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**RETIREMENT BOARD CALENDAR SHEET**  
**Retirement Board Meeting of October 9, 2019**

**To:** Retirement Board

**Through:** Jay Huish *JH*  
Executive Director

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

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

**From:** Andrew Collins *AC*  
Director of ESG Investing

Luke Angus, CFA *LA*  
Security Analyst, ESG Investing

**Date:** October 9, 2019

**Agenda Item:**

Update on Strategies to Address Climate Risk in the SFERS Portfolio

**Background:**

The SFERS Retirement Board ("Board") recognizes climate change as a risk to the health of the pension trust, and it has directed Investment Staff ("Staff") to take various actions to mitigate this risk.

Memorandum A provides a summary of progress that Investment Staff ("Staff") has continued to make to measure and manage climate risk in the SFERS portfolio, both overall and within the oil and gas industry.

Memorandum B provides a summary of progress that Investment Staff ("Staff") has continued to make to measure and manage climate risk in the SFERS portfolio within the utilities sector.

**Recommendation:**

If the Board wishes to continue with "prudently phased divestment" and agrees with Staff's recommendation for doing so, then the following motion is recommended:

1. Move that in order to fulfil the Board's request for "prudently phased divestment", divest positions in four companies, restrict further investment in those companies as well as six additional companies identified in Table 10 of Memorandum A.
2. Move that SFERS should adopt the SFERS Climate Transition Watch List, 2019 (Table 12 of Memorandum A), and that Staff should engage with companies on that list, focusing resources and efforts on companies where SFERS has current, material investment (as identified in Table 13 of Memorandum A).

3. Move that Staff should engage with existing and potential external managers that hold positions in fossil fuel companies, beginning with those that are invested in companies on the SFERS Climate Transition Watch List, 2019 (Table 12 of Memorandum A), to understand how they are including considerations of climate risk in their investment process.

Attachment:

Staff Memorandum A: Overview and Oil and Gas Industry - Voting Item

Staff Memorandum B: Utilities Sector - Non-Voting Item



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**Background:**

The SFERS Retirement Board (“Board”) recognizes climate change as a risk to the health of the pension trust, and it has directed Investment Staff (“Staff”) to take various actions to mitigate this risk.

At the July 8, 2015 Retirement Board meeting (“meeting”), the Board approved investment of \$100 million in an index that excludes companies that own fossil fuel reserves.

At the May 17, 2017 meeting, the Board approved Staff’s recommendations to restrict investment in companies that derive significant revenue from the mining of thermal coal.

At the January 24, 2018 meeting, the SFERS Board approved six strategies to address climate risk in the SFERS portfolio:

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.

As of May 1, 2018 SFERS, fulfilled Strategy 1 and Strategy 2.

At the October 10, 2018 Board Meeting, the Board accepted Staff's recommendations on Strategy 6, approving the following additional steps to manage climate transition risks associated with fossil fuel investments:

1. SFERS will divest its current positions and restrict future investment in seven (7) oil & gas companies that display the highest climate transition risk according to SFERS' newly developed Climate Transition Risk Framework ("the Framework").
2. SFERS will engage with 24 other oil & gas companies that display high climate transition risk according to the Framework, were within the top 10 SFERS fossil fuel holdings (and had at least one risk indicator identified by the Framework), and/or were engaged in tar sands activities.
3. SFERS will engage with thermal coal companies that receive between 10-50% of revenue from thermal coal and consider divesting from companies that are not exiting the thermal coal business in the near term.
4. SFERS will 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.
5. SFERS will modify the first strategy approved by the Board on January 24, 2018 to remove the word "passive" from its directive, thereby reading as follows: Adopt a carbon constrained strategy for \$1 billion of SFERS public markets portfolio.

This memorandum provides a summary of progress that Investment Staff ("Staff") has continued to make to measure and manage climate risk in the SFERS portfolio. This memorandum includes updates on the efforts described above and discusses new initiatives Staff has undertaken to manage SFERS' climate risk.

### **Introduction to the SFERS Climate Risk Strategy**

The effects of climate change are already being felt and are projected to significantly hamper global growth over the coming decades.

Collectively the world remains far off track from limiting global temperature rise to the Paris Agreement Goal of between 1.5°C and 2°C. In October 2018 the IPCC released a special report "Global Warming of 1.5°C" showing that even the difference between 2°C and 1.5°C of warming is significant.

The report forecasts that the additional 0.5°C of warming will result in the following impacts:

- 2.6x more of the global population exposed to severe heat at least once every five years;

- 10x the number of ice-free arctic summers;
- 2.5 inches more sea level rise by 2100 (to 1.5 feet overall);
- 2.3x reduction in crop yields; and
- 2x decline in marine fisheries.

At current rates, however, the world is on pace for over 4°C of warming by the end of the century, which would result in catastrophic impacts<sup>1</sup>. Global emissions were roughly 52 GtCO<sub>2</sub>-e in 2016 and are projected to be 52-58 GtCO<sub>2</sub>-e by 2030. Annual emissions need to be about half that (25-30 GtCO<sub>2</sub>-e/year on average) by 2030 to limit warming to 1.5°C (with low chance of overshoot).

SFERS continues to recognize that climate change poses a variety of risks (and also opportunities) to investors. These include risks from the physical impacts of climate change, risks and opportunities arising from the technological transition to a low carbon economy, and a range of related regulatory, policy, and legal liability risks.

Investors around the world continue to see climate risk as a threat to sustained global growth<sup>2</sup>. The World Economic Forum's 2019 Global Risk Report identified climate associated risks as the top three global risks for the first time ever<sup>3</sup>. Asset managers representing over \$3 trillion in assets identified "climate change/carbon" as the top ESG criterion in a US SIF Foundation survey<sup>4</sup>. And climate change jumped from third to first place in the 2019 Extreme Risks report from Willis Towers Watson Investments' Thinking Ahead Institute<sup>5</sup>.

SFERS has implemented a four-pillar approach to managing climate risk for the Plan. Staff notes that this approach incorporates five of the six strategies to address climate risk that were approved at the January 24, 2018 meeting (with the sixth strategy, "Hire a Director of ESG Investing", considered fulfilled and not requiring continual update).

The four pillars of SFERS's approach to manage climate risk are:

1. Invest – SFERS invests in strategies that are aligned with the transition to a low-carbon economy, including carbon-constrained investments, renewable energy-related investments, and low-carbon technology opportunities.
2. Engage – Individually and in collaboration with other investors, SFERS engages with companies in its underlying portfolio to encourage them to strategically incorporate considerations of climate risk into their strategy, governance, and operational management. SFERS engages with its external managers to understand their process for incorporating consideration of climate risk (among other ESG factors) into their investment process.
3. Divest – SFERS divests companies and/or industries in its portfolio that it considers to have high, unmitigated investment risk due to climate change, which cannot be addressed through engagement or other means.

<sup>1</sup> <https://climateactiontracker.org/global/temperatures/>

<sup>2</sup> <https://www.pionline.com/esg/climate-change-moves-top-investors-list-esg-issues>

<sup>3</sup> [http://www3.weforum.org/docs/WEF\\_Global\\_Risks\\_Report\\_2019.pdf](http://www3.weforum.org/docs/WEF_Global_Risks_Report_2019.pdf)

<sup>4</sup> Report on U.S. Sustainable, Responsible and Impact Investing Trends, US SIF Foundation

<sup>5</sup> <https://www.willistowerswatson.com/en-US/News/2019/09/thinking-ahead-institute-reveals-top-fifteen-extreme-risks-for-investors>

4. Advocate – Individually and in collaboration with other investors, SFERS advocates for policy efforts at the state, nation, and global level that promote a sustainable financial system that is focused on a just and orderly transition to a low-carbon and resilient economy.

Informing activities in each pillar are SFERS' use of data and analytics, including the SFERS Climate Transition Risk Framework for Oil & Gas Companies and a variety of third-party carbon and climate risk data. Staff has also developed an additional framework to assess climate transition risk in the Utilities sector and inform engagement efforts with relevant companies (described in an accompanying memo).

Staff continues to identify and evaluate data and analytical tools that may provide deeper insight into climate risk exposure for the Plan.

### **Pillar 1 – Invest**

SFERS has pursued a variety of low-carbon and renewables-related investment strategies as a way to mitigate risks as well as take advantage of opportunities created by the climate transition.

All such investments were determined to meet SFERS' investment criteria with respect to risk, return, and suitability within the overall portfolio.

As part of its commitment to invest \$1 billion of its public equity portfolio in low-carbon strategies, SFERS has invested \$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. In the year ending June 30, 2019 the strategy returned 10.2% outperforming its benchmark by 18 bps.

Additionally, as part of its commitment to invest \$1 billion of its public equity portfolio in low-carbon strategies, SFERS has committed up to \$500 million 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. In the year ending June 30, 2019 the strategy returned 14.92% outperforming its benchmark by 519 bps.

Within its Real Assets portfolio, SFERS has committed \$50 million to Sustainable Asset Fund II managed by Vision Ridge Partners, which invests in sustainable real assets including solar, EV charging, energy efficiency, and others.

Within its Private Credit portfolio, SFERS has committed \$50 million 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.

In addition, SFERS has over \$60 million in investments in renewable energy, clean tech, and related technologies-focused companies or projects across at least 28 private equity, private credit, and real assets funds (though funds were not entirely dedicated to renewables or low-carbon technologies).

In total, as of 6/30/19, SFERS has at least \$1.16 billion committed to low-carbon and renewables-related strategies, or 4.5% of total assets.

SFERS plans to continue to opportunistically seek these types of strategies when they meet SFERS' other investment criteria for the asset class.

### **Pillar 2 – Engage**

SFERS' ESG Policies and Procedures identify "Actively Promoting Environmental, Social Governance Interests – Direct Engagement" as a key aspect of its ESG platform. This recognizes that active shareholder engagement with management and directors of companies is both a right and responsibility of equity owners of publicly traded companies. Engagement helps to ensure that companies are properly managing key corporate governance and sustainability matters, thereby mitigating risks and enhancing value for SFERS and other long-term shareholders.

SFERS undertakes both individual engagements as well as collaborative engagements in partnership with other shareholders on a range of ESG topics.

