency (referring to the availability and accessibility of this information) and performance (referring to the content of an organization's position and engagement) of an organization across four key climate-change related issues. The issue categories assessed are climate science (i.e. support of the Intergovernmental Panel on Climate Change position on climate change science), global treaty (i.e. support of the United Nations Framework Convention on Climate Change Conference of the Parties process), climate change policy and legislation, and disclosure on relationships around business associations and other sources of influence which may impact the climate debate. The organization score is measured on over 10 climate policy-related areas within these categories to determine whether the company exerted obstructive or constructive influence. ▪ In addition to the organization score, a corporation will have a relationship score based on the relationships it holds with external agents exerting influence over climate policy (e.g. trade associations, chambers of commerce, and think tanks) and the relative importance of these influencers in affecting climate policy.

Table 2d. Framework Part 4 – Financial Health & Capital Discipline

A priori assumptions	<p>Companies with a better picture of financial health may be more resilient over the long-term, including to climate related risks.</p> <p>Companies that are generating cash flows and are retaining it, using it to pay down debt, or returning it to shareholders (through buybacks or dividends) are likely to be more agile in the future than those companies that are not generating cash and/or those spending/borrowing to acquire and developed significant new fossil reserves.</p>
Metrics	<p>Altman Z-score</p> <p>Free Cash Return on Assets (ROA)</p>
Data Source	Thompson Reuters Worldscope
Description of Metric	<p>The Altman Z-score is a credit-strength test developed in 1968 by Edward Altman. Using five financial ratios related to profitability, leverage, liquidity, solvency and activity, it is used to predict whether a company has a high risk of insolvency.</p> <p>It is calculated according to the following formula:</p> $z = 1.2x_1 + 1.4x_2 + 3.3x_3 + 0.6x_4 + 1.0x_5, \text{ where:}$ <p>x_1 = Working Capital / Total Assets</p> <ul style="list-style-type: none"> Measures liquid assets in relation to the size of the company; the ability to meet short-term obligations <p>x_2 = Retained Earnings / Total Assets</p> <ul style="list-style-type: none"> Measures profitability and the reliance on debt to fund assets <p>x_3 = Earnings Before Interest and Taxes (EBIT) / Total Assets</p> <ul style="list-style-type: none"> Also referred to as return on total assets (ROTA), measures operating efficiency apart from tax and leveraging factors <p>x_4 = Market Value of Equity / Book Value of Total Liabilities.</p> <ul style="list-style-type: none"> Incorporates security price fluctuations relative to liability as a measure of market confidence <p>x_5 = Sales / Total Assets S</p> <ul style="list-style-type: none"> Standard measure for total asset turnover or how efficiently the company is using assets to generate sales <p>Free Cash Return on Assets (ROA) = (Operating Cash Flow – CapEx) / Total Assets</p>

SFERS Climate Transition Risk Framework:

The four-part Climate Transition Risk Framework for owners of fossil fuel reserves is comprised of seven metrics and is displayed in Table 3.

Table 3. SFERS Climate Transition Risk Framework

1. Fossil Fuel Reserve Mix (1a) % of projected capex through 2025 stranded in SDS vs. NPS (1b) % of projected capex through 2025 stranded in B2DS vs. NPS	2. Operational Emissions & Efficiency (2a) Scope 1 + 2 CO ₂ e / \$MM rev (2b) Percentage change in Scope 1 + 2 CO ₂ e/ \$MM rev over 1 year
3. Climate Policy Approach (3a) InfluenceMap Total Score	4. Financial Health & Capital Discipline (4a) Altman Z-score (4b) Free Cash Return on Assets

Expert Consultation:

To develop the Framework, in addition to conducting independent research, Staff consulted with a variety of experts in climate finance to validate our views about impacts of the transition to a low-carbon economy, better understand the drivers of risk for fossil fuel companies, and to vet the suitability of our proposed Framework.

These organizations include:

Carbon Tracker Initiative

Carbon Tracker is an independent financial think tank that carries out in-depth analysis on the impact of the energy transition on capital markets and the potential investment in high-cost, carbon-intensive fossil fuels. Its team of financial market, energy and legal experts apply groundbreaking research using leading industry databases to map both risk and opportunity for investors on the path to a low-carbon future. It has cemented the terms “carbon bubble”, “unburnable carbon” and “stranded assets” into the financial and environmental lexicon.

World Resources Institute – Finance Center: Sustainable Investing Initiative

WRI is a global research organization that spans more than 60 countries, with offices in the United States, Brazil, China, India, Indonesia and more. Its more than 700 experts and staff focus on six critical issues at the intersection of environment, economic opportunity and human well-being: climate, energy, food, forests, water, and cities. The mission of WRI’s Finance Center is to promote the shift of finance away from environmentally unsustainable activities and toward sustainable ones. The Center produces data-driven, policy-actionable research and knowledge products and convenes coalitions of key stakeholders that can drive action on the

ground. In particular, the Center's Sustainable Investing Initiative focuses on advancing sustainable investment practices among institutional investors through tailored data, research, and peer-to-peer learning.

2° Degrees Investing Initiative (2°II)

The 2°II is global think tank that develops climate and long-term risk metrics and related policy options in financial markets. 2°II coordinates the research projects on climate metrics in financial markets, with over 40 research partners in the public, private, and philanthropic sector. The organization has developed the first science-based target setting and 2°C scenario analysis tool for financial portfolios, applied by over 200 financial institutions and three financial supervisory authorities to date. 2°II also initiated the first climate-related financial regulation in Europe in the context of the French mandatory climate-related disclosure by financial institutions (Art. 173).

InfluenceMap

InfluenceMap's Lobbying and Corporate Influence Project accurately assesses, ranks and communicates the extent to which corporations are lobbying climate and energy policy worldwide. To provide balanced rankings, InfluenceMap analyzes large amounts of data on corporate and trade association lobbying, communications and spending, collected from a wide range of sources, and then assigns those organizations with a letter grade (from A+ to F).

APPLICATION OF THE FRAMEWORK:

Staff applied the framework to companies in the MSCI ACWI IMI that are oil and gas reserve owners in the "Integrated Oil & Gas" or "Oil & Gas Exploration and Production" sub-industries. This universe consists of 155 companies globally. The framework was applied regardless of whether SFERS currently holds positions in the companies.

Companies were identified as "high climate transition risk" if the company is an outlier in two categories, at least one of which was a core climate category. Core climate categories are shown in **red** font in Table 4, below. "Outliers" in categories 1-3 are defined using the thresholds determined based on the worst quartile of companies. Thresholds for metric (4a) is based on the commonly accepted value for bankruptcy "distress", and the threshold for metric (4b) was determined as the point at which capital expenditures exceed operating cash flow.

Table 4. Thresholds to identify climate transition risk outliers

1. Fossil Fuel Reserve Mix		2. Operational Emissions & Efficiency	
Metric	Outlier Threshold	Metric	Outlier Threshold
(1a) % of projected capex through 2025 stranded in SDS vs. NPS	23% of planned capex	(2a) Scope 1 + 2 CO ₂ e / \$MM rev	1,015 CO ₂ e / \$MM rev
(1b) % of projected capex through 2025 stranded in B2DS vs. NPS	46% of planned capex	(2b) Percentage change in Scope 1 + 2 CO ₂ e / \$MM rev over 1 year	27% increase in 1 year
3. Climate Policy Approach		4. Financial Health & Capital Discipline	
Metric	Outlier Threshold	Metric	Outlier Threshold
(3a) InfluenceMap Total Score	31	(4a) Altman Z-score	<1.80
		(4b) Free Cash Return on Assets	<0.00

This two-step application of the Framework resulted in 25 companies being identified as high risk.

Each company's risk score is summarized below in Table 5, along with SFERS' equity and debt exposure (as of 6/30/18) to the company.

Table 5. High Climate Transition Risk Companies According to SFERS Framework

Company Name	Net Exposure (as of 6/30/18)	Fossil Fuel Reserve Mix		Climate Policy Approach	Operational Efficiency		Financial Health & Capital Discipline	
		Projected Capex Stranded in SDS	Projected Capex Stranded in B2DS	Influence Map Score	Emissions Intensity (tCO2e)/\$ mm rev	Emissions Trend (% change 2015-2016)	Free Cash ROA	Altman Z Score
Crescent Point Energy Corp	\$ -		44%	not scored	1705	12%	-2.93	0.71
Marathon Oil Corp	\$ 3,373,647	17%	55%	31.1	no data	no data	-0.34	2.02
Occidental Petroleum Corp	\$ 10,083,745	6%	40%	26.16	2230	200%	0.86	3.33
Exxon Mobil Corp	\$ 43,936,840	25%	48%	30.04	648	22%	4.17	3.52
Husky Energy Inc.	\$ 37,066	20%	64%	38.54	1370	23%	3.36	2.24
Anadarko Petroleum Corp	\$ 10,591,462	9%	18%	not scored	2606	252%	-2.43	1.36
California Resources Corp	\$ -	not scored	not scored	not scored	2479	39%	-2.16	0.85
Apache Corp	\$ 1,872,139	34%	50%	43.91	no data	no data	-1.51	1.54
Arc Resources Ltd	\$ -	8%	51%	not scored	1091	1%	-3.25	1.80
Baytex Energy Corp	\$ 338,378	not scored	not scored	not scored	1901	31%	0.07	0.50
Encana Corp	\$ 7,141,323	15%	36%	not scored	1598	259%	-4.07	2.03
Gulfport Energy Corp	\$ 1,027,279	22%	57%	not scored	no data	no data	-7.45	1.12
Hess Corp	\$ 4,490,788	25%	42%	39.97	953	12%	-5.17	1.35
Meg Energy Corp	\$ 432,897	not scored	not scored	not scored	1445	2%	-2.24	1.23
QEP Resources Inc	\$ 1,037,868	12%	55%	not scored	no data	no data	-20.07	1.18
Santos Ltd	\$ 685,595	9%	19%	not scored	2124	77%	4.61	1.64
WPX Energy Inc	\$ 1,730,961	45%	60%	not scored	no data	no data	-7.91	1.38
Bonavista Energy Corp	\$ 44,393	not scored	not scored	not scored	2351	27%	1.10	0.33
Concho Resources Inc	\$ 3,175,870	42%	64%	not scored	no data	no data	-5.50	3.45
ConocoPhillips	\$ 21,245,931	8%	35%	29.26	1131	30%	3.57	2.66
Energen Corp	\$ 656,327	54%	56%	not scored	no data	no data	-6.54	3.74
Petrobras SA	\$ 12,476,175	26%	50%	48	872	11%	2.60	1.53
Peyto Exploration & Dev	\$ 100,910	1%	13%	not scored	1630	-23%	4.13	1.05
Rosneft Oil Co PJSC	\$ 2,342,696	22%	43%	22.44	no data	no data	-6.02	1.84
Tullow Oil	\$ 2,402,114	34%	50%	not scored	598	27%	8.49	1.15
Total	\$129,224,403							

Sources: GSAM as of 9/28/18, Carbon Tracker as of May 2018, InfluenceMap as of September 2018, CDP as of 2016-2015, Worldscope as of June 2018, holdings data as of 6/30/18 and accessed via Caissa; GSAM assisted SFERS with gathering and analyzing the external data provided by the sources named herein. GSAM makes no implied or express recommendations concerning the manner in which any client's account should or would be handled.

Analysis of the Results:

Table 5 shows that SFERS public markets portfolio has \$129.2M invested across 22 of the 25 highest risk fossil fuel companies, as determined by the Framework. This accounts for approximately 30% of the \$424 million the public markets portfolio has invested in fossil fuel reserve owners and equates to approximately 0.5% of total plan assets.

As shown in Table 5, 76% of the total exposure to high risk companies is concentrated in five companies – Exxon Mobil Corp, Occidental Petroleum, Petrobras SA, Anadarko Petroleum, and ConocoPhillips.

The vast majority, approximately 93% of this exposure, is held in separately managed account (SMA) structures over which SFERS directly holds the securities and exercises shareholder voting responsibilities. The remaining approximately 7% is held in commingled account structures, in which SFERS' assets are invested along with other investors' assets. In these accounts SFERS does not directly hold securities, cannot implement investment restrictions over the account, and does not have the ability to exercise shareholder voting rights.

The account structure dictates (1) whether SFERS would be able to restrict the investment of certain securities in the account, and (2) whether SFERS is able to vote on and/or file shareholder resolutions with the company.

Staff also analyzed SFERS' exposure to high risk fossil fuel companies based on the investment style (or approach) followed by managers of each fund. Approximately 53% of exposure is passive investment strategies which are designed to track an index. Approximately 31% of exposure is in active quantamental strategies, which are managed using a quantitative model to guide security selection and portfolio construction. The remaining 16% of exposure is held in active fundamental strategies, in which portfolio managers guide the security selection and portfolio construction process.

The investment style will influence Staff's understanding of why each manager holds a position in the company. For passive strategies the company is in the SFERS portfolio because it is in the benchmark being indexed against. Generally speaking, for active quantamental strategies the company is in the SFERS portfolio because the managers' quantitative model determined it was suitable for inclusion in the portfolio. On the other hand, for active fundamental strategies the company is in the SFERS portfolio because, generally speaking, the portfolio management team conducted research and selected the company for inclusion in the portfolio.

Knowledge of the investment style will influence with whom and on what topics SFERS may engage related to our exposure to high risk fossil fuel companies.

Other Exposures

SFERS' top 10 holdings in oil & gas reserves owners accounts for approximately 60% of SFERS overall public markets investment in this set of companies. Of those top 10 holdings, three, Exxon Mobil Corp, ConocoPhillips, and Petrobras SA were identified as high climate transition risk companies.

While the climate transition risk associated with the other seven companies has been determined by the Framework to be relatively lower, Staff has identified the companies in that group that are outliers in *any* climate transition risk category. This was done because of the higher relative investment exposure to these companies.

This set of companies includes Total SA, CNOOC, OAO Gazprom, and Chevron Corporation.

Table 6. SFERS' top 10 holdings in Fossil Fuel Reserve Owners

Company Name	Net Exposure (as of 6/30/18)	Fossil Fuel Reserve Mix		Climate Policy Approach	Operational Efficiency		Financial Health & Capital Discipline	
		Projected Capex Stranded in SDS	Projected Capex Stranded in B2DS	InfluenceMap Score	Emissions Intensity (tCO ₂ e)/\$m rev	Emissions Trend (% change 2015-2016)	Free Cash ROA	Altman Z Score
Royal Dutch Shell	\$ 53,198,538	23%	36%	47	347	13%	3.02	4.06
Exxon Mobil Corp	\$ 43,936,840	25%	48%	30.04	648	22%	4.17	3.52
Chevron Corp	\$ 33,042,047	15%	31%	28.09	619	23%	3.39	3.19
BP	\$ 28,789,836	12%	30%	39.11	308	23%	1.65	2.79
Total SA	\$ 21,308,876	25%	40%	46.19	339	6%	1.30	NA
ConocoPhillips	\$ 21,245,931	8%	35%	29.26	1131	30%	3.57	2.66
Eni SPA	\$ 13,933,880	16%	32%	53	661	18%	1.91	2.76
Petrobras SA	\$ 12,476,175	26%	50%	48	872	11%	2.60	1.53
CNOOC Ltd	\$ 11,864,811	21%	35%	not scored	691	64%	6.98	3.17
Gazprom PJSC	\$ 11,858,330	16%	33%	not scored	1105	36%	-0.22	2.17

Sources: GSAM as of 9/28/18, Carbon Tracker as of May 2018, InfluenceMap as of September 2018, CDP as of 2016-2015, Worldscope as of June 2018, holdings data as of 6/30/18 and accessed via Caissa. GSAM assisted SFERS with gathering and analyzing the external data provided by the sources named herein. GSAM makes no implied or express recommendations concerning the manner in which any client's account should or would be handled.

Thermal Coal

The Framework specifically assesses climate transition risk of oil and gas companies and does not address thermal coal companies. However, thermal coal companies display a generally high level of climate transition risk, and SFERS maintains a policy to restrict investment in companies, regardless of country of domicile, that derive the majority of company revenues from thermal coal activities. SFERS currently restricts external managers from investing in 25 thermal coal companies.

SFERS remains invested in certain companies that derive less than 50% of their revenue from thermal coal. Table 7, below, indicates SFERS' direct investment in companies that derive greater than or equal to 10% but less than 50% of their revenue from thermal coal:

Table 7. SFERS investment in thermal coal companies (10% – 50% of revenue)

Company Name	Net Public Market Exposure (as of 6/30/18)	Climate Action 100+ List
China Shenhua Energy Company Limited	\$1,425,197	Y
South32 Limited	\$3,244,019	Y
Anglo American PLC	\$4,817,094	Y
Cimic Group Limited	\$2,627,183	N
Total	\$12,113,493	

Sources: MSCI ESG Research data was used to create the information provided; holdings data as of 6/30/18 and accessed via Caissa; Climate Action 100+ as of September 2018

Staff notes that Anglo American has recently sold off some thermal coal assets. Staff notes that the CEO of South32 Limited stated in August 2018, "We have been very clear that we don't plan to own an interest in

energy coal in the long term" as the company organized its coal operations into a new entity South Africa Energy Coal (SEAC).

Staff notes that SFERS retains direct investment in certain companies generating less than 10% of revenues from thermal coal activities. Staff intends to continue to analyze these companies' thermal coal activities and SFERS investment exposure to them.

Tar Sands Investments

As discussed above in the "Scope and Limitations" section, the Framework does not account for the relative potential risks associated with the types of hydrocarbon reserves that companies own.

Tar sands (or oil sands) are an unconventional hydrocarbon resource whose extraction requires mining rather than pumping. Concerns exist around the energy intensity of the extraction and processing process as well as other environmental and social impacts.

Staff has identified three companies that engage in tar sands activities in a material way that were not identified as high-risk companies according to the Framework. These companies are Canadian Natural Resources, Suncor Energy Inc., Cenovus Energy Inc., and Imperial Oil.

Husky Energy and MEG Energy are also predominately tar sands companies, and both were identified as high climate transition risk companies according to the Framework.

RECOMMENDATIONS:

Divestment Options

In accordance with the Board's request of an option for "prudently phased divestment", Staff recommends the following:

- Restriction of direct investment in any company that has been identified through application of the above-described Framework to have high risk of potential stranded capex, bankruptcy risk, and high-risk use of operating cash flows.

Staff recommends that if such divestment takes place that it occur after Staff has engaged with managers whose funds are invested in these companies, and managers confirm that they would be able to reasonably preserve the tracking error expectations of the fund.

Staff further notes that its Framework does not include meaningful consideration of valuation of the companies analyzed, therefore Staff cannot guarantee that companies deemed high risk are not currently undervalued in the market.

If the Board agrees to pursue such divestment, it would be targeted at \$8.5 million of direct investment (through separately managed accounts) in five companies identified in Table 8. Investment restriction would apply to two companies that SFERS does not currently have direct investment in.

Table 8. Recommended companies for targeted divestment

Company Name	Net Exposure (as of 6/30/18)	Divestible Exposure in SMAs	Weight in MSCI ACWI IMI
Crescent Point Energy	\$ -	\$ -	0.00681%
Apache Corp	\$1,872,139	\$1,766,823	0.02473%
Arc Resources Ltd.	\$ -	\$ -	0.00647%
Gulfport Energy Corp	\$1,027,279	\$399,572	0.00312%
Hess Corp	\$4,490,788	\$4,426,069	0.02474%
QEP Resources Inc.	\$1,037,868	\$244,312	0.00436%
WPX Energy Inc.	\$1,730,961	\$1,730,961	0.01068%
Total	\$ 10,159,035	\$8,567,737	

Sources: GSAM as of 9/28/18, MSCI ACWI IMI weights as of Q2 2018; holdings data as of 6/30/18 and accessed via Caissa GSAM assisted SFERS with gathering and analyzing the external data provided by the sources named herein. GSAM makes no implied or express recommendations concerning the manner in which any client's account should or would be handled.

Engagement Recommendations

Based on the results of the Framework, Staff has identified:

- 17 high climate transition risk fossil fuel companies in SFERS portfolio for engagement;
- Four additional companies that demonstrate risk in only one climate transition risk category, but represent a relatively high portion of SFERS' public markets exposure to fossil fuel companies; and
- Three companies engaged in tar sands activities, but which are not identified as high climate transition risk by the Framework.

Staff recommends that the three tar sands companies – Canadian Natural Resources, Suncor Energy Inc., Cenovus Energy Inc. – not identified by the Framework be added to Staff's Watch List due to the unique risks of tar sands involvement (SFERS does not have current investment in Imperial Oil).

Staff recommends that the four companies within SFERS' top 10 oil and gas that demonstrate risk in only one category be added to Staff's Watch List.

Staff recommends that it engage with each of the 24 companies on its Watch List and develop a company-specific engagement plan that is results-oriented. Staff recommends setting reasonable timeframes for companies to take action on reducing their climate transition risk.

The potential outcome of each engagement and the subsequent monitoring could be:

- Staff gains comfort that the company has taken steps to adequately manage its climate transition risk and recommends no further action;
- Staff believes that the company has not taken clear, decisive action to adequately manage its climate transition risk and considers filing a shareholder resolution or recommending divestment and restricting further investment;
- Staff believes that additional engagement and monitoring is necessary to assess the company's climate transition risk.

The general topics areas, associated engagement objectives, and potential target timeframes are indicated below in Table 9.

Table 9. Engagement focus topics, objectives, and target timeframes

Topic	Engagement Objectives	Target Timeframe
Reserves viability	Company is able to demonstrate through use of transparent, best-practice scenario analysis that its reserve base, project development, and capital expenditures are economically viable within a 2 degree or lower scenario.	3-5 years
Climate lobbying and regulatory influence	Company agrees to cease direct and indirect (through organizational affiliation and paid membership) lobbying against prudent climate regulation and carbon pricing schemes; company actively engages and supports development of climate regulation and carbon pricing mechanisms	1-3 years
Operational Efficiency	Company sets aggressive, time-bound targets for emissions reductions; company commits to measuring, monitoring, and reducing fugitive methane emissions and other greenhouse gas emissions.	1-3 years
Strategy for use of cash	Company is able to demonstrate how its use of cash is aligned with operating within a 2 degree scenario, including whether it is actively acquiring new reserves and their economic viability.	1-3 years

	Company is able to demonstrate a disciplined strategy for deploying cash that balances future growth, shareholder needs, and managing debt.	
Management of debt burden	Company is able to demonstrate that it is taking actionable steps to reducing its debt burden, maintaining appropriate liquidity, and improving profitability.	1-3 years
Tar Sands Reserves	Company is able to demonstrate that it is winding down its tar sands operations, not acquiring additional tar sands reserves, and adequately managing the ecological, social, reputational, and regulatory risks associated with tar sands activities	3-5 years

Staff recommends that it engage where possible through existing collaborative engagements of which SFERS is a participant and which target the Watch List companies. Where companies are not targeted by existing collaborative engagements then Staff recommends that it directly engage with the company. The two key collaborative efforts through which SFERS can engage are the Climate Action 100+ and the Ceres Carbon Asset Risk (CAR) Working Group.

Climate Action 100+

The initiative is a five-year initiative launched in 2017 and led by investors to engage systemically important greenhouse gas emitters and other companies across the global economy that have significant opportunities to drive the clean energy transition and achieve the goals of the Paris Agreement.

The initiative focuses on encouraging companies to:

- Implement a strong governance framework which clearly articulates the board's accountability and oversight of climate change risk and opportunities.
- Take action to reduce greenhouse gas emissions across their value chain, consistent with the Paris Agreement's goal of limiting global average temperature increase to well below 2-degrees Celsius above pre-industrial levels.
- Provide enhanced corporate disclosure in line with the final recommendations of the Task Force on Climate-related Financial Disclosures (TCFD)

Ceres Carbon Asset Risk (CAR) Working Group

The Working Group organizes investors within the Ceres Investor Network on Climate Risk and Sustainability to develop strategies and tactics for engaging with oil and gas and electric power companies as they transition to a low-carbon economy. The initiative was launched in September 2013 by Ceres and the Carbon Tracker Initiative with support from the Global Investor Coalition.

Table 10, below, summarizes the recommended engagement focus topics and mechanisms for engagement with each company on the Watch List.