Recent engagement efforts related to climate change have include:

- SFERS has been a participant in the Ceres Carbon Asset Risk (CAR) Working Group and the Climate Action 100+ Initiative. SFERS has joined and participated in 10 collaborative engagements with oil & gas companies as part of these initiatives.
- SFERS sent letters to all 24 companies on the SFERS Fossil Fuel Watch List explaining Staff's concerns with their readiness for a transition to a low carbon economy. Staff received responses from several of these companies and had direct conversations with representatives of eight (8) companies on the Watch List. As well, SFERS supported engagements through Climate Action 100+ at four (4) additional companies on the Watch List. Staff participated in a collaborative engagement with a company not on the Watch List but among the top 10 SFERS holdings in oil & gas companies.
  - Since 10/12/18, SFERS ceased to hold equity long positions in five (5) of the companies on the Watch List. One of these companies, Baytex Energy Corp, SFERS held a debt position at various points during FY 2018. SFERS did not continue to pursue engagement with these companies after initial letter writing due to the fact that SFERS was not a consistent investor and overall exposure was non-existent or immaterial.
  - For one (1) company (Suncor Energy) SFERS held an immaterial equity position (<\$20,000) as of 6/30/19 but did not hold at various points during FY 2018, so Staff did not pursue engagement after initial letter writing.
  - Two (2) companies were acquired during FY 2018, Anadarko and Energen. Energen was acquired by Diamondback Energy (not on the SFERS Fossil Fuel Watch List for 2018) and Anadarko was acquired by Occidental Petroleum (on the SFERS Fossil Fuel Watch List for 2018).
  - Despite multiple attempts to reach company representatives, SFERS was unable to individually or collaboratively engage with four (4) companies on its Watch List.
- SFERS sent letters to all companies in its portfolio receiving between 10 and 50% of revenues from thermal coal. Staff received responses from Anglo American and South32, which helped to clarify those companies' strategy for their thermal coal segment.
- Along with other Climate Action 100+ members, SFERS co-filed a shareholder proposal at BP on adopting a business strategy aligned with the goals of the Paris Agreement; this proposal passed, receiving support from management and 99% shareholder support.

- SFERS, along with 200 other investors, sent letters to 47 of the largest US companies (that were also included on the Climate Action 100+ list) urging them to align their climate lobbying with the goals of the Paris Agreement and cautioning that lobbying activities that are inconsistent with meeting climate goals are an investment risk. Several of the companies that received a letter are on the SFERS Watch List.
- Through August 31, 2019, SFERS voted in support of several climate-risk related shareholder resolutions including seven requesting that the company adopt quantitative greenhouse gas emissions reduction goals, five requesting that the company establish an environmental/social issues board committee, four requesting a report on the impacts of climate change, one requesting the company to publish a two degree scenario analysis report, and one requesting the company require environmental/social qualifications for director nominees. Staff notes that far fewer shareholder resolutions came to vote in 2019 as compared to the prior few years, due in large part to withdrawals by proponents after management of companies agreed to address the issues raised.
- SFERS voted against three Exxon directors, including CEO Darren Woods for failure to adequately address environmental and social, including climate change (all directors were re-elected by shareholders). SFERS voted to support establishing a chartered board committee to oversee environmental and social issues (this item received 7.4% votes for).
- Staff has developed a climate transition risk framework for the Utilities sector, which it has used to identify companies for engagement in the sector beginning in 2019-2020.

### **Pillar 3 – Divest**

SFERS' ESG Policies and Procedures allow for "Investment Restriction" when environmental, social and governance concerns have not been or cannot be addressed adequately through exercise of shareholder voting rights, direct engagement, or other means.

At the October 10, 2018 board meeting the Board approved Staff's recommendation to divest its current positions and restrict future investment in seven (7) oil & gas companies that display the highest climate transition risk according to SFERS' Climate Transition Risk Framework ("the Framework").

At the May 17, 2017 meeting, the Board approved Staff's recommendations to restrict investment in companies that derive significant revenue from the mining of thermal coal. At the September 12, 2018 Board meeting Staff last updated the set of companies subject to this investment restriction.

### **Pillar 4 – Advocate**

Individually and in collaboration with other investors, SFERS advocates for policy efforts at the state, nation, and global level that promote a sustainable financial system that is focused on a just and orderly transition to a low-carbon and resilient economy.

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 the Global Investor Statement to Governments on Climate Change, which was sent to G7 leadership in advance of their June 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.

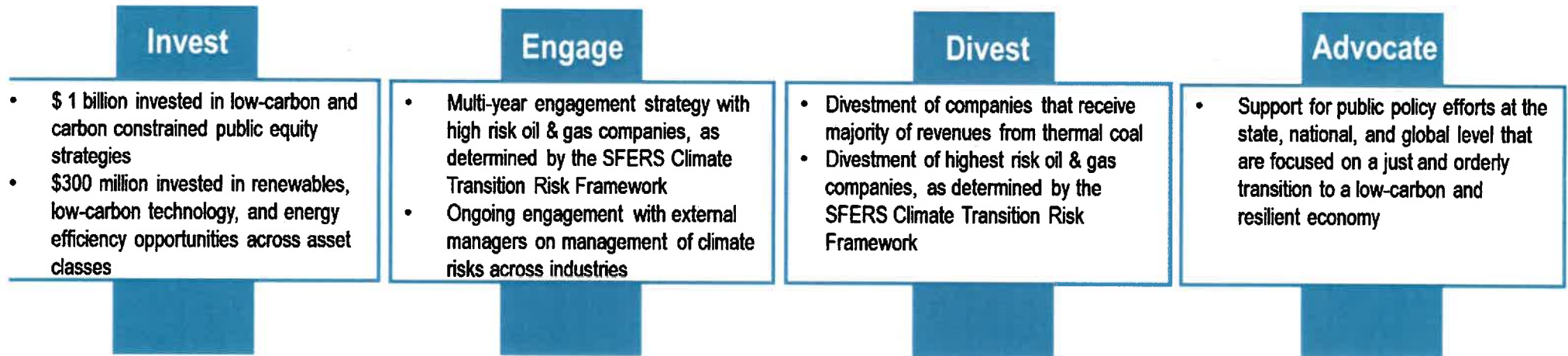
The Statement was relaunched ahead of the UN Secretary General's Climate Action Summit in New York on September 23, 2019, and at the time had support of 515 investor representing \$35 trillion in assets.

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.

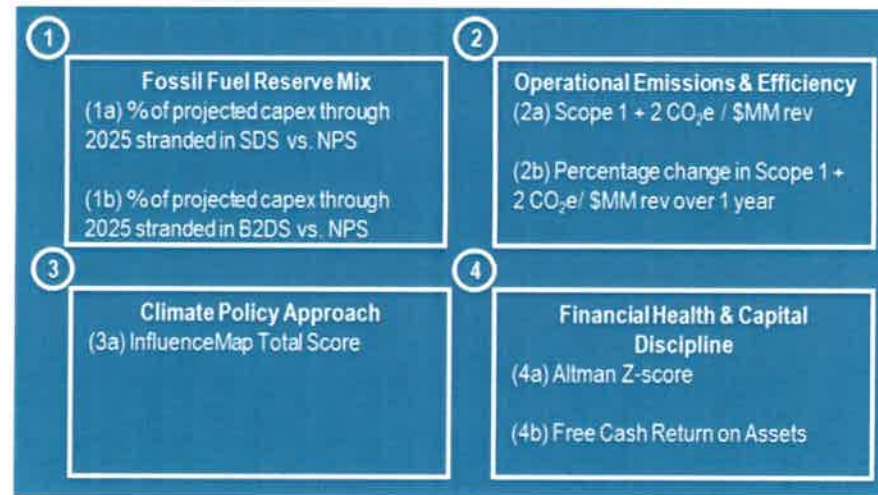
SFERS is participating in the C40 Divest/Invest Forum initiative, of which the City of San Francisco is a founding city. This initiative places San Francisco alongside peers from New York, London, and others in sharing information and best practices around managing investment risk due to climate change. 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."

Chart 1. Managing Climate Risk at SFERS

## Managing Climate Risk at SFERS



### SFERS Climate Transition Risk Framework



## Update on Oil & Gas Markets

Oil prices rebounded from December 2018 lows but have followed the risk on pattern in financial markets in the first half of 2019. Crude prices spent most of the 12 months between \$50 - \$70 / barrel (WTI).<sup>6</sup>

Sustained growth of US shale production, concerns about global growth, and the US-China trade war continue to shape global energy markets. According to Goldman Sachs, rallies in oil & gas prices can be “self-defeating” due to extremely short lead times for shale production (months) vs. conventional projects (years)<sup>7</sup>.

Production in the US is expected to increase by 1.2 mb/d to 12.2 mb/d in 2019 according to the EIA.<sup>8</sup> OPEC in coordination with Russia (OPEC+) have sought to utilize market influence and reduce supply to offset increases in non-OPEC production. Within OPEC, the pullback in supply is mostly attributed to Iran and Venezuela. Production from Iran declined sharply from 3.6 md/d in 2018 to 2.3mb/d in June 2019 due to sanctions. Production from Venezuela has declined sharply from 1.5 mb/d in Q4 18 to 1.0 m b/d in June 2019.<sup>9</sup>

The growth of US supply, particularly from the Permian basin and Bakken, combined with the ability to ramp production in response to price signals, means, however, that OPEC+ has a partially weakened position to influence market dynamics.

Notably, the September 2019 attacks on Saudi Arabia oil facilities caused the loss of ~5m b/d of capacity. The price response, although dramatic, was only temporary since capacity is expected to be rapidly recovered and in the interim inventories will be utilized.<sup>10</sup>

In general, investors want to see continued focus on capital discipline, debt reduction, and positive free cash flows from companies. Few investors have pushed back on increased dividend payments companies have responded with, and through 2018 and 2019 the oil & gas industry has focused transforming from a focus on production growth to re-centering on “best assets” and emphasizing operational efficiency.

Optimism for continued supercharged growth in US shale production has begun to wane. This has been driven by the realization that estimates about how tightly new wells can be placed next to older wells without impacting production have been overly optimistic<sup>11</sup>. Most of the planned new wells face this challenge because they are so-called “child wells” meaning they will be drilled close to an existing well.

Markets have taken note of US shale production challenges, subdued demand, and lower spot and futures prices. In mid-August of 2019, SPDR S&P Oil & Gas Exploration & Production ETF hit its lowest point since the index was created in 2006. Through August 2019, the energy sector was the worst performer in S&P500 in to date in 2019 and the worst performer over the prior decade.<sup>12</sup>

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<sup>6</sup> <https://www.eia.gov/outlooks/steo/marketreview/crude.php>

<sup>7</sup> <http://energyfuse.org/goldman-sachs-sees-continued-trendless-and-volatile-oil-market/>

<sup>8</sup> [https://www.eia.gov/outlooks/steo/report/us\\_oil.php](https://www.eia.gov/outlooks/steo/report/us_oil.php)

<sup>9</sup> OPEC Monthly Oil Market Report September 2019

<sup>10</sup> <https://www.eia.gov/todayinenergy/detail.php?id=41413>

<sup>11</sup> [https://www.wsj.com/articles/shale-companies-adding-ever-more-wells-threaten-future-of-u-s-oil-boom-11551655588?mod=article\\_inline](https://www.wsj.com/articles/shale-companies-adding-ever-more-wells-threaten-future-of-u-s-oil-boom-11551655588?mod=article_inline)

<sup>12</sup> <https://oilprice.com/Energy/General/Energy-The-Worst-Performing-Sector-Last-Decade.html>

Longer term, the outlook is not favorable with weakness indicated in futures prices with the December 2020 contract at \$52 (compared to December 2019 contract at \$57 / barrel) on September 24, 2019, and the curve is flat at \$53 out to 2030.<sup>13</sup>

The EIA forecasts modest demand growth for oil of 0.9 million barrels per day (mb/d) for 2019 (to 100.8 mb/d) versus 1.3 mb/d in 2018. Most of the forecast growth is attributed to India and China.<sup>14</sup> Tepid global economic growth, improving efficiency and substitution in certain areas are amongst causes declining growth forecasts.

Over the mid to longer term, declines in oil demand from road transportation due to electrification could have significant implications for the sector.

Road-based transport contributes 44% of final oil demand (including natural gas liquids) according to BP and has contributed the vast majority of oil demand growth from 2005 to 2020.<sup>15</sup> Given oil is a more valuable commodity than gas, oil-based transportation is crucial for most producers.

In 2018, global EV sales increased 63% to 2 million vehicles according to Bloomberg NEF.<sup>16</sup> This is despite partial incentive phaseouts in China and the US, which have been offset by improving economics and accelerations in policy in Europe and at the city level globally. Bloomberg NEF's latest forecast is for 10 million in global annual EV sales in 2025.

The IEA published two scenarios with stocks of 130 million and 250 million EVs in 2030 displacing 2.5m and 4.3m barrels / day of crude oil demand (in a market of ~100m barrels / day).<sup>17</sup> This level of displacement is material since an imbalance of only ~2m barrels / day caused the dramatic price declines of 2014 according to Carbon Tracker.

Staff's review of the IEA scenarios reveals an underlying assumption of the above scenarios is relatively low mileage per day of the EV fleet (~22-24 miles). In Staff's opinion, this fails to consider that EVs are most economic in high mileage (+100 miles per day) applications such as buses, fleets and commercial vehicles. This is due to excellent efficiency and low operating costs (with fewer moving parts for maintenance) offsetting (current) high capital costs for EVs.

BYD, the world's largest producer of electric vehicles, continues its comprehensive strategy across the product range, including in trucks and buses. There are now more than 400,000 electric buses in China – already displacing growth in oil demand.<sup>18</sup> Tesla continues its testing of its Semi prototype. In a marketing stunt in July 2019, Ford's electric F-150 pickup truck prototype towed one million pounds of rail cars, dispelling the outdated notion that EVs are weak. VW is spending over \$50 billion by 2025 on its electrification program, including launching the MEB-platform-based ID.3 in September 2019 (for production in 2020) and shifting 100% of its class A and B vehicles to electric.

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<sup>13</sup> <https://www.cmegroup.com/trading/energy/crude-oil/light-sweet-crude.html>

<sup>14</sup> [https://www.eia.gov/outlooks/steo/report/global\\_oil.php](https://www.eia.gov/outlooks/steo/report/global_oil.php)

<sup>15</sup> <https://www.bp.com/en/global/corporate/energy-economics/energy-outlook.html>

<sup>16</sup> <https://about.bnef.com/electric-vehicle-outlook/>

<sup>17</sup> <https://www.iea.org/publications/reports/globalevoutlook2019/>

<sup>18</sup> <https://about.bnef.com/blog/forget-tesla-chinas-e-buses-denting-oil-demand/>

The challenge ahead for the transport industry is no longer about developing new technology. It is about replicating technology across manufacturers, scaling up production and making vehicles that are suitable for fleets. These are far easier and more predictable challenges than developing the new technology from scratch. With over 400 models by 2025 and automaker capex plans exceeding \$100 billion, this is imminent in just a few years and is well within the horizon impacting investments in oil companies.

### **Update on Thermal Coal**

The thermal coal market continues to show signs that it is in secular decline. This is due to the combined effects of tightening climate regulations along with the fact that blends of gas and renewables integrated with energy storage, transmission and demand response have significant advantages over coal for electricity generation. The coal industry is already significantly weakened in the US and Western Europe (which accelerated in the first half of 2019), and indications are this is likely to occur around the world. Further observations about global thermal coal markets are detailed in a separate memo.

In addition, as detailed in the same memo, SFERS is recommending expanding its investment restrictions in thermal coal companies to those receiving majority (i.e., >50%) of revenue from thermal coal as well as those that receive between 10-50% of revenue from thermal, if the company has not signaled an intention to limit or eliminate its thermal coal activities in the future.

### **Update on Oil Sands**

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

Oil sands (tar sands) are unconventional hydrocarbon resources. Extraction requires either mining or in-situ production, with shallower resources typically mined while deeper resources use in-situ production. Mining involves large open cast pits that disturb significant land areas. The raw mined material must be extracted and transported to a processing facility to separate the bitumen from the sand. In situ-production involves drilling and applying a combination of heat and pressure to the buried sands so that the bitumen is separated from the sand and flows. Both processes require significant heat and are therefore energy and carbon intensive.

Oil sands produce bitumen rather than crude oil. Bitumen does not flow at ambient temperatures and therefore must be partly processed to be transportable and marketable to refineries in North America or elsewhere. This is a necessity because the main oil sands region in Alberta is far from ports in the Gulf of Mexico, the West Coast or Great Lakes. Bitumen can be converted into synthetic crude oil (syncrude) by cracking a portion of the long-chain hydrocarbons into shorter-chain hydrocarbons. Alternatively, diluted bitumen (dilbit) can be produced by diluting the bitumen with shorter chain hydrocarbons such as natural gas liquids. Both processes require significant energy through either heat or transporting the diluent multiple thousands of miles round trip.

Pipeline and rail capacity issues have been a concern for oil sand operations in recent years and caused significant discounts versus other benchmarks such as (WTI). These issues are partly easing, with the Trans Mountain project for example to be completed by 2022. Another reprieve for the oil sands industry has been the sharp decline of heavy oil production from Venezuela.<sup>19</sup> These heavy grades are substitutes and are in demand from refineries that have existing capacity to produce high value transport fuels.

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<sup>19</sup> <https://www.forbes.com/sites/arielcohen/2019/06/25/will-canadas-oil-industry-get-a-pipeline-lifeline/#70bf3ca748ee>

Research by IHS Markit anticipates in situ (SAGD) upstream emissions intensity could fall by 17-27% while mining emissions intensity could fall by 15-20% from 2017 to 2030.<sup>20</sup> The IHS Market report finds that oil sands are comparable to the average US crude (including upstream and downstream). Data of Natural Resources Canada also shows that oil sands' emissions intensity per barrel has been declining.<sup>21</sup> However, Staff believe that the debate over life cycle emissions is far from settled. For example, it is unclear as to whether fugitive methane emissions from mining, with source material exposed to the atmosphere, are measured accurately presently or controllable in future.

Staff's engagement with MEG Energy has been productive in highlighting some plausible pathways for increased efficiency of in-situ production. In situ production potentially could be increasingly more efficient and less impactful than mining. Additionally, Staff's analysis of MEG Energy's financials reveals that existing production is only moderately expensive and still profitable at recent spot prices. However, analysis from Carbon Tracker Initiative, using underlying data from Rystad indicates that new projects requiring capital expenditure are high on the global cost curve on a levelized basis and are therefore at high risk of being stranded assets.

In a reversal of the trend earlier in the decade, several large multinational oil companies have been delaying, scaling back or exiting oil sands, including Shell.<sup>22</sup>

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<sup>20</sup> <https://www.businesswire.com/news/home/20180913005658/en/2030-Upstream-Greenhouse-Gas-Emissions-Intensity-Canadian>

<sup>21</sup> <https://www.nrcan.gc.ca/energy-and-greenhouse-gas-emissions-ghgs/20063>

<sup>22</sup> <https://business.financialpost.com/commodities/energy/interview-statoil-plants-flag-in-big-oils-race-for-cleaner-crude>

## Other Public Funds' Actions to Manage Climate Risk

SFERS continues monitor peer funds' approaches to managing climate risk and pursuing opportunities created by the transition to a low carbon economy. Following is a representative, but non-exhaustive, list of notable updates at peer funds:

### New York State Common Retirement Fund

A bill (S12126) was introduced to the New York State Senate that would require the Common Retirement Fund to divest from fossil fuel companies included in the Carbon Underground 200 list. The bill is currently in committee with Senators evaluating whether to bring it to the Senate floor for voting.

The bill was opposed by the fund's interim CIO on behalf of the Comptroller on the basis of fiduciary duty considerations. The fund prefers to consider ESG factors, including climate change, in its investment process rather than rules-based divestment. The fund has committed \$10 billion to its Sustainable Investment Program, which includes a low emissions index strategy and exposures to sustainable investments across asset classes. The fund's other climate-related actions include scenario analysis and carbon footprinting, engagement and policy advocacy. The engagement strategy is directed towards companies that are the largest emitters as well as with appointed external asset managers with low scores relating to climate risks.