Table 10. SFERS Climate Transition List Watch

Company Name	Reserve Viability	Lobbying & Regulatory Influence	Engagement Focus Areas				Tar Sands Activities	Engagement Mechanism
			Operational Efficiency	Strategy for use of cash	Mgmt of debt burden			
Marathon Oil Corp	x	x		x				CA 100+
Occidental Petroleum Corp		x	x					CA 100+
Exxon Mobil Corp	x	x						CA 100+
Husky Energy Inc.	x		x					CERES CAR
sAnadarko Petroleum Corp			x	x	x			Direct
Baytex Energy Corp			x		x			Direct
Encana Corp			x	x				Direct
Meg Energy Corp			x	x	x	x		Direct
Santos Ltd			x		x			CA 100+
Bonavista Energy Corp			x		x			Direct
Concho Resources Inc	x			x				Direct
ConocoPhillips		x	x					CA 100+
Energen Corp	x			x				CERES CAR
Petrobras SA	x				x			CA 100++
Peyto Exploration & Dev			x		x			Direct
Rosneft Oil Co PJSC		x		x				CA 100+
Tullow Oil	x				x			Direct
Cenovus Energy						x		Direct
Suncor Energy						x		CA 100+
Canadian Natural Resources						x		CA 100+
Chevron Corp		x						CA 100+
Total SA	x							CA 100+
CNOOC LTD			x					CA 100+
Gazprom PJSC			x	x				CA 100+

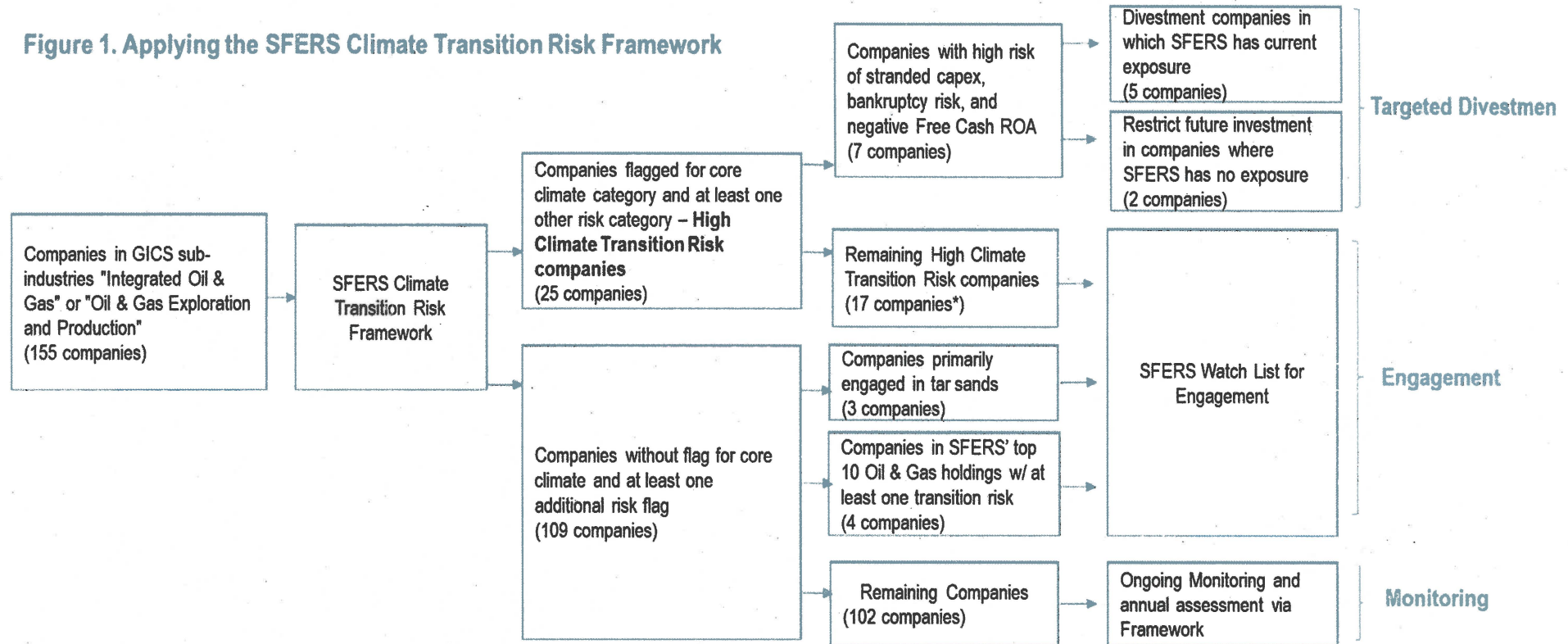
In addition, Staff recommends that it engage with its external managers on fossil fuel investment risk, including specifically:

- For fundamental active managers on how they assess risks and opportunities faced by fossil fuel companies, including their consideration of factors in the Framework.
- For quantamental and model driven active managers on how their quantitative investment process and risk management account for future risks associated with the transition to a low carbon economy.
- For passive managers on how they approach engagement with fossil fuel companies, including their participation in collaborative initiatives and priority focus areas.

Separately, Staff has identified four companies in its portfolio that derive between 10-50% of revenues from thermal coal activities.

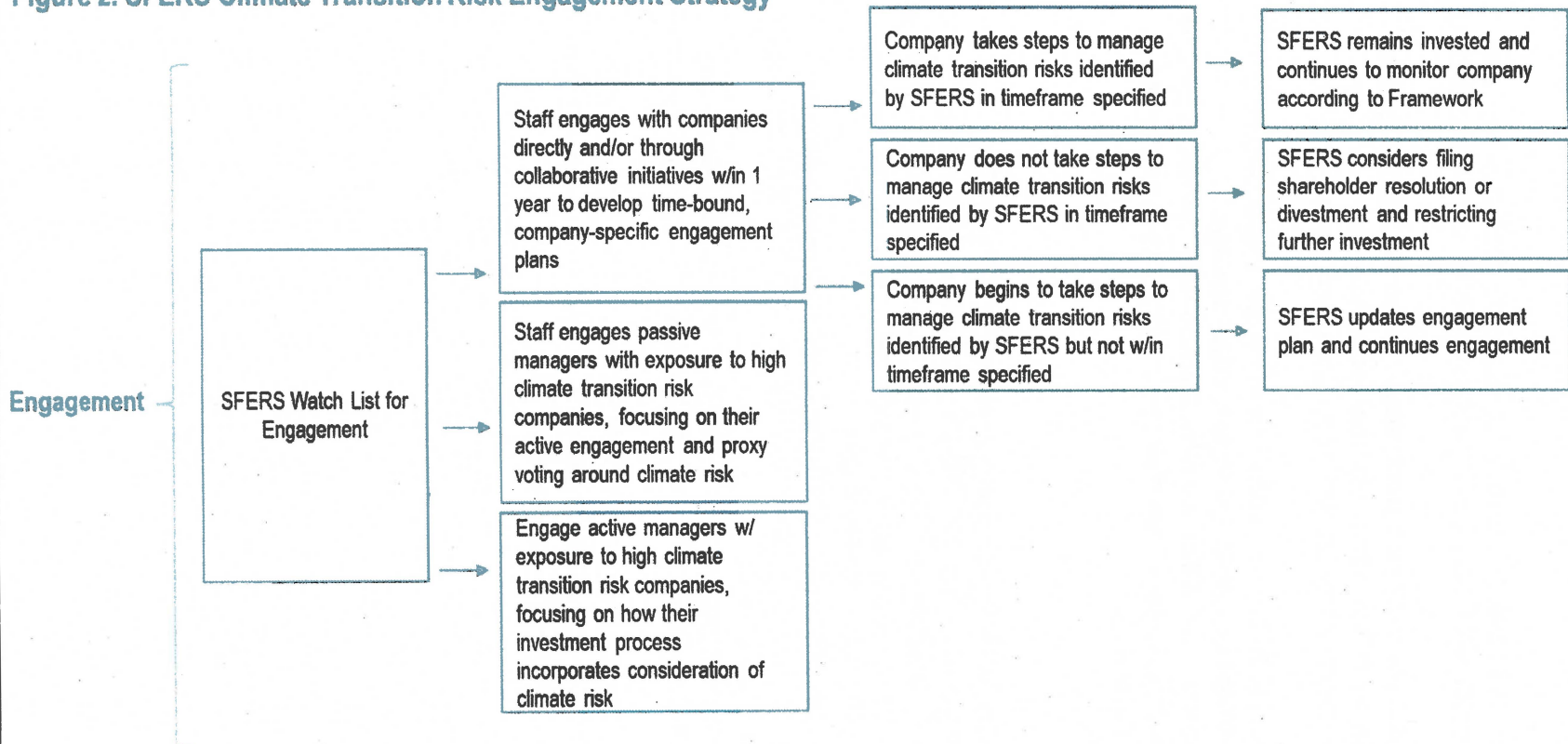
Staff recommends that it engage with the four companies with some thermal coal activities to seek to understand whether their plans to reduce or eliminate its coal assets. Staff further recommends that the Board consider divestment from those companies that do not demonstrate a commitment to exiting thermal coal activities in a reasonable timeframe. Additionally, Staff recommends engaging with the external managers of funds that are invested in these four companies to understanding how their investment process considers climate transition risks.

Figure 1. Applying the SFERS Climate Transition Risk Framework



* Excludes one company in which SFERS does not have current investment; this company will be subject to ongoing monitoring via the Framework

Figure 2. SFERS Climate Transition Risk Engagement Strategy



Summary of Next Steps

1. Continue to identify and prioritize investments consistent with Strategy Area 5 "Pursue renewable energy and carbon-constrained investments" and report annually on the amount and performance of these investments.
2. Annually, re-run the Framework analysis for SFERS' investments in companies that own fossil fuel reserves; add and remove companies to the Watch List for engagement based on the process described herein; consider future companies for "prudent phased divestment" according to the process described herein.
3. Continue to improve the robustness of the climate transition risk framework through evaluating additional categories of risk, improving data quality, and improving data coverage.
4. Continue collaborating with other investors, collaborative initiatives, think-tanks, regulators, and others to manage the investment risks associated with climate changes, including through sharing and educating others on the SFERS' Framework.

Summary of Recommended Actions

1. Modify the first strategy approved by the Retirement Board on January 24, 2018 as follows:
Adopt a carbon constrained strategy for \$1 billion of SFERS ~~passive~~ public markets portfolio.
2. To fulfil the Board's request to being "prudently phased divestment", divest positions in five companies, restrict further investment in those companies as well as two additional companies that display high climate transition risk across key categories of the Framework.
3. Engage with companies that are determined to be high climate transition risk according to the Framework, companies in the top 10 SFERS fossil fuel holdings that have at least one risk indicator, and companies engaged in tar sands activities.
4. Engage with thermal coal companies that receive between 10-50% of revenue from thermal coal. Considering divesting from any companies that do not make a commitment to exit the thermal coal business in the near term.
5. Engage with existing and potential external managers that hold positions in fossil fuel companies, beginning with those that are invested in high climate transition risk companies, to understand how they are including considerations of climate risk in their investment process.

Disclosure

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To: SFERS Board and Staff

From: Allan Martin, Sam Austin, Daniel Hennessy, and Michael Miranda

Date: January 24, 2018

Subject: Fossil Fuel Divestment Commentary

Background

In response to the motion placed before the SFERS Board on May 17, 2017, to divest the Plan's holdings in the Carbon Underground 200, NEPC has prepared the following analysis detailing our recommendation on this matter. We do not advise the Board to accept the motion to divest for the reasons we will discuss herein. Because climate change will likely become an increasingly important risk factor in investment decisions, we do strongly encourage SFERS to consider other actions we believe will be more effective and less costly to Plan participants and beneficiaries.

Climate change poses significant risk to the environment, to the economy and, therefore, to investment portfolios. In IPCC (2014), the Intergovernmental Panel on Climate Change flatly asserts that "Warming of the climate system is unequivocal...The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, and sea level has risen. Each of the last three decades has been successively warmer at the Earth's surface than any preceding decade since 1850" (p. 2). Dahlman (2017, September 11) provides context on the long term historical pace of warming. "Since 1880, surface temperature has risen by 0.13°F (0.07°C) every 10 years for a net warming of 1.69°F (0.94°C) through 2016." As NASA looked at the period since 2000, they report in "Global Climate Change: Vital Signs of the Planet," (2018, January 2) "Sixteen of the 17 warmest years in the...record all have occurred since 2001." Bringing the data forward to the most recent year, "U.S. had 3rd warmest year to date" (2017, December 6, 2017) finds that the January-November 2017 period was the third warmest such period in the 138-year record for the world's land and ocean surfaces with an average temperature that was 0.84°C above the 20th century average.