In March 2019, following through on a 2018 intention, the Governor and Comptroller formed a Decarbonization Advisory Panel. Noteworthy comments from the panel include:

*"The Panel believes that climate change poses significant risk to the Fund's investment portfolio across equities, alternatives and credit, as most (if not all) do not currently adequately price climate-related risk."*

*"The Panel believes managers and companies with deeply embedded and carefully analyzed climate-related strategies, operations, metrics, governance and incentives will outperform the market as physical risks not properly underwritten in capital markets materialize and the Transition unfolds."*

The Panel's recommendation is summarized as:

*"The Panel recommends the Fund pursue alignment of its entire portfolio with a 2-degree or lower future by 2030 in accordance with climate science consensus. As a first step, the Panel recommends the Fund establish a new "climate solutions" allocation through which the Fund can substantially increase its commitment to investments with a proactive approach to climate risk and opportunity in the near term."<sup>23</sup>*

Other recommendations relating to the investment process included setting minimum standards for investments, reconsidering benchmarks, developing expertise on climate modelling, re-auditioning consultants and managers, integrating sustainability metrics into compensation structures, breaking soft barriers and reviewing staffing requirements.

In June 2019, NYSCRF published a Climate Action Plan which formalizes its beliefs. In addition to the strategies mentioned above, the document goal to double the Sustainable Investment Program from \$10 billion to \$20 billion over the next decade. While identification and assessment, investment, and engagement and advocacy

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<sup>23</sup> <https://osc.state.ny.us/reports/decarbonization-advisory-panel-report.pdf>

appear to be the core of the strategy, a door is open for divestment if this is judged to be in the fiduciary interest of the plan.<sup>24</sup>

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, NYC RF has at least 3% of plan assets invested in low-carbon and/or climate opportunities.

### New York City Pension Funds

In January 2018, in conjunction with the city's mayoral office, the New York City Comptroller, announced an intention to divest the city's five pension funds from fossil fuels. As part of this process, a Request for Information for a study into divestment was issued. Subsequently, a Request for Proposal was issued in December 2018. The RFP sought advisers to analyze, evaluate, and recommend prudent fossil fuel divestment strategies for three of the five pension funds representing 70% of the City's pension fund assets (the Fire Department Pension Fund and Police Pension Fund declined to participate).

The five funds (which collectively have over \$200 billion in assets) continue to make progress towards toward 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' \$230+ 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.

In September 2019, California State Treasurer and ex officio CalSTRS Board Member, Fiona Ma, demanded the fund divest from fossil fuels.

Also in September 2019, California Governor Gavin Newsom issued an order to direct CalSTRS and CalPERS to work with his administration on an investment framework that would “provide a timeline and criteria to shift investments to companies and industry sectors that have greater growth potential based on their focus of adapting to and mitigating the impacts of climate change, including investments in carbon-neutral, carbon-negative and clean energy technologies.”<sup>25</sup>

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<sup>24</sup> <https://osc.state.ny.us/pension/climate-action-plan-2019.pdf>

<sup>25</sup> <https://www.sacbee.com/news/politics-government/capitol-alert/article235306877.html>



## CalPERS

CalPERS' \$375+ 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. In 2018 it 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 370 investors representing \$35 trillion+ in assets that are systematically engaging over 150 companies on this topic over a five-year period.

In September 2019 CalPERS and investment management firm Wellington Management Co., in conjunction with the Woods Hole Research Center released a framework on physical climate risk disclosure. It is intended to help companies assess and disclose the potential risks of climate change on their business and help asset owners and investment managers better evaluate how the companies they hold will be able to adapt to risks.

## University of California Regents

In September 2019, it was announced that the UC Regents would be divesting from fossil fuels in its \$13.4 billion endowment portfolio. It was also signaled that the \$70 billion pension plan "will soon follow". In a Los Angeles Times op-ed piece, the CIO, Jagdeep Singh Bachher, and Board of Regents Chair, Richard Sherman, explain that the divestment is based on climate-related financial risks, rather than social concerns. They outline that the fund will be investing in more attractive opportunities, including new energy sources.<sup>26</sup>

## Norwegian Government Pension Fund Global (CPFG)

In March 2019, Norway's Government Pension Fund Global (GPF), the \$1 trillion USD sovereign wealth fund managing national oil funds, said that it will divest from upstream oil and gas companies. This decision is based on a 2017 recommendation from Norges Bank Investment Management (NBIM), which manages the assets on behalf of the Norwegian government.

NBIM has stated that the decision is risk based; the manager maintains both ethical and risk-based exclusions and this this exclusion falls into the latter area. Furthermore, the decision is not primarily motivated by concerns about climate-risk.

NBIM has states that this action is an effort to manage oil price risk. Due to the country's overall reliance on oil for national wealth, it is concerned about the risk of a sustained or permanent decline in the price of oil. It sees reducing equity market exposure to oil companies a small step to reduce overall risks to fund from oil price shocks. NBIM also, but separately, recognizes climate risk as an important risk factor for its investment process. However, it has different mechanisms for understanding and mitigating climate risk.

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<sup>26</sup> <https://www.latimes.com/opinion/story/2019-09-16/divestment-fossil-fuel-university-of-california-climate-change>

This divestment action is limited in scope. GPFG will only divest from pure-play upstream or Exploration & Production companies. This does not include midstream, downstream, and importantly integrated oil companies (IOCs). Therefore, NBIM will remain invested in supermajors such as Shell, BP, Exxon, Chevron, and Total. It says:

- *As the world economy makes progress on reducing greenhouse gas emissions from fossil energy, it must be assumed that the composition of the energy sector will be changed correspondingly. Many integrated oil and gas companies already have significant renewable energy operations, in absolute terms, and both the expert group and Norges Bank note that integrated companies may have significantly larger renewable energy operations than pure play renewable energy companies. Moreover, it is anticipated that companies that do not have renewable energy as their main business will account for about 90 percent of the growth in listed renewable energy infrastructure towards 2030. If the entire energy sector is excluded, or if the GPFG is restricted to only investing in pure play renewable energy companies, it may limit the Fund's scope to participate in this growth.*

## INTRODUCTION - SFERS CLIMATE TRANSITION RISK FRAMEWORK

At the October 10, 2018 Board Meeting, SFERS introduced the SFERS Climate Transition Risk Framework. This Framework was developed as a key aspect of fulfilling Strategy 6 of the Six Strategies to Address Climate Risk that the Board adopted in January 2018:

- 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

The Climate Transition Risk Framework blends best-in-class climate risk datasets with core financial ratios to provide a forward-looking, transparent, and holistic view of risks facing fossil fuel companies. It was developed with data from Carbon Tracker Initiative, InfluenceMap, CDP, and with input from leading climate finance think-tanks, asset management firms, and financial services companies.

The Framework allows SFERS to analyze its investments in publicly traded oil and gas companies to identify those companies which may have relatively higher climate transition risk and which ones are relatively lower risk from an investment perspective, consistent with SFERS' fiduciary duty.

In turn, this allows SFERS to (1) identify companies which should be placed on a Watch List for direct engagement around their management of climate risk, and (2) identify companies which may have unmitigated climate transition risks and therefore should be subject to investment restriction.

Furthermore, the Framework assists SFERS in prioritize which topics are most suitable for engagement for each company on the Watch List by identifying climate risk areas where each company significantly lags its peers.

At the October 20, 2018 Board meeting, Staff introduced a Watch List of 24 oil and gas companies for engagement activities (Table 1 below) and recommended seven (7) companies for investment restriction based on the analysis using the Framework (Table 2 below).

**Table 1. SFERS Oil & Gas Company Watch List for Engagement**

Company Name	Engagement Focus Areas							Engagement Mechanism
	Reserve Viability	Lobbying & Regulatory Influence	Operational Efficiency	Strategy for use of cash	Mgmt of debt burden	Tar Sands Activities		
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	
Anadarko 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+

Sources: GSAM as of 9/17/19; holdings data as of 6/30/19 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.

**Table 2. Oil & Gas Companies Subject to 2018 Investment Restriction**

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

Sources: GSAM as of 9/23/18; 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.

As describe on pages 4-6 above, since October 2018, Staff has made progress on engaging with companies placed on the Watch List. Two companies were acquired during the period and SFERS ceased to hold positions in several additional companies, so Staff did not pursue additional engagement at these companies.

In order to evaluate the performance impacts arising from restricting investment in the seven Oil & Gas companies, Staff licensed custom indices from MSCI. The methodology and limitations of this approach are detailed in a separate Board report.

As shown below, SFERS' decision to restrict its managers from investing in the seven companies has had negligible impact on the total fund through June 30, 2019.

**Table 3: Estimated Impact on Relative Returns and Volatility from Oil & Gas Restriction**

Index Name	Restriction Weighting*	Cumulative Return**	Annualized Return**	Annualized Volatility**	Dollar Impact
ACWI IMI ex (select) Energy	0.07%	+0.02%	+0.03%	-0.02%	+\$1.9m

\* Weightings of restricted stocks in the generic MSCI ACWI IMI Index at June 30, 2019.

\*\* Relative returns and volatility are against the MSCI ACWI IMI Index through to June 30, 2019.

## APPLICATION OF THE FRAMEWORK – 2019:

Staff again 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 153 companies globally (as opposed to 155 in 2018). 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**

<b>1. Fossil Fuel Reserve Mix</b>		<b>2. Operational Emissions &amp; Efficiency</b>	
Metric	Outlier Threshold	Metric	Outlier Threshold
<b>(1a) % of projected capex through 2025 stranded in SDS vs. NPS</b>	<b>46% of planned capex</b> (2018 - 23% of planned capex)	<b>(2a) Scope 1 + 2 CO<sub>2</sub>e / \$MM rev</b>	<b>1,051 CO<sub>2</sub>e / \$MM rev</b> (2018 - 1,015 CO <sub>2</sub> e / \$MM rev)
<b>(1b) % of projected capex through 2025 stranded in B2DS vs. NPS</b>	<b>70% of planned capex</b> (2018 – 46% of planned capex)	(2b) Percentage change in Scope 1 + 2 CO <sub>2</sub> e/ \$MM rev over 1 year	11% increase in 2 year (2018 - 27% increase in 1 year)
<b>3. Climate Policy Approach</b>		<b>4. Financial Health &amp; Capital Discipline</b>	
Metric	Outlier Threshold	Metric	Outlier Threshold
<b>(3a) InfluenceMap Total Score</b>	<b>33.6 score</b> (2018 – 31 score)	(4a) Altman Z-score	<1.80
		(4b) Free Cash Return on Assets	<0.00

Staff notes that the thresholds for "Category 1. Fossil Fuel Reserve Mix" are significantly higher in 2019 as opposed to 2018. Simply put, this indicates that companies across the entire universe have been determined to have significantly more capex at risk of stranding in each of the two climate scenarios. The reason for this is multi-fold. First, Carbon Tracker Initiative updated two aspects of its underlying methodology used to determine capex at risk of stranding. In 2019, Carbon Tracker assumed that all currently producing or under development assets will continue to produce throughout their life, regardless of the underlying project economics relative to unsanctioned projects. Previously Carbon Tracker had allowed for new assets to be sanctioned and displace already sanctioned assets where their breakevens were sufficiently low. This update to methodology has the effect of reducing the overall "carbon budget" for each company, potentially resulting more future capex being stranded. Carbon Tracker's analysis also extended the time horizon over which it conducted its analysis, using the periods 2019-2030 for capex and 2019-2040 for production/demand. Previously, Carbon tracker used the periods 2018-2025 for capex and 2018-2035 for production/demand. In this extended time horizon, the gap

between oil and gas prices in a business as usual scenario versus the two climate constrained scenarios widens, resulting in more capex at risk of stranding.