Rising ocean levels are another indicator of climate change. By cobbling together land-based tide gauge measurements, Australia's Commonwealth Scientific and Industrial Research Organization has produced a historical reconstruction of global mean sea level (GMSL) change since January 1880. Church and White (2009) calculate a 210 millimeter rise in ocean levels for the 130 years ending in December 2009. And based on satellite altimeter data compiled by the NASA Goddard Space Flight Center, the recent pace of sea level change seems to be accelerating, with a cumulative rise of 81 millimeters between January 5, 1993, and August 20, 2017. The satellite data indicates GMSL is currently rising at a rate of 3.2 millimeters per year, according to "Global Climate Change: Vital Signs of the Planet," (2018, January 2).

The same NASA source cites shrinking coverage of glaciers and ice sheets, which contribute to rising ocean levels. The space agency's Gravity Recovery and Climate Experiment found that "Greenland lost 150 to 250 cubic kilometers of ice per year between 2002 and 2006".



On the topic of human contribution to climate change, IPCC (2014) concluded that "Total anthropogenic GHG [greenhouse gas emissions] have continued to increase over 1970 to 2010 with larger absolute increases between 2000 and 2010...It is extremely likely that more than half of the observed increase in global average surface temperature from 1951 to 2010 was caused by the anthropogenic increase in GHG concentrations and other anthropogenic forcings together...Anthropogenic influences have likely affected the global water cycle since 1960 and contributed to the retreat of glaciers since the 1960s and to the increased surface melting of the Greenland ice sheet since 1993" (p.5).

The future direction of climate change is likely to have an impact on long-term investors such as SFERS, although the scope and timing of this impact is difficult to forecast. Mercer (2015), in collaboration with 18 project partners and an international study group, published a landmark study, *Investing in a Time of Climate Change*. Mercer and their partners developed sophisticated climate models, defined four risk factors (Technology, Resource Availability, Impact and Policy) and applied these models and factors to "four relevant scenarios for investors" envisioning "several views of the way the next 35 years might play out" (p.10)

Mercer (2015) describes four possible pathways climate change may follow:

- A. **Transformation** is characterized by strong climate change mitigation that puts us on a path to limiting global warming to 2°C above pre-industrial-era temperatures this century. This scenario has:
 - Strong climate-mitigation action: emissions peak by 2020, then fall by 56%, relative to 2010 levels, by 2050.
 - Fossil fuels representing less than half of the energy mix by 2050
 - Estimated annual emissions of 22 gigatons of equivalent carbon dioxide (GtCO_{2e}) by 2050.
- B. **Coordination** is a scenario in which policies and actions are aligned and cohesive, limiting global warming to 3°C above pre-industrial-era temperatures this century. The Coordination scenario has:
 - Substantial climate-mitigation action: Emissions peak after 2030, then fall by 27%, relative to 2010 levels, by 2050.
 - Fossil fuels representing around 75% of the energy mix by 2050.
 - Estimated annual emissions of 37 GtCO_{2e} by 2050.
- C. **Fragmentation (Lower Damages)** sees limited climate-mitigation action and lack of coordination, resulting in a 4°C or more rise above pre-industrial-era temperatures this century. This sees:



- Limited climate action: emissions grow another 33% over 2010 levels, peaking after 2040.
- Fossil fuels representing 85% of the energy mix by 2050.
- Estimated annual emissions of 67 GtCO_{2e} by 2050.

D. **Fragmentation (Higher Damages)** sees the same limited climate-mitigation action as the previous scenario, but assumes that relatively higher economic damages result.⁷

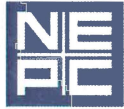
The Mercer (2015) study is included in its entirety as Attachment 1 to this report. It reaches a number of detailed conclusions, including that

[C]limate change presents a series of risks to institutional investors...For the fiduciaries overseeing investments, climate change poses portfolio risks but also opens up new opportunities. This is because the necessary reduction in carbon emissions will require a fundamental change in the energy mix that underpins, to some extent, every investment in a portfolio (p.2)...

Asset class return impacts could be material – varying widely by climate change scenario. For example, a 2°C scenario could see return benefits for emerging market equities, infrastructure, real estate, timber and agriculture. A 4°C scenario could negatively impact emerging market equities, real estate, timber and agriculture. Growth assets are more sensitive to climate risks than defensive assets. A 2°C scenario does not have negative return implications for long-term diversified investors at a total portfolio level over the period modelled (to 2050) and is expected to better protect long-term returns beyond this timeframe (p.7).

Executive Summary

We agree that long-term portfolio diversification should be a key element as prudent investors grapple with climate change as an increasingly important risk factor. The challenge is to determine the most efficient tools that SFERS can utilize to diagnose the impact of climate change, mitigate potential negative consequences and capitalize on potential positive outcomes. An integrated ESG approach can encourage the active investment managers engaged by SFERS to disclose the role that climate change plays in their investment process. An optimal set of tools can help leverage resources with like-minded institutional investors to pressure the worst carbon emitters and to encourage new green technologies that may flourish during the transition to a cleaner energy infrastructure over the next several decades.



The array of tools available to address the potential impact of climate change on SFERS can include, but are not limited to:

- * Proxy voting to endorse transparent corporate disclosure regarding their carbon footprint and the risk that environmental factors pose to their business***
- * Active engagement alongside other large investors to influence egregious carbon emitters***
- * Investment in technologies and industries expected to benefit from change in energy mix***
- * Integration of ESG principles throughout the investment process at the Plan level and at the asset manager level***
- * Selective reduction of exposure to impacted industries via passive management with screens***
- * Broad divestment from industries expected to be most impacted***

It is NEPC's opinion that divestment is the least efficient of these tools and a potentially costly option for SFERS. Removing a significant portion of the investable universe of securities that active money managers can invest in is, by definition, a restriction on diversification of the SFERS portfolio. Academic research (Adler and Kritzman 2014) has found that divestment decreases the return of active management and past studies (MacAskill, 2015, October 20) of other security exclusion initiatives have confirmed the negative effects of divestment.

Less diversification is undesirable, because it moves the investor's risk-adjusted return below what that investor would be expected to enjoy on the efficient frontier. The efficient frontier represents the mix of investments that offer the highest return at a given level of risk. Or, said another way, any point on the efficient frontier represents the lowest volatility at a given level of return. Financial theory is clear that a more diversified portfolio offers superior risk-adjusted returns than a portfolio that is significantly less diversified.

The amount by which a restricted portfolio will suffer from reduced expected return (or higher expected risk) depends on the size of the restriction. Approximately 4.6% (\$473 million) of SFERS' public equity portfolio was in shares of Carbon Underground 200 (CU200) companies held in separately-managed accounts as of June 30, 2018. By another measure of fossil fuel exposure, Global Industry Classification Standard (GICS) Energy Sector stocks made up approximately 4.4% (\$447 million) of the SFERS total public equity portfolio at 6/30/2018. See summary in Exhibit 1. It is noteworthy that this divestment would exceed the size of prior divestment campaigns such as tobacco and Sudanese investments.



SFERS Assets Under Management as of 6/30/2018

	Total Fund	Public Equities	Fixed Income	CU200 Equity Holdings	CU200 Fixed Income Holdings	GICS Energy Equity Holdings	GICS Energy Fixed Income Holdings
Total AUM	\$24,310,636	\$10,236,408	\$3,148,152	\$472,988	\$18,802	\$447,293	\$24,005
% of Total Fund	100.00%	42.11%	12.95%	1.95%	0.08%	1.84%	0.10%
Separate Account Holdings		\$8,432,586	\$2,570,328				
% of Total Equity		82.38%		4.62%		4.37%	
% of Equity Separate Accounts				5.61%		5.30%	
% of Fixed Income			81.65%		0.60%		0.76%
% of Fixed Income Separate Accounts					0.73%		0.93%

Throughout this analysis, we compare the impact of divestment from the CU200 with an analogous restriction on GICS Energy Sector holdings. The reason we compare restrictions based on both the CU200 and the GICS Energy Sector is that many of SFERS' investment managers do not currently have access to the Carbon Underground 200 list, which is available by license from its sponsor, Fossil Free Indexes. Therefore, the GICS Energy Sector is the only common database on which we can aggregate forward-looking projections from each manager. Since NEPC has a license to use the CU200, we were able to run historical analyses based on both the CU200 and GICS Energy Sector restricted lists.

Neither restriction list avoids unintended consequences for an investor seeking to avoid securities of environmentally challenged companies. Some energy companies that might be excluded from investment have made very large investments in green technologies. Some technology companies that might not be restricted are heavily reliant on the global extraction of rare metals. Utilities, auto makers, chemical companies, airlines and even many consumer product companies are deeply dependent on carbon-based inputs.

THE CASE FOR ACTIONS OTHER THAN DIVESTMENT

While we advise SFERS to consider integration of ESG principles, proactive engagement and market competitive green investing within its Investment Policy, we recommend against adopting the blunt instrument of active management divestment for the following reasons.

1. There will be significant costs associated with divestment

Institutional fiduciaries considering fossil fuel divestment must contemplate that they are trading a sure cost to the pension plan and its participants in exchange for an unlikely impact on climate change. The estimated costs of divestment can be broken down into the one-time transaction expense and the ongoing annual performance shortfall due to a loss of portfolio diversification.

Transaction Costs

In Exhibit 2, we tally the expected transaction cost for excluding the CU200 stocks or GICS Energy Sector stocks in SFERS' public equity separate account portfolios as of June 30, 2018. The amount to be divested based on a CU200 restricted list is \$473 million. Using the GICS Energy Sector names, SFERS would divest \$447 million of stock holdings. We included the cost of selling the existing carbon-related stocks and using the cash raised to replace these positions with a like dollar amount of unrestricted stocks.



Exhibit 2: Divestment Transaction Costs – Public Equity Separate Accounts

	Mkt Val (\$000)	(%)	T-Cost Est (%)	Incremental T-Costs (\$000)
Total	8,432,586			
Total CU200	472,988	5.6%	0.10%	909
Total GICS Energy	447,293	5.3%	0.10%	781

As of 6/30/2018, source: NEPC calculations, Russell Investments for t-cost commissions only estimate.

Incremental costs represent a round trip trade.

After considering the cost to divest from fossil fuel equities, we also estimated the cost for SFERS to divest from the bonds of carbon-related companies. The total exposure to fixed income securities is smaller than the pension plan's stock exposure as of 6/30/2018 at approximately \$19m for CU200 bonds and \$24 million for GICS Energy Sector bonds. Again, using industry standards for institutional fixed income trading, we calculate in Exhibit 3 the total cost of fixed income divestment to be \$120,000 if using the CU200 list or \$154,000 if using the GICS Energy Sector list. While we used the Russell estimates for fixed income trading, the 32 basis point estimate here includes spread and market impact costs. Estimating trading costs for fixed income securities is less precise than for equities due to the somewhat subjective nature of bond spread assumptions.

Exhibit 3: Divestment Transaction Costs – Public Fixed Income Separate Accounts

	Mkt Val (\$000)	(%)	T-Cost Est (%)	Incremental T-Costs (\$000)
Total	2,570,328			
Total CU200	18,802	0.7%	0.32%	120
Total GICS Energy	24,005	0.9%	0.32%	154

As of 6/30/2018, source: NEPC calculations, Russell Investments for t-cost commissions only estimate.

Incremental costs represent a round trip trade.

So, in summary, we estimate the one-time transaction cost of divesting from CU200 securities is \$1,029,000 versus an estimated \$935,000 to replace GICS Energy Sector stocks and bonds.

There are other difficult-to-quantify costs (monetary and time-related) to SFERS and its managers to administer and monitor divestment. We did not include the cost of licensing to SFERS if the proprietary CU200 list is chosen to define the restricted securities. If licensing specific to each manager were necessary to pursue CU200 divestment, then this also would require each SFERS equity manager to pay an annual licensing fee to Fossil Free Indexes along with the possible need to pay additional security identification (CUSIP) license fees to properly administer the portfolio restrictions.

Lower Risk-Adjusted Return



Although widely accepted financial theory, beginning with Markowitz (1952), predicts a lower risk-adjusted return from a restricted portfolio, it is impossible to precisely calculate this expected performance shortfall. Historical data alone is insufficient to accurately forecast future returns of a portfolio divested of energy stocks. Fischel, Fiore & Kendall (2017, June) may set an upper bound by predicting a 0.22% per annum cost of divestment from energy and utility stocks (p. 10). Applied to the \$7,078.109 million portion of the SFERS equity portfolio that was studied, Fischel et al (2017, June) calculate a performance shortfall cost of \$15.771 million per year (p.14). NEPC cannot fully endorse this 22 bps divestment cost estimate as definitive for two reasons:

- a. Past returns do not guarantee future results. The presumed future shortfall is based on historical sector returns, using an imprecise proxy for only a subset of the SFERS public equity portfolio as of an unidentified date we believe to be in the 2nd half of 2016.
- b. The report, prepared by senior staff at the economic consulting firm, Compass Lexecon, must be viewed through the lens that it was commissioned by the Independent Petroleum Association of America (p.1)

Fischel et al (2017, June) map 79% of SFERS actual equity holdings to a similarly weighted sector portfolio before analyzing 50 years of performance data, both with and then excluding carbon-related sectors (pp.3-11).

NEPC conducted its own examination of long-term historical data to see if we could confirm whether risk-adjusted returns have indeed been lower for portfolios without energy stocks, as predicted by financial theory. To this end, we analyzed historical returns of the S&P 500 large cap U.S. equity benchmark, broken down by sector returns from October 1989 through June 2018 (the longest time period over which comparable S&P 500 sector data is available). We used monthly returns and sector weightings to compare performance of the S&P 500 Index (which includes energy stocks) versus a hypothetical S&P 500 portfolio that excludes GICS energy sector stocks. Over this time-period, the portfolio that included energy stocks had almost identical returns (approximately 9.7%) compared to the performance of the portfolio that excluded energy stocks. But, as expected, the standard deviation of the portfolio without energy stocks (14.47%) was more volatile than that of the S&P 500 with its energy stocks included (14.11%). As we have stated previously, a significant reduction in diversification should lead, by definition, to a lower risk-adjusted return over time for Plan participants and beneficiaries.

Moving away from history, we are perhaps more interested in the risk-adjusted return forecasts of the investment firms that currently manage SFERS' public equity portfolio. To that end, NEPC surveyed all of SFERS' separate account equity managers regarding their ability to continue to manage their portfolios under their current performance objectives, benchmarks, and contractual obligations, but subject to a restriction on buying and holding energy stocks. While all the responding managers indicated they forecast similar expected returns, five out of the 11 responding managers indicated that the tracking error of the restricted portfolio would be higher. Among the five managers forecasting higher volatility, the expected increase in tracking error was 11% higher than in the portfolios these firms currently manage for SFERS.

Higher tracking error at the same level of expected return will result in a lower return for SFERS over time. This is a result of the impact of compounded returns over time and the



volatility of the return stream. For example, if we assume the average arithmetic return assumption is unchanged for the SFERS US equity portfolio following the exclusion of energy stocks, an increase in portfolio level volatility will then reduce the geometric return of the portfolio. Thus, the expected return of the SFERS US equity portfolio will be lower based on the assumption that the tracking error of the US equity portfolio will be 11% higher than the historical level of 1% and the volatility of the index ex energy, as stated above, will be higher than the S&P 500 Index over the long-term. Accounting for the increase in volatility levels and assuming no change in the average arithmetic return assumption results in a range of expected return of 5-20 bps per annum lower over the long-term compared to the US equity portfolio. We believe it is fair to assume a similar negative performance impact of 5-20 bps from restricting fossil fuel stocks from the SFERS international equity portfolio. When applied to SFERS' total equity portfolio of \$10,236.406 million as of 6/30/2018, we expect a performance shortfall due to fossil fuel divestment within a range of \$5.118 million to \$20.473 million per annum. The annual performance impact to the SFERS portfolio on (\$24,310.636 million on 6/30/2018) is estimated to be 2.1bps to 8.4bps per year, in addition to the one-time transaction cost impact of 0.4 bps.

We do not attempt to estimate a performance impact on equity commingled funds or fixed income accounts.

2. There are still costs (although lower) to limited options like fossil-free passive management and ESG integration

Per manager projections, the incremental management fee for running a \$1.171 billion fossil-free index fund would be 4-7 bps (\$468,400 - \$819,700) per year. The one-time transaction cost of excluding CU200 stocks from the existing US large cap value passive portfolio would be 2-4 bps (\$234,200 - \$468,400). The fossil-free index fund ex-ante tracking error is estimated to be 50-60 bps higher than the tracking error of an index fund that includes energy stocks.

IF SFERS were to integrate ESG principles throughout its investment process, there will be implementation and oversight cost in terms of staff time. Much larger funds like CalPERS and CalSTRS have hired dedicated staff to oversee their ESG programs. Without knowing the scope and granularity of reporting envisioned for such a program, it is impossible for NEPC to quantify a cost.

3. Divestment reduces the opportunity set for SFERS' active managers to earn excess returns.

Restricting managers from the opportunity to invest across sectors can meaningfully impact performance over different time periods. Because the S&P 500 energy sector exhibits one of the lowest correlations of any sector to the overall S&P 500 (0.61 from October 1989 through June 2018), it is an important part of a diversified opportunity set for active managers. The S&P 500 energy sector ranked in the top half of all S&P sectors in terms of performance in two of the most recent five-year periods, while ranking as the best overall performing sector in two of those periods. Unless one believes that energy prices will monotonically decrease to zero, depriving value style managers of their ability to exercise their investment judgement on a significant portion of their opportunity set could be the one



of the highest costs of divestment. Exhibit 4 (below) illustrates S&P 500 sector returns over different rolling time periods.

Exhibit 4: Relative performance of each S&P 500 sector

S&P Sector	5 Years Ending 6/30/1998	Rank	5 Years Ending 6/30/2003	Rank	5 Years Ending 6/30/2008	Rank	5 Years Ending 6/30/2013	Rank	5 Years Ending 6/30/2018	Rank
S&P 500 Consumer Discretionary (GTR)	19.47	6	-0.10	5	2.08	9	16.85	1	15.97	2
S&P 500 Consumer Staples (GTR)	25.01	4	-1.27	7	8.16	5	11.73	2	8.17	8
S&P 500 Energy (GTR)	17.67	7	2.56	1	29.63	1	-0.28	10	2.22	10
S&P 500 Financials (GTR)	27.97	3	1.87	3	-1.27	10	1.31	8	13.13	4
S&P 500 Health Care (GTR)	32.88	2	2.17	2	2.41	8	11.70	3	13.77	3
S&P 500 Industrials (GTR)	20.88	5	-0.09	4	9.72	4	6.83	6	12.66	5
S&P 500 Information Technology (GTR)	34.34	1	-4.90	9	7.27	7	7.83	5	21.91	1
S&P 500 Materials (GTR)	13.34	9	-0.94	6	17.89	2	0.79	9	10.86	6
S&P 500 Telecommunication Services (GTR)	16.44	8	-9.99	10	8.07	6	8.65	4	3.71	9
S&P 500 Utilities (GTR)	10.25	10	-2.55	8	16.98	3	2.85	7	10.57	7
5 Year Annualized Change in Headline CPI	2.45		2.42		3.56		1.31		1.54	

The following Exhibit 5 illustrates the relative size of the GICS Energy Sector for US Large Cap equities in total, and for the growth and value subset. As should be intuitive, energy stocks reside predominantly in the value space.

Exhibit 5: Relative weight of sectors in Russell large cap indices

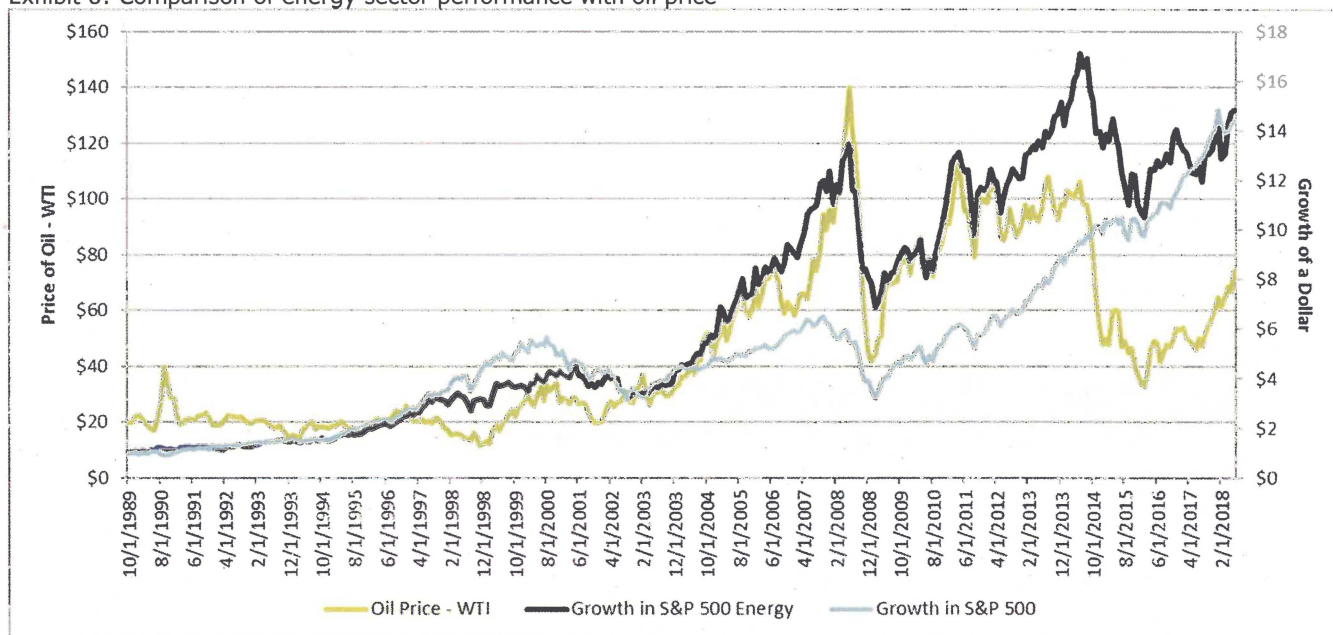
	Ending Sector Weights 6/30/2018		
	Russell 1000	Russell 1000 Growth	Russell 1000 Value
Energy	6.11%	1.01%	11.12%
Materials	2.96%	1.80%	4.10%
Industrials	9.85%	11.87%	7.87%
Consumer Discretionary	13.08%	17.93%	8.31%
Consumer Staples	6.50%	5.72%	7.27%
Health Care	13.61%	13.37%	13.85%
Financials	13.94%	4.44%	23.27%
Information Technology	25.58%	41.54%	9.89%
Telecommunication Services	1.92%	0.15%	3.66%
Utilities	2.88%	0.00%	5.72%
Real Estate	3.55%	2.16%	4.91%

It is important to note that energy stock returns have demonstrated significant cyclicity. Cyclical industries represent the best opportunity set for SFERS' active managers with a value style bias. The five out of 11 managers surveyed by NEPC that predicted higher tracking error for a portfolio divested of energy stocks are mostly value style investors, since they have more to gain than growth style managers by investing in energy stocks at certain times in the economic cycle.



The energy sector is heavily influenced by oil and gas prices which exhibit cyclicity, as well as sensitivity to the economy as a whole. Increases in macroeconomic factors such as employment, vehicles sales, and disposable income are expected to positively influence the energy sector. Exhibit 6 illustrates the results over time of the S&P 500 energy sector versus the broader S&P 500 Index along with oil prices over the same time period. Periods of high or increasing oil prices have provided energy stocks with outsized growth relative to the market as a whole. Divestment deprives asset managers (particularly value style managers) of the opportunity to buy certain energy sector securities when prices have dropped and valuations are favorable. Reducing the opportunity set of investments available to value style managers has the potential to diminish SFERS returns in the future.