The threshold for Category (2a) in Operational Emissions & Efficiency was little changed from 2018. The threshold for Category (2b) representing the trend in emissions intensity was lowered from 27% to 11%. This means that the threshold tightened on an absolute basis, flagging companies whose emissions intensity increased 11% or more from 2015 to 2017 (the time period used) as opposed to 27% or more from 2015 to 2016 (the time period used in 2018). Staff notes that due to additional data availability, Staff analyzed the trend in emissions intensity over a two-year period as opposed to a one year period. Staff believes that using a long period to analyze the trend will be more indicative of the success or failure of improvements in operational efficiency, while using a one year period may result in idiosyncratic results.

The threshold for “Category 3. Climate Policy Approach” was raised from an Influence Map Total Score of 31 to a Total Score of 33.6. This reflects tightening of the threshold on an absolute basis, which indicates a general improvement in Influence Map scores across the universe of companies analyzed. Staff expects that this average score may continue to rise over time as companies adjust their approach to climate lobbying and policy. For example, Shell comprehensively reviewed its association with 19 industry groups and announced it would leave the American Fuel & Petroleum Manufacturers industry due to divergent views on climate policy.

The thresholds for “Category 4. Financial Health & Capital Discipline” remain unchanged as they were established on an absolute basis rather than a relative. Staff notes, however, that across the universe of companies there was a large average increase in the Free Cash Return on Assets metrics – from -2.38 in 2018 to -0.40 in 2019. This reflects the reduced capital expenditures and fiscal restraint that has been broadly observed across the upstream oil & gas sector. The average Altman Z-Score for the universe of companies decreased from 1.72 in 2018 to 1.54 in 2019. This indicates that solvency risk, on average, has increased across the oil and gas sector. Anecdotally, Staff notes that there has been an uptick in bankruptcies among North American oil and gas producers in 2019<sup>27</sup>.

Application of the Framework resulted in 34 companies being identified as high risk in 2019.

Each company’s risk score is summarized below in Table 5, along with SFERS’ equity and debt exposure (as of 6/30/19) to the company. The table additionally indicates if the company was identified as high risk during 2018 or not.

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<sup>27</sup> [https://www.haynesboone.com/-/media/files/energy\\_bankruptcy\\_reports/oil\\_patch\\_bankruptcy\\_monitor.ashx?la=en&hash=D2114D98614039A2D2D5A43A61146B13387AA3AE](https://www.haynesboone.com/-/media/files/energy_bankruptcy_reports/oil_patch_bankruptcy_monitor.ashx?la=en&hash=D2114D98614039A2D2D5A43A61146B13387AA3AE)



**Table 5. Companies Identified for High Climate Transition Risk, 2019**

Company Name	Net Exposure (as of 6/30/19)	Fossil Fuel Reserve Mix		Climate Policy Approach	Operational Efficiency		Financial Health & Capital Discipline		Identified in 2018
		Projected Capex Stranded in SDS	Projected Capex Stranded in B2DS	Influence Map Score	Emissions Intensity (tCO <sub>2</sub> e)/\$mm rev	Emissions Trend (% change 2015-2016)	Free Cash ROA	Altman Z Score	
Apache Corp*	\$ 226,781	28%	38%	43.9	1180.19	-3.31%	-1.74	1.27	y
Baytex Energy Corp.	\$ 191,402	75%	80%		1612.72	10.95%	-0.2	-0.27	y
California Res. Corp	\$ (201,873)	34%	34%		1920.07	7.40%	-3.2	0.07	y
Canadian Nat. Res.	\$ 763,592	2%	2%	34.83	1829.86	-4.32%	5.75	1.58	y
Concho Resources	\$ (4,549,069)	85%	95%				-0.62	2.59	y
Crescent Point*	\$ (30,661)	81%	81%		1720.99	12.73%	-2.34	-1.29	y
EnCana Corp	\$ 3,606,241	72%	85%				1.77	1.41	y
Hess Corporation*	\$ 976	57%	80%	39.96	750.06	-11.66%	-2.35	1.76	y
MEG Energy Corp	\$ -	0%	0%		1096.32	-22.85%	-4.18	0.55	y
Occidental Petroleum	\$ 8,159,422	30%	56%	31	1239.21	66.65%	-1.39	3.18	y
QEP Resources*	\$ -	93%	97%				-7.9	0.69	y
Rosneft	\$ 308,718	14%	17%	28.08	739.86	118.66%	0.43	1.41	y
Santos Ltd	\$ 869,698	18%	34%		2005.15	66.71%	5.68	1.01	y
Tullow Oil	\$ 2,085,583	48%	54%		645.03	36.87%	7.05	1.21	y
WPX Energy Inc.*	\$ -	69%	94%				-7.36	0.93	y
Aker BP ASA	\$ 562,515	35%	61%		357.48	62.10%	16.74	0.98	n
Cairn Energy	\$ -	59%	70%		1467.97		5.51	0.72	n
Centennial Res Dev, Inc.	\$ 136,424	33%	95%				-7.85	2.55	n
Chesapeake Energy	\$ 2,369,468	60%	85%				-3.28	-0.35	n
Cimarex Energy Co	\$ 549,953	16%	80%				-2.88	2.84	n
Diamondback Energy	\$ (7,954,798)	60%	82%				-0.67	1.67	n
Enplus Corporation	\$ -	67%	68%		1239.32	26.91%	3.26	2.29	n
EOG Resources	\$ 5,882,382	67%	92%	31.59	521.66	-18.21%	3.7	3.97	n
Gazprom PJSC	\$ 9,628,066	19%	30%		1184.61	45.36%	-1.43	1.79	n
Mator Resources	\$ 744,286	65%	94%				-26.64	1.37	n
Medco Energi	\$ 355,574	6%	9%		1448.22	251.42%	-3.3	0.91	n
Origin Energy	\$ 547,972	0%	22%	54.43	1857.73	3.61%	2.65	1.62	n
Parsley Energy Inc	\$ 366,653	97%	97%				-8.53	1.88	n
PDC Energy Inc.	\$ 490,868	57%	70%				-5.46	1.32	n
Pioneer Nat. Res.	\$ 596,142	82%	97%				-3.33	3.69	n
Premier Oil	\$ -	-	-		908.06	17.70%	4.91	1.25	n
PTT Explr. & Prod.	\$ 1,875,495		12%		1067.39	21.66%	7.85	1.74	n
Tourmaline Oil Corp	\$ 573,945	4%	30%		1095.75	-44.75%	-1.1	1.39	n
Whiting Petroleum	\$ (909,403)	95%	95%				1.73	0.78	n
Total	\$ 27,246,352								

\* Company subject to investment restriction

Sources: GSAM as of 9/17/19; holdings data as of 6/30/19 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.

The list of companies flagged includes 15 companies that were identified in 2018 and 19 companies that were not previously flagged.

Seven companies that were identified as high-risk during 2018, were not identified as high risk during 2019. The following table displays these companies and their associated risk scores:

**Table 6. Companies No Longer Identified for High Climate Transition Risk in 2019 vs. 2018**

Company Name	Net Exposure (as of 6/30/19)	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)/\$m rev	Emissions Trend (% change 2015-2016)	Free Cash ROA	Altman Z Score
ARC Res. Ltd.	\$ (104,311)	32%	38%		1034.79	-4.14%	-0.49	1.07
ConocoPhillips	\$ 21,601,541	28%	46%	35	706.15	-18.93%	6.89	3.16
ExxonMobil	\$ 28,447,268	36%	61%	33.17	552.37	3.81%	0.76	3.25
Marathon Oil	\$ 2,839,847	24%	65%	25.69	977.31	5.99%	1.32	2.22
Petrobras	\$ 8,888,651	34%	37%	47.69	754.41	-3.82%	3.76	1.14
Peyto Ex. & Dev	\$ (65,472)	0%	0%				3.45	0.8
Gulfport Energy *	\$ -	0%	0%				-1.99	0.72

Sources: GSAM as of 9/17/19; holdings data as of 6/30/19 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.

Of note, ConocoPhillips is no longer flagged for risk in any of the Framework categories, while Petrobras is no longer flagged for risk in any of the climate-related Framework categories.

ExxonMobil was previously identified for risk in the Fossil Fuel Reserve Risk and Climate Policy Approach categories; it is currently identified for risk in the Climate Policy Approach category only.

ARC Resources and Gulfport Energy, two of the companies that were placed on the SFERS investment restriction list in October 2018, are no longer flagged for risks in any of the climate-related Framework categories. Gulfport, in particular, showed a material improvement in its stranded capex at risk due to a methodology update made by Carbon Tracker. Previously, Carbon Tracker assumed global demand from oil and gas would be met with the lowest cost source of those hydrocarbon regardless of what types of fields they were produced from. For example, Carbon Tracker assumed an oil field would be sanctioned if it had economically well-positioned gas resources, even if gas was the minority product. The updated methodology assumes a project will be sanctioned only if the majority resource is well-positioned. This assumption affects North American operators in particular where there is significant co-production of associated gas and liquids. In lower carbon scenarios, where oil demand is lower relative to gas, the assumption benefits gas specialists like Gulfport; lower production of oil means less associated gas from those fields, which means more remaining gas demand would be filled by newly sanctioned gas fields.

Staff additionally notes that two companies identified in 2018 are no longer in the MSCI ACWI IMI universe. Energen Corp was acquired by Diamondback Energy in November 2018. Bonavista had a large drop in share price and during Q1 2019 earnings, the company announced it would suspend its dividend in May and warned about the possibility of breaching debt covenants.