Exhibit 6: Comparison of energy sector performance with oil price



4. Divestment can reduce expected performance of the SFERS portfolio in periods of high inflation.

Each large cap equity investable sector exhibits characteristics that serve specific roles in the SFERS portfolio. Some of these characteristics are particularly useful at certain times in the economic cycle. Inflation protection has historically been among the desirable diversification benefits the energy sector has historically contributed to the large cap equity space.

Shroders (2010) tells us that energy equities are one of a limited set of assets which perform well in higher inflation environments. For example, during the most recent period of high inflation from 1973 to 1981, the S&P 500 Index returned a cumulative -26% in real terms whereas equities in the energy sector returned +154% in real terms. Exhibiting strong performance in high inflation environments is an important feature for a portfolio investment, since SFERS' liabilities are likely to increase with inflation due to the impact of



wage growth on future benefits for active members and potential cost of living adjustments for retired members.

NEPC and other forecasters anticipate an increased level of inflation over the medium term (5-7 years) and long term (30 years). Salzman (2018, January 1) provides us context, "Inflation as measured by the core CPI has risen at an average rate of 1.76% since 2009" (p. 17), but the "producer price index, which measures the prices that goods and services producers get, rose 3.1% on a year-over-year basis in November, the fastest rate since January 2012 (p. 18)." The chief economist of GAM Investments, Larry Hatheway, said "An unanticipated acceleration in inflation is probably the biggest risk for markets in 2018 (p. 17)." Certain sectors can be expected to provide some protection from unexpected inflation. "...[F]inancial, energy and materials stocks could ride a wave of accelerating growth in prices. (p. 17)". Salzman (2018, January 1) continues:

Already, prices are rising in some quarters, although not in a sustained fashion. Restaurants have been increasing prices over the past year or so to deal with new city and state minimum-wage laws and higher food prices. Apple clearly feels comfortable charging higher prices, as evidenced by its \$1,000 iPhone X. And Netflix raised its monthly streaming fee for the first time in two years.

Fiscal policy also points in an upward direction. The tax cut passed at the end of December should spur business investment and, potentially, employment...President Donald Trump's aggressive posture on trade raises the possibility of trade restrictions that boost prices. Lumber prices have already spiked in part because of new U.S. duties. 'Trade wars are inflationary,' (p. 18) [said Lloyd Khaner, president of Khaner Capital Management].

Interestingly, concern about sufficient portfolio diversification to weather inflationary periods was an important driver in the evolution toward today's concept of a fiduciary standard for institutional investors. ("Prudent Investor Rule – Compliance in California," n.d.) points out that damage to trust portfolios four decades ago due to a lack of preparation for unexpected inflation was central to today's concept of fiduciary duty.

The surprising acceleration in inflation during the late 1970s and its impact on 'safe' investments created an ongoing concern for long-term pension and trust investors. Thereafter, their fiduciary responsibilities would always include a consideration of inflation risks and the protection of the portfolio's purchasing power. To meet this standard of care, it was recognized that fiduciary investors would need to take higher levels of risk in their portfolios to preserve purchasing power...

The nonexclusive list of circumstances in the prudent investor rule that are appropriate for trustees to consider in investing and managing trust assets details the extent of their duties of care and skill. Economic conditions and the possible effect of inflation or deflation require an in-depth analysis and active surveillance by trustees. These circumstances are always relevant to the trust and its beneficiaries, because economic conditions determine portfolio growth and expected total returns, inflation reduces the real value of returns and the purchasing power of the trust estate, and deflation endangers trust income and principal.

The arguments in this compliance guide are that the prudent investor rule requires trustees...to distinguish between speculative-demand economic conditions based on



excess liquidity and asset price inflation that significantly increase volatility and liquidity risks, from real, sustainable economic growth that supports long-term investments. And the possible effect of inflation or deflation should be viewed as not only relating to broad price trends in the overall economy, but also to the growth and adjustment price cycles in stocks, bonds, real estate, and commodities.

5. SFERS active manager returns in the energy sector are dependent on macroeconomic trends as well as manager skill

In response to a specific query from Commissioner Makras regarding SFERS portfolio gains or losses attributable to CU200 stocks over the last 10 years, we have listed the data below. Energy holdings provided a net gain to SFERS in six of the last 10 fiscal years, ending June 30, 2017.

Exhibit 7: SFERS recent annual gain or loss due to CU200 securities

	Fiscal Year Ending June 30									
	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008
Change In Unrealized Gain/Loss	\$6,409,176	\$6,949,222	-\$81,486,016	\$19,641,348	-\$685,959	-\$28,878,978	\$42,491,212	-\$2,890,118	-\$29,899,738	\$16,648,385
Realized Gain/Loss on Security Sales	-\$8,758,115	-\$41,954,514	-\$11,827,390	\$2,904,950	\$3,837,635	-\$5,284,913	\$18,303,029	\$18,249,814	-\$20,052,161	\$49,879,807
Additional Receipts and Distributions	\$5,878,180	\$8,179,174	\$8,574,739	\$8,002,266	\$7,438,390	\$7,301,829	\$6,050,303	\$5,320,654	\$5,460,187	\$5,062,613
Total Gain/Loss from Fossil Fuel Holdings	\$3,529,241	-\$26,826,118	-\$84,738,668	\$30,548,565	\$10,590,067	-\$26,862,062	\$66,844,544	\$20,680,350	-\$44,491,712	\$71,590,805
1 Year %Change In Oil Price	-4.66%	-18.85%	-43.92%	10.08%	13.31%	-10.77%	26.07%	8.26%	-50.11%	98.61%
1 Year %Change in CPI	1.63%	1.00%	0.12%	2.07%	1.75%	1.66%	3.56%	1.05%	-1.43%	5.02%

It must be noted, however, that these results in isolation do not answer the question of whether energy stocks are a good investment. It is apparent that in every period when oil prices rose, SFERS enjoyed gains from fossil fuel securities. Conversely, in every period (except FY2017) when the price of crude fell, the portfolio experienced a net loss. Furthermore, inflation was quiescent during the entire 10-year period. As we demonstrated in Sections 3 and 4, above, energy stocks have historically outperformed during periods of rising oil prices and/or rising inflation. If we had chosen, instead to study a period of high inflation, the returns attributable to carbon-related stocks would look quite different.

Exhibit 8: Energy sector performance in last inflationary period

	1973-1981	
	Real Return	Annualized CPI
S&P 500	-26%	9.22%
S&P Energy	154%	

Despite the strong correlations between energy stock prices, oil and inflation, active manager skill does matter. SFERS hires active managers with an implied assumption that the managers have skill in stock selection. As an actual example of good stock selection by one of SFERS' active managers, Causeway invested in a CU200 stock, Arcelor Mittal, at several entry points starting in July 2016. The net gain (+\$1,116,634.91) of the position



divided by the investment cost basis (\$4,995,893.23) was 22.35% between 7/5/2016 and 6/9/2017.

6. Divestment campaigns have often resulted in economic losses for investors and have not driven down the share price of targeted companies

Broadly, there is a large body of academic work on the historical outcomes of divestment. Overwhelmingly, studies such as MacAskill (2015, October 20); Kritzman (2013), Hong and Kacperczyk (2008); Adler and Kritzman (2008); Teoh, Welch and Wazzan (1999); Love (1985); Wagner, Emkin and Dixon (1984); as well as Rudd (1979) have shown that investment decisions to sell and permanently exclude portions of an investment universe have not been accretive to investors. Several other studies, such as Parwada (2013); Kurtz and DiBartolomeo (Fall 2011); Statman and Glushkov (2009); and Guerard (1997) have shown a mixed impact of social investing.

One of the strong arguments against the effectiveness of divestment is that the shares sold by divesting institutions are usually not diminished in value solely as a result of the sell-off. MacAskill (2015, October 20) illustrates the expected lack of impact on share price,

(I)f the aim of divestment campaigns is to reduce companies' profitability by directly reducing their share prices, then these campaigns are misguided. An example: suppose that the market price for a share in ExxonMobil is ten dollars, and that, as a result of a divestment campaign, a university decides to divest from ExxonMobil, and it sells the shares for nine dollars each. What happens then?

Well, what happens is that someone who doesn't have ethical concerns will snap up the bargain. They'll buy the shares for nine dollars apiece, and then sell them for ten dollars to one of the other thousands of investors who don't share the university's moral scruples. The market price stays the same; the company loses no money and notices no difference. As long as there are economic incentives to invest in a certain stock, there will be individuals and groups—most of whom are not under any pressure to act in a socially responsible way—willing to jump on the opportunity. These people will undo the good that socially conscious investors are trying to do.

The divestment of shares in companies doing business in South Africa during the 1980s still stands as, by far, the largest and most studied example of shareholder pressure against a perceived social evil. Therefore, it is instructive to learn from the economically measurable impact of this action, which was augmented by contemporary American consumer boycotts against these same companies and U.S. governmental sanctions against the South African economy. A statistically rigorous study, Teoh, Welch and Wazzan (1999), carefully analyzed

...the financial effects of shareholder pressure in what activists consider to have been the most visible and successful instance of social activism in investment policies, the boycott of South Africa designed to speed the end of the apartheid regime...The announcement of legislative or shareholder pressure had no discernible effect on the valuation of banks and corporations with South African operations or on the South African financial markets... One explanation may be that the boycott primarily reallocated shares and operations from 'socially responsible' to more indifferent



investors and countries. Our findings are consistent with the view that demand curves for stocks are highly elastic and so have little downward slope. In all, the evidence from both individual and legislative actions, taken together, suggests that the South African boycott had little valuation effect on the financial sector.

But the South African example is by no means the only action that failed to produce substantial financial damage against the target in question. We learn from MacAskill (2015, October 20) that

Studies of divestment campaigns in other industries, such as weapons, gambling, pornography, and tobacco, suggest that they have little or no direct impact on share prices. For example, the author of a study on divestment from oil companies in Sudan wrote, 'Thanks to China and a trio of Asian national oil companies, oil still flows in Sudan.' The divestment campaign served to benefit certain unethical shareholders while failing to alter the price of the stock.

As an important element that must go along with any divestment, CalPERS tracks their ongoing cost of divestment from tobacco-related securities. In the Foresti and Ingram (2017, October 24) letter to CalPERS, Wilshire Associates calculated the potential impacts related to tobacco divestment, including foregone performance and transaction costs, at \$3,887mm since 2001, an amount equal to 1.2% of plan AUM at June 30, 2017. As we stated earlier, the size of the proposed fossil-fuel divestment for SFERS would be larger than prior exclusions of tobacco and Sudan-related stocks.

7. Fiduciary responsibility requires U.S. public pensions to act solely in economic interest of Plan participants

Due to the aforementioned expected costs of divestment and the historical futility of divestment campaigns in accomplishing their stated objective, a prudent public pension plan should take great caution before approving an action such as broad divestment that intentionally and meaningfully reduces portfolio diversification.

Government sponsored pension plans in the United States are subject to the so-called "Prudent Investor Rule" which incorporates the concept that a meaningful reduction in portfolio diversification will result in a less than optimal risk-adjusted return for said portfolio. This principle is one of the central tenets of Modern Portfolio Theory ("MPT"). MPT is the name given to a set of efficient portfolio construction principles that have evolved over the six decades since Markowitz (1952). Markowitz was awarded the 1990 Nobel Memorial Prize in Economic Sciences for his conceptual framework for building optimal portfolios. Bill Sharpe shared the 1990 Nobel Prize for expanding on Markowitz' work by developing important tools (such as the Capital Asset Pricing Model) to aid in investment decisions.

The Prudent Investor standard that investment decisions for assets held in trust should be made based on overall portfolio risk (which is lowered by combining weakly correlated asset classes) was a break from the prior "reasonable person" approach to the stewardship of trust assets. The standard prior to the Prudent Investor Rule discouraged institutional investors from investing in any specific security or asset class (such as private equity) that



was perceived to be "risky" by a reasonable person. The Prudent Investor standard was first embedded in the Employee Retirement Income Security Act of 1974 ("ERISA"), which governs American corporate pension funds. The American Law Institute in its 1992 Third Restatement of the Law of Trusts applied the Prudent Investor standard and the MPT concept of efficient portfolio construction to all U.S. fiduciaries overseeing assets held in trust. In 1994, the Uniform Law Commission codified the new standard of fiduciary care into the Uniform Prudent Investor Act (UPIA), also known as the Prudent Investor Rule. "ERISA and UPIA admonish fiduciaries to embrace the principles of Modern Portfolio Theory" according to p. 3 of Anke, Ong & Ong (n.d.).