### Additional Flags



Previously, SFERS identified companies for the Climate Transition Watch List if they engage in tar sands activities in a material way but were not identified as high-risk companies according to the Framework. Tar sands (or oil sands) are an unconventional hydrocarbon resource whose extraction requires either mining or “in situ” extraction using steam. Staff recommended identifying tar sands companies for engagement due to concerns around the energy intensity of the extraction and processing process as well as other environmental and social impacts that are not captured in the SFERS Framework.

Husky Energy, Suncor Energy Inc., Cenovus Energy Inc., and Imperial Oil have been identified in 2019 as companies that do not demonstrate high climate risk according to the Framework categories but are predominately tar sands companies.

Canadian Natural Resources and MEG Energy are also predominately tar sands companies, and both have been identified as high climate transition risk companies according to the Framework.

In addition, SFERS again analyzed its top 10 holdings in public oil & gas companies to identify 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.

In 2018, Staff identified four companies (Total SA, CNOOC, OAO Gazprom, and Chevron Corporation) that displayed risk in at least one climate transition risk category but were not otherwise identified by the Framework. These companies were added to SFERS’ Watch List and targeted for engagement.

Three of SFERS’ top 10 holdings in 2018 (Exxon Mobil Corp, ConocoPhillips, and Petrobras SA) were identified by the Framework as high climate transition risk companies. Staff notes that, as discussed above, two of these companies were not flagged as high climate transition risk by the Framework in 2019.

The following table shows the composition of SFERS’ top 10 holdings in public oil & gas companies as of June 30 and each company’s associated risk score.

**Table 7. SFERS Top 10 Public Markets Exposures in Oil & Gas Sector**

			Fossil Fuel Reserve Mix		Climate Policy Approach	Operational Efficiency		Financial Health & Capital Discipline	
	Net Exposure (as of 6/30/19)	Net Exposure (as of 6/30/18)	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
ExxonMobil	\$ 28,447,268	\$ 43,936,840	36%	61%	33.17	552	3.8%	0.76	3.25
Chevron	\$ 25,213,374	\$ 33,042,047	17%	33%	27.05	494	-1.7%	3.34	3.34
Royal Dutch Shell	\$ 25,171,215	\$ 53,198,538	31%	39%	48.73	279	-8.9%	2.93	3.23
ConocoPhillips	\$ 21,601,541	\$ 21,245,931	28%	46%	35	706	-18.9%	6.89	3.16
Total	\$ 13,284,323	\$ 21,308,876	30%	35%	47.41	270	-15.6%	1.05	2.58
BP	\$ 11,371,952	\$ 28,789,836	17%	28%	37.14	247	-1.3%	-0.18	2.45
CNOOC Ltd.	\$ 10,297,782	\$ 11,864,811	33%	50%	-	389	-7.4%	7.73	2.23
Gazprom PJSC	\$ 9,628,066	\$ 11,858,330	19%	30%	-	1185	45.4%	-1.43	1.79
Sinopec	\$ 9,458,884	\$ 657,203	4%	6%	-	477	8.8%	1.52	1.94

Occidental Pet.	\$ 8,159,422	\$ 10,083,745	30%	56%	31	1239	66.7%	-1.39	3.18
Total	\$162,633,827	\$235,986,157							

Sources: GSAM as of 9/17/19; holdings data as of 6/30/19 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.

In 2019, two of SFERS top 10 holdings were identified by the Framework as high climate transition risk companies, Occidental Petroleum and Gazprom. ExxonMobil and Chevron display risk in one category (Climate Policy Approach), so are recommended for continued engagement (both companies are currently on the SFERS Watch List).

### Update on Restricted List Companies

At the October 10, 2018 Board meeting the Board approved restriction of direct investment in any company that has been identified through application of the SFERS Climate Transition Risk Framework to have high risk of potential stranded capex, bankruptcy risk, and high-risk use of operating cash flows. This resulted in the following seven companies being added to SFERS investment restrictions:

**Table 8. SFERS Restricted Oil & Gas Companies, 2018**

Company Name	Net Exposure (as of 6/30/18)	Net Direct Exposure (as of 6/30/18)*
Crescent Point Energy	\$ -	\$ -
Apache Corp	\$1,872,139	\$1,766,823
ARC Resources Ltd.	\$ -	\$ -
Gulfport Energy Corp	\$1,027,279	\$399,572
Hess Corp	\$4,490,788	\$4,426,069
QEP Resources Inc.	\$1,037,868	\$244,312
WPX Energy Inc.	\$1,730,961	\$1,730,961
Total	\$ 10,159,035	\$8,567,737

\* Net Direct exposure are investment through separately managed account (SMA) structures where SFERS has discretion over underlying holdings in the fund. This figure excludes investments made through commingled vehicles.

Sources: GSAM as of 9/23/18; 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.

Four of the restricted companies continue display high risk of potential stranded capex, bankruptcy risk, and high-risk use of operating cash flows.

Two companies, ARC Resources Ltd. and Gulfport Energy no longer display high risk of potential stranded capex based on 2019 data from Carbon Tracker Initiative and are only displaying high risk in the Financial Health & Capital Discipline categories (though Gulfport lacks data for the other climate categories).

One company, Apache Corp, no longer displays high risk of potential stranded capex based on 2019 data from Carbon Tracker Initiative though it continues to display high risk in the Financial Health & Capital Discipline categories as well as the Emissions Intensity category.

The 2019 analysis identifies six new companies that have high risk of potential stranded capex, bankruptcy risk, and high-risk use of operating cash flows according to the SFERS Climate Transition Risk Framework. The following table displays these companies, their associated risk scores, and SFERS net direct exposure to these companies as of 6/30/19:

**Table 9. Companies Identified for Potential Investment Restriction, 2019**

Company Name	Net Exposure (as of 6/30/19)	Net Direct Exposure (as of 6/30/19)*	Fossil Fuel Reserve Mix		Climate Policy Approach	Operational Efficiency		Financial Health & Capital Discipline	
			Projecte d Capex Strande d in SDS	Projecte d Capex Strande d in B2DS	Influence Map Score	Emissio ns Intensity (tCO2e)/ \$mm rev	Emissio ns Trend (% change 2015- 2016)	Free Cash ROA	Altman Z Score
Chesapeake Energy	\$ 1,983,096	\$ 1,983,096	60%	85%	-	-	-	-3.28	-0.35
Diamondback Energy	\$ (7,954,798)	\$ 1,369,553	60%	82%	-	-	-	-0.67	1.67
Matador Resources	\$ 186,384	\$ -	65%	94%	-	-	-	-26.64	1.37
Parsley Energy Inc	\$ 366,653	\$ 366,653	97%	97%	-	-	-	-8.53	1.68
PDC Energy Inc.	\$ (32,633)	\$ -	57%	70%	-	-	-	-5.46	1.32
Baytex Energy Corp	\$ 191,402	\$ 191,402	75%	80%	-	1612.72	10.95%	-0.2	-0.27
<b>Total</b>	<b>\$ (5,259,896)</b>	<b>\$ 3,910,704</b>							

\* Net Direct exposure are investment through separately managed account (SMA) structures where SFERS has discretion over underlying holdings in the fund. This figure excludes investments made through commingled vehicles.

Sources: GSAM as of 9/17/19; holdings data as of 6/30/19 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.

Staff notes that, in aggregate, the public markets portfolio is net short the six companies identified the highest climate transition risk according the Framework. However, in separately managed accounts, SFERS had \$3,910,704 of net investment as of June 30, 2019.

### **Investment in Public Oil & Gas Companies:**

As of 6/30/19 SFERS has approximately \$224 million, or 2.55%, of the public equity portfolio invested in Integrated Oil & Gas ("IOG") and Oil & Gas Exploration & Production ("E&P") companies. This compares to \$397 million, or 3.88%, as of one year prior (6/30/18). Five years prior, as of 6/30/14, SFERS had approximately \$635 million, or 5.95%, of the public equity portfolio invested in IOG and E&P companies.

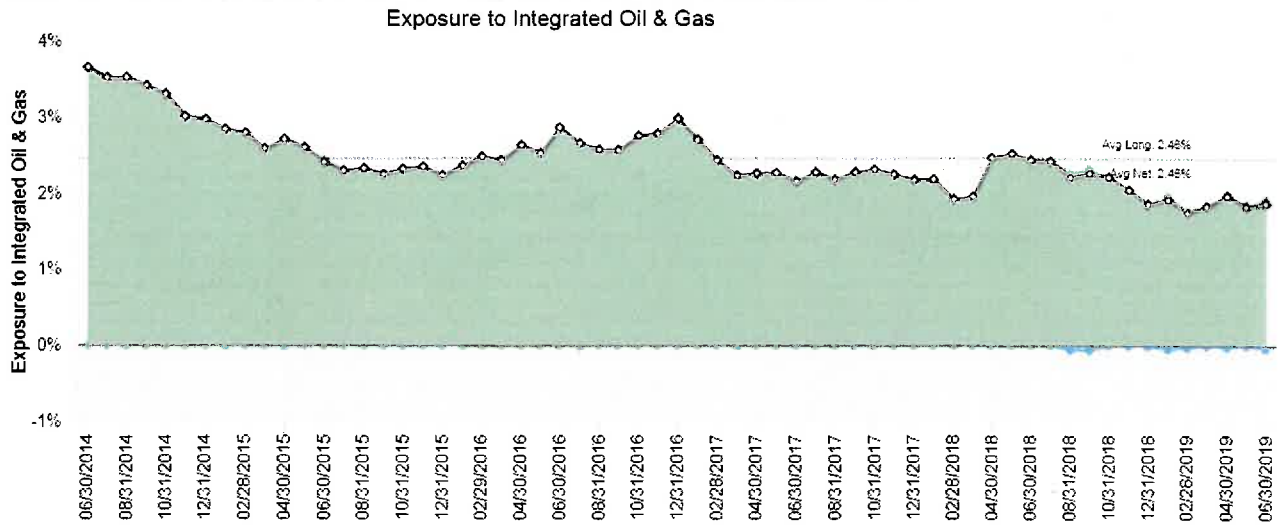
Over the past five years, SFERS' public equity exposure has dropped by more than half (57%) when measured as a percentage of the portfolio, and almost two-thirds (65%) when measured on an absolute dollar basis.

SFERS' exposures are measured on a net basis but it is of note that SFERS public equity portfolio now includes strategies with short positions. While the fund has an immaterial short position in the IOG sector, as of 6/30/19, it did have a more significant -0.29% aggregate short position across the E&P sector.