California's version of the Prudent Investor Rule, was adopted into the state Constitution in 1995. Article XVI, Section 17 of the California Constitution lays out three fiduciary premises:

A. Primary Loyalty Rule

The members of the retirement board of a public pension or retirement system shall discharge their duties with respect to the system solely in the interest of, and for the exclusive purposes of providing benefits to, participants and their beneficiaries, minimizing employer contributions thereto, and defraying reasonable expenses of administering the system. A retirement board's duty to its participants and their beneficiaries shall take precedence over any other duty.

B. Exclusive Benefit Rule

The assets of a public pension or retirement system are trust funds and shall be held for the exclusive purposes of providing benefits to participants in the pension or retirement system and their beneficiaries and defraying reasonable expenses of administering the system.

C. Prudent Investor Rule/Duty to Diversify Investment

The members of the retirement board of a public pension or retirement system shall discharge their duties with respect to the system with the care, skill, prudence and diligence under the circumstances then prevailing that a prudent person acting in a like capacity and familiar with these matters would use in the conduct of an enterprise of a like character and with like aims...(They) shall diversify the investments of the system so as to minimize the risk of loss and maximize the rate of return, unless under the circumstances it is clearly not prudent to do so.¹⁹

In the Monaco (2017, July 13) legal opinion (included in its entirety as Attachment 2 to this report) prepared in reference to the consideration of fossil fuel divestment by the Seattle City Employees Retirement System (SCERS), ERISA Attorney Michael Monaco wrote:

In accordance with the directions of the Board at its meeting on April 13, 2017, we have conducted a comprehensive reexamination of whether there has been any expansion or change in the legal rules determining the legality of ESG investment proposals. Following a review of relevant legal authorities in Washington State, throughout the United States, and internationally, we conclude that there has been no change in the legal standards that SCERS must follow in considering ESG



proposals. Indeed, the ESG legal standards relevant to SCERS have only been reaffirmed by relevant court decisions, legal articles and treaties, model laws, and opinions by other law firms regarding the fiduciary responsibility standards governing retirement plans...

Particularly in the wake of financial services scandals and the economic crisis of 2008-2009, some advocates of broader ESG investment have argued that ordinary methods of valuation of stocks and other securities are missing the mark and should be supplemented - simply for the benefit of the retirement fund and the beneficiaries, to protect them from overvaluations. In particular, advocates of divestment from fossil-fuel companies have suggested that the financial markets are overvaluing them, and that alternative analyses of the alleged weaknesses of these companies require consideration of fossil fuel divestment.

However, in the last few years, the U.S. Supreme Court has reaffirmed that it is generally 'implausible' for a fiduciary to believe that a retirement plan committee can predict the value of a publicly-traded company better than the financial markets have...

Thus we continue to believe that the legal hazards would be great if a fiduciary were to consider taking an ESG action based (in whole or in part) on a rejection of ordinary economic principles as explained by investment professionals. As stated above, U.S. Supreme Court expressly considers a fiduciary's acceptance (of) well-established economic principles like the "efficient markets" view of publicly-traded companies to be prudent. More generally, the decisions by the Supreme Court (and other federal courts throughout the country) on these issues demonstrate the legal safety of basing investment decisions on analysis by established professionals with unquestionable expertise, and following established and accepted modes of analysis as well as the great hazard of failing to do so.

Finally, NEPC's view is shared by our peers that a significant divestment decision may conflict with the fiduciary duty of a U.S. public fund. NEPC surveyed all ten of the largest U.S. institutional investment Public Fund consulting firms (and two others in addition) on the question of whether they have ever recommended full divestment from fossil fuel stocks for a U.S. defined benefit public pension plan. Eleven firms responded. All of these competitors state that, similar to NEPC's stance, they have not made such a broad divestment recommendation to a government sponsored pension plan in this country.

One such competitor, Pension Consulting Alliance (PCA), was commissioned by the Vermont Pension Investment Committee (VPIC) "to review potential divestment and its potential impacts on the VPIC portfolio". Bernstein (2017, February 8) summarized PCA's opposition to restricting active managers from investing in fossil fuel securities as follows.

We find that divestment from fossil fuels, thermal coal, or ExxonMobil could:



- *increase costs*
- *add diversification and technological change risks to VPIC's portfolio*
- *only effect potential stranded assets risk, not other material climate change risks and opportunities,*
- *leave unaffected the financial situation of companies offering alternatives to fossil fuels,*
- *conflict with VPIC's governance in its asset allocation, equity investment strategy, and proxy voting and direct corporate engagement, and*
- *introduce a slippery slope of potential for other restrictions on VPIC's investment universe whose potential benefits have not been shown to outweigh the potential harm to the VPIC portfolio (p.5).*

Pension Consulting Alliance essentially agreed with NEPC's summary in p. 1 of Moseley (2013, February 22) that "...we believe that the Energy divestment initiative, if enacted, will have significant implications for VPIC, including the generation of immediate transaction costs, increase in asset management fees, and most importantly a potential reduction in expected return...going forward". Bernstein (2017) – which is included as Attachment 3 to this report – concludes that "Fossil fuel divestment does not reduce the global economic dependence on, or demand for, fossil fuels, or impact the financing of the targeted companies" (p. 5).

8. Divestment removes many options for SFERS to take positive action to impact climate change

As stated at the beginning of this paper, NEPC agrees that institutional investors are prudent to position their policies and portfolios in response to climate change as a risk factor. While consideration of divestment may promote an illusion of "doing something", it is one of the least effective tools available to impact climate change and protect the SFERS portfolio. In fact, divestment can reduce the influence the Plan will have on helping to create a cleaner environment, fund greener technologies and shape better climate policy.

As an alternative to a strategic exclusion of energy securities, the Board may wish to consider various positive investment actions to address the climate risk within the investment program, as envisioned in the SFERS ESG Procedures. The City and County of San Francisco has been a leader in shareholder activism by policy since 1988. Through its Social Investment Policy, later known as its ESG policy, the Plan has followed a tiered assignment system ascribing levels of engagement. These levels are defined as Level I - Shareholder Voting, Level II - Direct Engagement and Level III - Investment Restrictions (divestment). There is recent evidence that proxy voting and engagement strategies are starting to have a positive impact on major energy producers.



Some US public pension systems have expressed concern about the damaging effects of climate change and have pursued various positive actions that they believe will benefit the financial well-being of their systems and the environment. These actions include engaging with corporations, integrating environmental risks into their investment process and pursuing sustainable investments. This approach is consistent with the principles of investment theory while addressing investor concerns about climate change.

UN PRI and the Ceres Investor Network are among the prominent examples of institutional investors collaborating to take positive action on climate change. "Global Investors Driving Business Transition" (n.d.), identifies Climate Action 100+ as a five-year investor initiative launched in December 2017 "to engage with the world's largest corporate greenhouse gas emitters to curb emissions, strengthen climate-related financial disclosures and improve governance on climate change. Specifically, investors will request that companies reduce emissions consistent with the goal of the Paris Agreement, to keep global temperature rise well-below 2-degrees Celsius and align their disclosures with the Task Force on Climate-related Financial Disclosures (TCFD) recommendations."

One of the most significant recent victories in shareholder activism was led by US public pension funds and money managers against Exxon Mobil and Occidental Petroleum, as chronicled in Mufson (2017, May 31), excerpted from the *Washington Post*:

ExxonMobil management was defeated Wednesday by a shareholder rebellion over climate change, as investors with 62.3 percent of shares voted to instruct the oil giant to report on the impact of global measures designed to keep climate change to 2 degrees centigrade.

The shareholder rebellion at the ExxonMobil annual meeting in Dallas was led by major financial advisory firms and fund managers who traditionally have played passive roles. Although the identity of voters wasn't disclosed, a source familiar with the vote said that major financial advisory firm BlackRock had cast its shares in opposition to Exxon management and that Vanguard and State Street had likely done the same. All three financial giants have been openly considering casting their votes against management on this key proxy resolution.

BlackRock and Vanguard are the biggest shareholders in ExxonMobil, owning 13 percent, or \$43.6 billion worth, of the company's stock. State Street Global Advisers, another big financial advisory firm that has called for greater climate disclosures, is close behind with 5.1 percent of the stock. The vote by them against management marked an important step for groups that have been trying to force corporations to adopt greater disclosure and transparency about the financial fallout of climate change.

BlackRock, which said that climate disclosure is one of its top priorities, had warned on its website that "our patience is not infinite."



'This is an unprecedented victory for investors in the fight to ensure a smooth transition to a low carbon economy,' said New York State Comptroller Thomas P. DiNapoli, a trustee of the New York Common Retirement Fund which co-sponsored the proxy resolution. 'Climate change is one of the greatest long-term risks we face in our portfolio and has direct impact on the core business of ExxonMobil,' he said in a statement.

The resolution, which was co-sponsored by the New York City pension fund, says that the company 'should analyze the impacts on ExxonMobil's oil and gas reserves and resources under a scenario in which reduction in demand results from carbon restrictions and related rules or commitments adopted by governments consistent with the globally agreed upon 2 degree [Celsius] target.'

The resolution adds that 'this reporting should assess the resilience of the company's full portfolio of reserves and resources through 2040 and beyond, and address the financial risks associated with such a scenario.'

It notes that other major oil companies including BP, Total, ConocoPhillips and Royal Dutch Shell have endorsed the two degree analysis.

BlackRock's website injected a sense of urgency about the issue.

'As a long-term investor, we are willing to be patient with companies when our engagement affirms they are working to address our concerns,' it said.

However, it added, 'when we do not see progress despite ongoing engagement, or companies are insufficiently responsive to our efforts to protect the long-term economic interests of our clients, we will not hesitate to exercise our right to vote against management recommendations.'

Fidelity Investments said it was adopting the U.N.'s Principles for Responsible Investment, though a spokesman said that was just a 'formulization of what we've done for a long time.'

The prospect of major financial management firms joining pension funds such as California's and New York's that have backed social and environmental resolutions in the past is already putting some companies on the defensive.

This month similar resolutions demanding that management explain how climate change could affect their businesses were adopted at Occidental Petroleum and PPL, a large utility holding company. Occidental's shareholders backed the resolution with a 67 percent majority, including BlackRock in its first vote ever against a company's management over the climate issue.



SFERS can leverage joint action with a number of like-minded larger institutional investors. Engagement strategies by CalPERS and CalSTRS are reviewed below and serve as examples of how US public pension systems can strive to achieve positive environmental impact while meeting their investment objectives. In considering the applicability of these programs, the Board should keep in mind that CalPERS' and CalSTRS' resources far exceed that of SFERS. CalPERS has been engaged in ESG initiatives since the launch of their corporate governance reform program in 1984. They were also a founding member of Ceres in 1989 and of the Ceres-coordinated Investor Network on Climate Risk in 2003. Ceres is a non-profit organization that advocates for sustainability leadership. As cited in *Towards Sustainable Investment & Operations* (2014), CalPERS' approach includes:

- Integrating climate change risk into their investment process with the intent of preserving the long term financial integrity of the system as a prudent investor;
- Leading initiatives to understand and require disclosure of the risks associated with these companies;
- Engaging through proxy voting initiatives and organizations like Ceres to promote understanding of how management at these firms are incorporating climate risk into their decisions;
- Finding investment opportunities that have a positive environmental impact, such as public companies that derive a material portion of their revenues from environmentally friendly sectors (e.g. low-carbon energy production, energy efficiency management, carbon trading) and sustainable forestry;
- Supporting organizations such as the Urban Land Institute Greenprint Center for Building Performance, which is committed to reducing energy consumption and carbon emissions in the real estate industry;
- Promoting the adoption of ESG guidelines by investment managers; and
- Partnering with the academic community through the CalPERS-founded Sustainable Investment Research Initiative, a program launched to study how sustainability factors impact investment return and risk.