Over this same period, these two industries composition in equity benchmarks also declined. The Integrated Oil & Gas Sector was approximately 4.4% of the ACWI IMI as of 6/30/14, dropping to approximately 2.9% as of 6/30/19 (Chart 4). The Exploration & Production Sector was approximately 2.4% of the ACWI IMI as of 6/30/14, dropping to approximately 1.1% as of 6/30/19 (Chart 5).

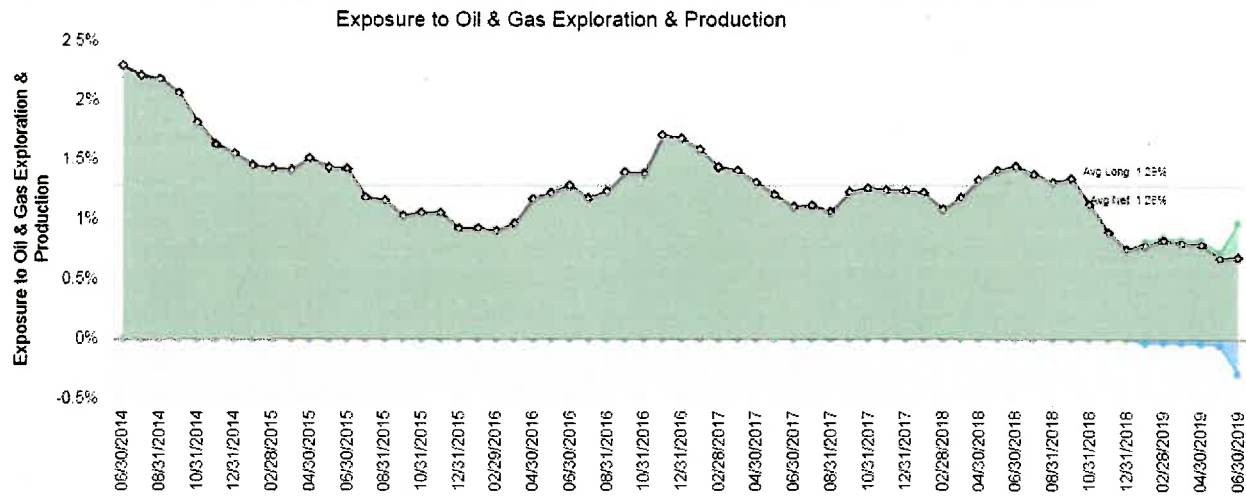
Public Fixed Income exposures similarly have declined over the past five years. As of 6/30/19 SFERS has approximately \$18 million, or 0.70%, of the public fixed income portfolio invested in IOG and E&P sectors. This compares to \$90 million, or 3.6%, as of five years prior (6/30/14).

**Chart 2. Public Equity Exposure to Integrated Oil & Gas Sector, 2014-2019**



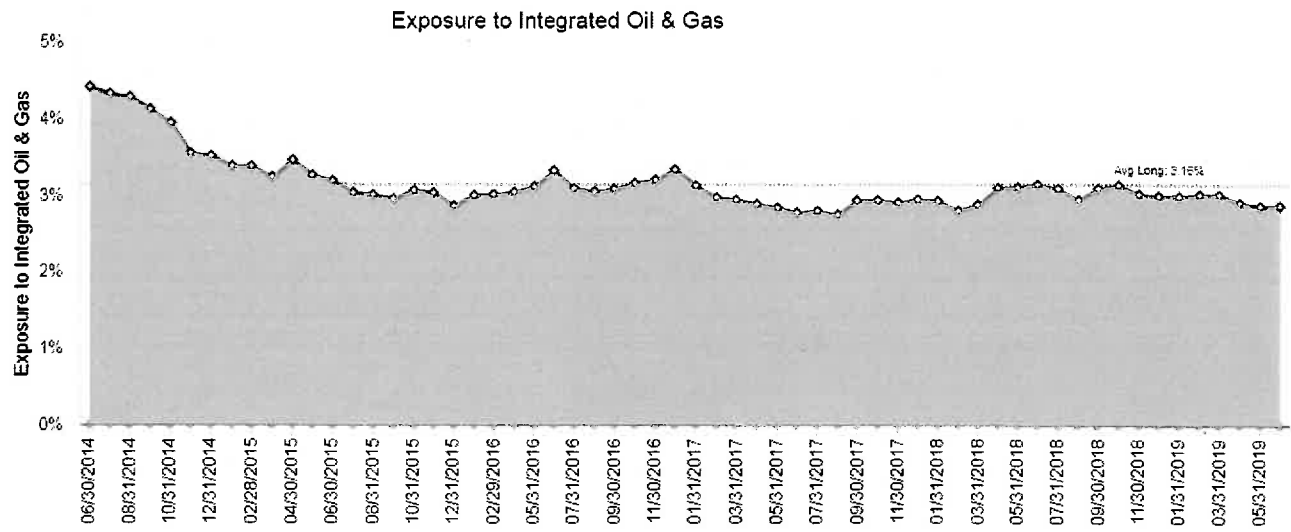
Source: Caissa

**Chart 3. Public Equity Exposure to Oil & Gas Exploration & Production Sector, 2014-2019**



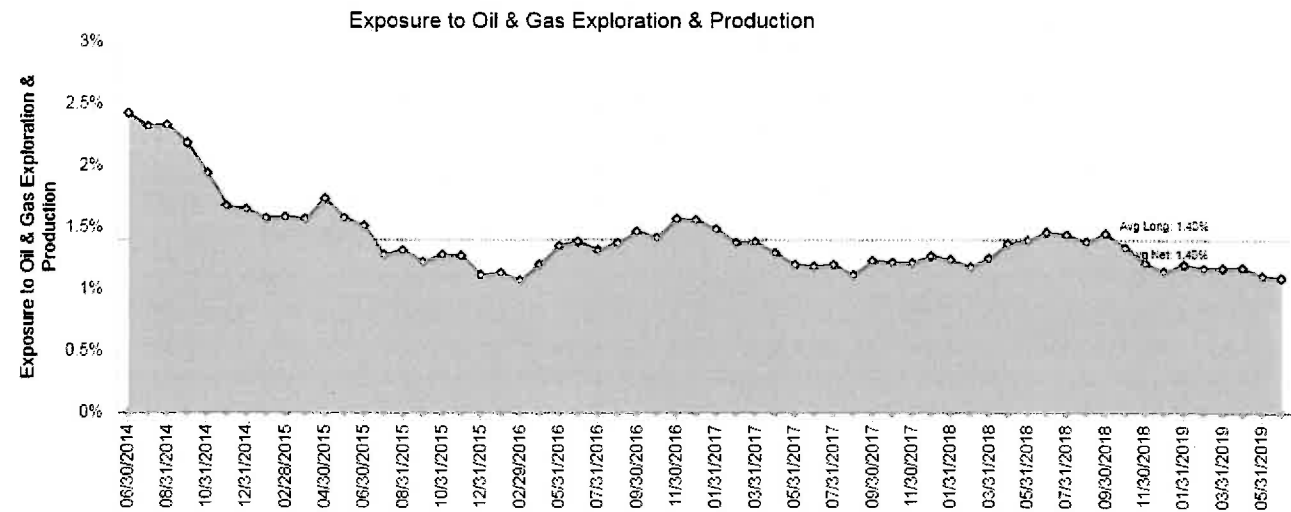
Source: Caissa

**Chart 4. MSCI ACWI IMI Integrated Oil & Gas Sector Weight, 2014-2019**



Source: Caissa

**Chart 5. MSCI ACWI IMI Oil & Gas Exploration & Production Sector Weight, 2014-2019**



Source: Caissa

## **Analysis of the Results:**

Overall, SFERS public markets investment in oil & gas sector is meaningfully less on an absolute and relative basis compared to one year ago and five years ago. As of 6/30/19 SFERS has approximately \$242 million, or 2.1%, of the public markets portfolio invested in in the sector. This compares to \$437 million, or 3.3%, as of one year prior (6/30/18). Five years prior, as of 6/30/14, SFERS has approximately \$725 million, or 5.5%, of the public markets portfolio invested in sector.

SFERS investment in companies identified as having relatively high climate transition risk according to the Framework (i.e., Watch List companies) was meaningfully less than one year ago. Table 5 shows that the SFERS public markets portfolio had \$27.2 million invested, as of 6/30/19, across the 34 companies identified compared to \$129.2 million invested, as of 6/30/18, across the 24 companies identified in 2018 (though, as described above, the composition of companies on these lists differs). The \$27.2 million accounts for approximately 11% of the \$242 million the public markets portfolio that is invested in oil & gas companies and equates to approximately 0.1% of total plan assets.

Interestingly, SFERS had a net short exposure to companies that have high risk of potential stranded capex, bankruptcy risk, and high-risk use of operating cash flows according to the SFERS Climate Transition Risk Framework. This is the set of criteria Staff previously used as the basis for recommending investment restrictions in 2018. Table 9 shows that the SFERS public markets portfolio had \$ (5 million) on a net basis invested in five companies identified in 2019. While SFERS had a net short aggregate exposure to these five companies, it had +\$3.9 million invested in this group companies through separately managed accounts (i.e., those for which SFERS could implement investment restrictions).

Approximately 67% of SFERS investment in oil & gas companies was concentrated in its top 10 holdings (a slightly higher percentage compared to one year prior). However, on a dollar basis, this amount was meaningfully less. Table 7 shows that, as of 6/30/19, SFERS had \$162.6M invested in its top 10 public markets holdings of oil & gas companies. Two of these companies (Gazprom and Occidental Petroleum) were identified for climate transition risk by the SFERS Framework. Two additional companies (ExxonMobil and Chevron) were identified as having climate transition in at least one category.

## RECOMMENDATIONS:

### Divestment Options

If the Board maintains its request of an option for “prudently phased divestment”, Staff recommends that the same criteria used in 2018 continue to be used:

- 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 occurs 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 again 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.

Staff further recommends that companies no longer meeting the abovementioned criteria, and that were previously restricted from direct investment, be removed the list of restricted companies.

If the Board agrees to pursue such option, it would be targeted at \$3.9 million of direct investment (through separately managed accounts) in four companies, two companies in which SFERS does not currently have direct investment, and four companies in which SFERS previously restricted investment. All companies are identified in Table 10.