As captured in *Green Initiative Task Force* (2014), CalSTRS integrated environmental risk management and positive action into their investment process in 2004 with the launch of a mission to manage risks and capture opportunities associated with climate change to enhance the risk-adjusted return profile of the fund. The CalSTRS approach includes:

- Integrating climate change considerations throughout the investment process and working with other investors in order to broaden its engagement reach;
- Managing climate change risk by voting proxies and routinely submitting environmental-related shareholder proposals to companies held in the public equity portfolio;



- Measuring an investment's profitability from activities and exposure to air quality, water quality, land usage and climate change;
- Promoting the incorporation of ESG factors by their public equity managers by polling them on an annual basis to assess the level of climate change considerations in their investment processes;
- Engaging with management, such as a recent request of 44 energy companies that they confirm adherence to SEC rules on reserve valuation that it be contained to "reserves that are the basis for their share price values are expected to be produced and sold within the next five to 10 years, making sequestration unlikely";
- Finding investments that have a positive environmental impact, such as a public equity sustainability program, private equity clean technology and renewable energy infrastructure; and
- Requiring their real estate separate account managers to include a "conservation/sustainability assessment" in their annual planning/budgeting process.

It is important to note that CalSTRS has spent more than a decade carefully weighing and crafting investment policies that support its integrated approach to ESG. SFERS and other pension plans may want to review the CalSTRS 21 Risk Factors outlined in Investment Policy for Mitigating Environment, Social, and Geopolitical Risks (n.d.) that is included as Attachment 4 to this report. "It is important to note that fiduciary standards do not allow CalSTRS to select or reject investments based solely on social criteria." (p.2)

Conclusion:

While there is likely an element of catharsis that comes with taking a broad divestment action, SFERS should carefully weigh the cost and likely impact of such a decision. NEPC believes that ESG integration is a far more effective step for SFERS to help improve our environmental future while remaining aligned with the fiduciary responsibility of a US defined benefit public pension system. In a website post, Divestment from Fossil Fuels is Not the Solution (2014), CalPERS states that "we all have a shared concern with climate risk, but our view is that the solution lies in tackling energy companies through an engagement process focused on finding solutions, rather than walking away."

In the words of one climate change activist, Krosinsky (2016, October 12), who believes the goal of a cleaner environment is not advanced by the feel-good rush of taking an ultimately empty action like broad divestment:

As a Board Member of the Carbon Tracker Initiative myself, it is great to see our work continue to become accepted, and given recent scientific acceptance of climate change via the IPCC findings, the need for an energy transition through investment decisions couldn't be clearer.

Divesting from a few producer companies is a personal choice, and which is fine (I have done that myself), but changing the energy mix to a more sustainable balance is much more challenging and important, as are the complications large investors



face especially as concerns fiduciary duty and the use of benchmarks through passive, low-cost indexed investments.

Fiduciary Duty calls for asset owners such as Pension Funds...to act prudently and for the best interest of their beneficiaries.

A movement could be fostered to transition passive investment into indexes which evolve over time to match the sort of energy transition that is desperately needed.

Such a movement makes more sense than a Divestment from Oil campaign.

Frank Wolak, Stanford professor of economics, perhaps sums up our argument best when Chandler (2015, April 10) quotes him as saying "We all could agree that divestiture is a symbolic gesture that, sadly, will have no measurable impact on global greenhouse emissions, or the behavior of companies that produce fossil fuels."



APPENDIX

Attachment 1: Mercer (2015)



Attachment 2: Monaco (2017, July 13)



Attachment 3: Bernstein (2017)



Attachment 4: CalSTRS ESG Investment Policy





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Disclaimers and Disclosures

- Past performance is no guarantee of future results.
- All investments carry some level of risk. Diversification and other asset allocation techniques do not ensure profit or protect against losses.
- The information in this report has been obtained from sources NEPC believes to be reliable. While NEPC has exercised reasonable professional care in preparing this report, we cannot guarantee the accuracy of all source information contained within.
- The opinions presented herein represent the good faith views of NEPC as of the date of this report and are subject to change at any time.





NEPC, LLC

To: SFERS Retirement Board

From: Allan Martin, Sam Austin, Daniel Hennessy, Michael Miranda

Date: October 10, 2018

Subject: Commentary on Managing SFERS Fossil Fuel Investment Risk

Background

On September 27, 2018, NEPC was directed to update our Fossil Fuel Divestment Commentary which was presented to the Board on January 24, 2018, and to comment on the October 10, 2018 staff memo on Framework for Assessing and Managing SFERS' Fossil Fuel Investment Risk. The updated Fossil Fuel Divestment commentary is attached.

Summary of Updates to NEPC Fossil Fuel Divestment Commentary

While the urgency to address the issue of climate change has risen, the pejorative effect of divestment of fossil-fuel-related securities on the SFERS portfolio has not materially diminished. In point one of the Jan 24 memo, we estimated the annual performance shortfall due to fossil fuel divestment (due to the implicit cost of reduced diversification in the equity allocation) was 5-20 basis points per year on the plan's equity portfolio. The plan's exposure to equities has declined modestly from \$11,529 Million on 9/30/2017 to \$10,236 Million on 6/30/2018, resulting in an annual performance impact in dollars of 2.1bps to 8.4bps, in addition to the one-time transaction cost impact of 0.4 bps. Additionally, in Point 4 of the original memo, we highlighted that "Divestment can reduce expected performance of the SFERS portfolio in periods of high inflation." Since that conclusion was presented, inflation in the US has indeed risen, and the likelihood of higher GDP growth and resulting increases in inflation from tax-cuts and other fiscal policy stimulants, has also risen. Since growing economies consume more energy, and alternative energy sources cannot expand sufficiently in the near term to meet the demand, the prospect of rising oil prices, and profits for fossil-fuel producers is more significant than anticipated back in January. In fact, the return of the S&P 500 Index including fossil-fuel companies, has exceeded the S&P 500 Fossil-Free Index by 34bps since 9/30/2017 (through 6/30/2018).

Finally, the primary concern in preventing an active money manager from exercising their investment judgement as to whether a security (be it a fossil fuel based equity or not) is the potential for reduced manager outperformance. To be clear, SFERS does not directly own the bulk of their equity securities. They have entrusted that task to appointed money managers, who in turn are fiduciaries to the plan. Those managers only purchase a security when in the manager's professional judgement (for which they are compensated), the prospect of a return from that security exceeds the incremental risk to the portfolio. Forbidding them the opportunity to exercise their judgment diminishes their potential to add alpha to the return of the portfolio they are managing on SFERS behalf. Since 9/30/2017,



through 9/30 of 2018, the average return of fossil fuel securities held by SFERS' active managers has exceeded the return of the Dow Jones U.S. Oil and Gas Index by 634 bps (21.71% vs 15.37%).

NEPC's original view that a significant divestment may conflict with the fiduciary duty of a US public plan continues to be the view held by our Public Fund Consulting peers, as reported in the January Commentary. All the firms we contacted last year continue to assert that they have not advised their large Public Fund clients to broadly divest of fossil fuel holdings. As stated in the original memo "We contend that divestiture is a symbolic gesture that sadly will have no measurable impact on global greenhouse emissions, or the behavior of companies that produce fossil fuel, but unfortunately there will likely be a negative impact on the returns of the divested portfolio".

That said, there are an increasing array of effective tools available to address the impact of climate change on SFERS portfolio, which were enumerated in our original memo. Those listed below have the least likelihood of negatively impacting plan performance.

**** Proxy voting to endorse transparent corporate disclosure regarding their carbon footprint and the risk that environmental factors pose to their business***

**** Active engagement alongside other large investors to influence egregious carbon emitters***

**** Investment in technologies and industries expected to benefit from change in energy mix***

**** Integration of ESG principles throughout the investment process at the Plan level and at the asset manager level***

**** Selective reduction of exposure to impacted industries via passive management with screens***

SFERS staff recommendations

SFERS staff memo setting forth their framework for Addressing and Managing SFERS Fossil Fuel Investment Risk describes in detail several actions being undertaken, or contemplated, which we believe may have the intended effect of encouraging companies to reduce carbon-emissions without significantly impacting investment returns.

We highlight a few of these described in the SFERS Staff memo, in addition to the critical step of hiring a Director of ESG Investing

Proxy Voting

- SFERS voted in support of 65 climate-risk related shareholder resolutions during the 2018 proxy season, including key votes at Kinder Morgan, Anadarko Petroleum Corporation, and Range Resources Corporation that received majority shareholder



support. An important narrative of this year's proxy season was the significant number of climate resolutions that were withdrawn by filers (nearly half of those tracked by Ceres) due, in most cases, to management's agreement to address the topics included in the resolution through dialogue, commitment, or some other means.

Divestment would deprive SFERS the opportunity to directly express their opinions alongside other concerned asset owners to the Board and management of targeted companies.

Engagement

- SFERS became a signatory to the Investor Agenda, launched at the September 2018 Global Climate Action Summit, and developed by the Asia Investor Group on Climate Change, CDP, Ceres, the Investor Group on Climate Change, the Institutional Investor Group on Climate Change, Principles for Responsible Investment and UNEP Finance Initiative.
- SFERS was a signatory to a letter to the G7 leadership in advance of their June 8-9, 2018 meeting, encouraging governments to: (1) Achieve the Paris Agreement's goals; (2) Accelerate private sector investment into the low carbon transition; and (3) Commit to improve climate-related financial reporting.
- SFERS has become an official supporter of the Taskforce for Climate-Related Financial Disclosure (TCFD) an initiative of the Financial Stability Board, which develops voluntary, consistent climate-related financial risk disclosures for use by companies in providing information to investors, lenders, insurers, and other stakeholders.

Investment in technologies and industries expected to benefit from change in energy mix

- SFERS has committed \$50MM to Sustainable Asset Fund II managed by Vision Ridge Partners, which invests in sustainable real assets including solar, EV charging, energy efficiency, and others.
- SFERS has committed up to \$100MM to Denham Capital Management's International Power fund, which invests in solar, wind, hydro and efficient gas-fired generation in developing countries.
- SFERS has committed up to \$50MM to New Energy Capital Infrastructure Credit Fund II, L.P. managed by New Energy Capital Partners, which invests in clean energy or clean infrastructure projects including, solar, wind, energy storage, and energy efficiency among other renewables.
- SFERS has committed \$12.4 million to a co-investment in Clean Line Energy, a company focuses on transmission projects to connect renewable energy sources to end markets.
- SFERS has committed up to \$500MM to the Global Equity Strategy fund managed by Generation Investment Management which is 70-80% less carbon intensive than its benchmark, the MSCI World Index.



These investments were made specifically to earn higher-risk adjusted returns, not for social benefits. SFERS reputation and demonstrated interest in finding high-return investments which simultaneously mitigate climate change risks contributed to the sourcing and positive evaluation of these strategies.

Passive Management with Screens

- SFERS has committed \$500MM to a passive public equities strategy managed by Goldman Sachs Asset Management (GSAM), the "Risk Aware Low Emissions" strategy that has at least 50% lower emissions than the Russell 1000
- SFERS has over \$100MM invested in a passive public equities strategy that tracked the MSCI US Ex-Fossil Fuel Index.

Taken individually and in aggregate, these actions will and have established SFERS as a recognized leader in responsibly incorporating broader risk parameters into the oversight of its directly-owned and separately managed investment portfolio, without the negative actions associated with divestment.

The final portion of the staff memo, Step 6, outlines a procedure, which in this case, accomplishes what amounts to phased divestment. NEPC's view is that divestment, whether broad-based or narrowly focused, will negatively impact the plan's risk-adjusted return potential and is therefore inappropriate. That said, we did review the described methodology and have concluded that the approach outlined is a superior risk framework for identifying the "riskiest and dirtiest" security issuers.

- 1) The process targets the effect of divestment action on specific measurable outcomes which can be logically argued will have positive effect on the curtailment of fossil fuel production. In this sense, the framework described is ultimately about managing risk in a specific, targeted and logical process, with environmental or specifically climate-change risk as the specific risk being addressed. The framework itself is both forward-looking and innovative, and goes beyond the off-the-shelf measures of environmental risks described in a single dimension such as carbon footprint. It is also robust and could be adapted to addressing other sources of risk. As a process to direct and focus engagement activities, it represents a significant advancement.
- 2) The process limits the extent of divestment activities to firms which are significantly impacted financially in a 2-degree scenario and therefore reduces (but does not eliminate) the negative effect on portfolio returns.