Staff recommends that the Board consider removing investment restriction for Apache Corp, ARC Resources, and Gulfport Energy due to the fact that the companies no longer meet the criteria described above. Staff recommends retaining all three companies for the Watch List (see below) for additional monitoring and engagement.



**Table 10. Recommended companies for investment restriction, 2019**

Company Name	Net Exposure (as of 6/30/19)	Net Direct Exposure (as of 6/30/19)
Chesapeake Energy Corp	\$ 1,983,096	\$ 1,983,096
Diamondback Energy Inc.	\$ (7,954,798)	\$ 1,369,553
Matador Resources Co.	\$ 186,384	\$ -
Parsley Energy Inc	\$ 366,653	\$ 366,653
PDC Energy Inc.	\$ (32,633)	\$ -
Baytex Energy Corp	\$ 191,402	\$ 191,402
Crescent Point Energy*	\$ (30,661)	\$ -
Hess Corp*	\$ 976	\$ -
QEP Resources Inc.*	\$ -	\$ -
WPX Energy Inc.*	\$ -	\$ -
<b>Total</b>	<b>\$ (5,289,581)</b>	<b>\$ 3,910,704</b>

\* Currently subject to investment restriction based on 2018 Board decision

Sources: GSAM as of 9/17/19; holdings data as of 6/30/19 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:

- 24 high climate transition risk fossil fuel companies in SFERS portfolio for engagement;
- Two (2) 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
- Four companies engaged in tar sands activities, but which are not identified as high climate transition risk by the Framework.

In addition, there are four companies that were on the SFERS Watch List in 2018 that were not identified by the Framework in 2019: ConocoPhillips, Petrobras, Peyto Exploration & Development Company, and Marathon Oil. Two companies were on the restricted list in 2018 but was not identified by the Framework in 2019: ARC Resource Inc. and Gulfport Energy. During the past year, Staff have had productive engagements with ConocoPhillips and Petrobras. Staff recommends that engagement with these companies continue and that it attempts additional engagement with Marathon Oil, Peyto Exploration & Development Company, ARC Resources, and Gulfport Energy in order to gain additional understanding that these companies are taking steps to manage climate transition risk.

Staff recommends that the Board direct it to establish a Watch List consisting of 36 companies:

- 24 high climate transition risk fossil fuel companies in SFERS portfolio for engagement;
- Two (2) 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
- Four (4) companies engaged in tar sands activities, but which are not identified as high climate transition risk by the Framework.
- Six (6) companies identified for climate transition risk in 2018 and where engagement may be underway, but not identified as high climate transition risk in 2019.

Staff further recommends that the Board direct it to focus engagement efforts on companies where SFERS has current (as of 6/30/19) equity, long investment of greater than ~\$1 million. For these companies, Staff



recommends that it (continue to) develop company-specific engagement plans that are results-oriented and set reasonable timeframes for companies to take action on reducing their climate transition risk.

As was recommended in 2018, 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 11.

**Table 11. Engagement focus topics, objectives, and target timeframes**

<b>Topic</b>	<b>Engagement Objectives</b>	<b>Target Timeframe</b>
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. Company is able to demonstrate a disciplined strategy for deploying cash that balances future growth, shareholder needs, and managing debt.	1-3 years
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
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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.

Table 12, below, summarizes the recommended engagement focus topics and mechanisms for engagement with each company on the Watch List.

**Table 12. SFERS Climate Transition List Watch, 2019**

Company Name	Engagement Focus Areas					Tar Sands	Engagement Mechanism	Reason
	Reserve Viability	Lobbying & Regulatory Influence	Operational Efficiency	Strategy for use of cash	Mgmt of debt burden			
Apache Corp*			x	x	x		CERES CAR	Climate Framework
California Res. Corp*			x	x	x		Direct	Climate Framework
Canadian Natural Res.*			x		x		CA 100+	Climate Framework
Concho Resources Inc*	x			x			Direct	Climate Framework
EnCana Corp*	x				x		Direct	Climate Framework
MEG Energy Corp*			x	x	x		Direct	Climate Framework
Occidental Petroleum*		x	x	x			CA 100+	Climate Framework
Rosneft*		x	x		x		CA 100+	Climate Framework
Santos Ltd*			x		x		CA 100+	Climate Framework
Tullow Oil*	x		x		x		Direct	Climate Framework
Aker BP ASA			x		x		Direct	Climate Framework
Cairn Energy	x		x		x		Direct	Climate Framework
Centennial Res. Dev.	x			x			Direct	Climate Framework
Cimarex Energy Co	x			x			CERES CAR	Climate Framework
Enerplus Corporation	x		x				Direct	Climate Framework
EOG Resources	x	x					CERES CAR	Climate Framework
Gazprom PJSC*			x	x	x		CA 100+	Climate Framework
Medco Energi			x	x	x		Direct	Climate Framework
Origin Energy			x		x		CA 100+	Climate Framework
Pioneer Nat. Res.	x			x			CERES CAR	Climate Framework
Premier Oil			x		x		Direct	Climate Framework
PTT Expl. & Prod PCL			x		x		CA 100+	Climate Framework
Tourmaline Oil Corp			x	x	x		Direct	Climate Framework
Whiting Petroleum	x				x		Direct	Climate Framework
ARC Resources Ltd.*				x	x		Direct	2018 Invest. Restriction
Gulfport Energy*				x	x		Direct	2018 Invest. Restriction
ConocoPhillips*							CA 100+	2018 Watch List
Chevron*		x					CA 100+	Top 10 Oil & Gas holding
ExxonMobil*		x					CA 100+	Top 10 Oil & Gas holding
Marathon Oil*		x					Direct	2018 Watch List
Petrobras*					x		CA 100+	2018 Watch List
Peyto Expl. & Dev.*					x		Direct	2018 Watch List

Cenovus Energy*	x	x	Direct	Tar sands
Husky Energy*		x	CERES CAR	Tar sands
Imperial Oil Ltd*		x	CA 100+	Tar sands
Suncor Energy*	x	x	CA 100+	Tar sands

\* identifies company on SFERS 2018 Watch List, subject to investment restriction in 2018, or identified as high climate transition risk in 2018 but not placed on Watch List due to SFERS not having investment in the company at the time.

Sources: GSAM as of 9/17/19; holdings data as of 6/30/19 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.

The following table identifies the companies where (as of 6/30/19) SFERS had long equity positions of greater than approximately \$1 million, and where Staff intends to prioritize its engagement efforts:

**Table 13. Companies Prioritized for SFERS Engagement, 2019**

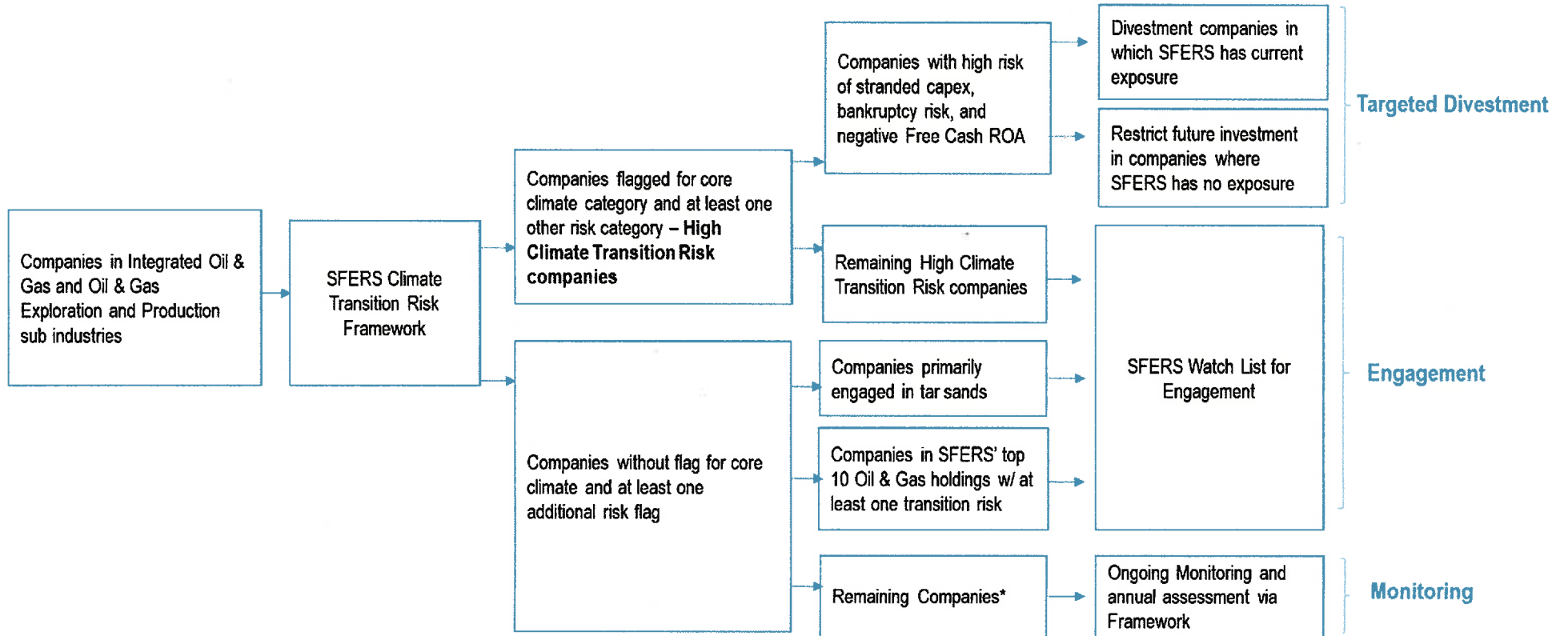
Company Name	Engagement Focus Areas					Tar Sands Activities	Engagement Mechanism
	Reserve Viability	Lobbying & Regulatory Influence	Operational Efficiency	Strategy for use of cash	Mgmt of debt burden		
EnCana Corp	x				x		Direct
Occidental Petroleum		x	x	x			CA 100+
Tullow Oil	x		x		x		Direct
EOG Resources	x	x					CERES CAR
Gazprom PJSC			x	x	x		CA 100+
PTT Expl. & Prod PCL			x		x		CA 100+
ConocoPhillips							CA 100+
Chevron		x					CA 100+
ExxonMobil		x					CA 100+
Marathon Oil		x					Direct
Petrobras					x		CA 100+
Suncor Energy					x	x	CA 100+

Sources: GSAM as of 9/17/19; holdings data as of 6/30/19 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.

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

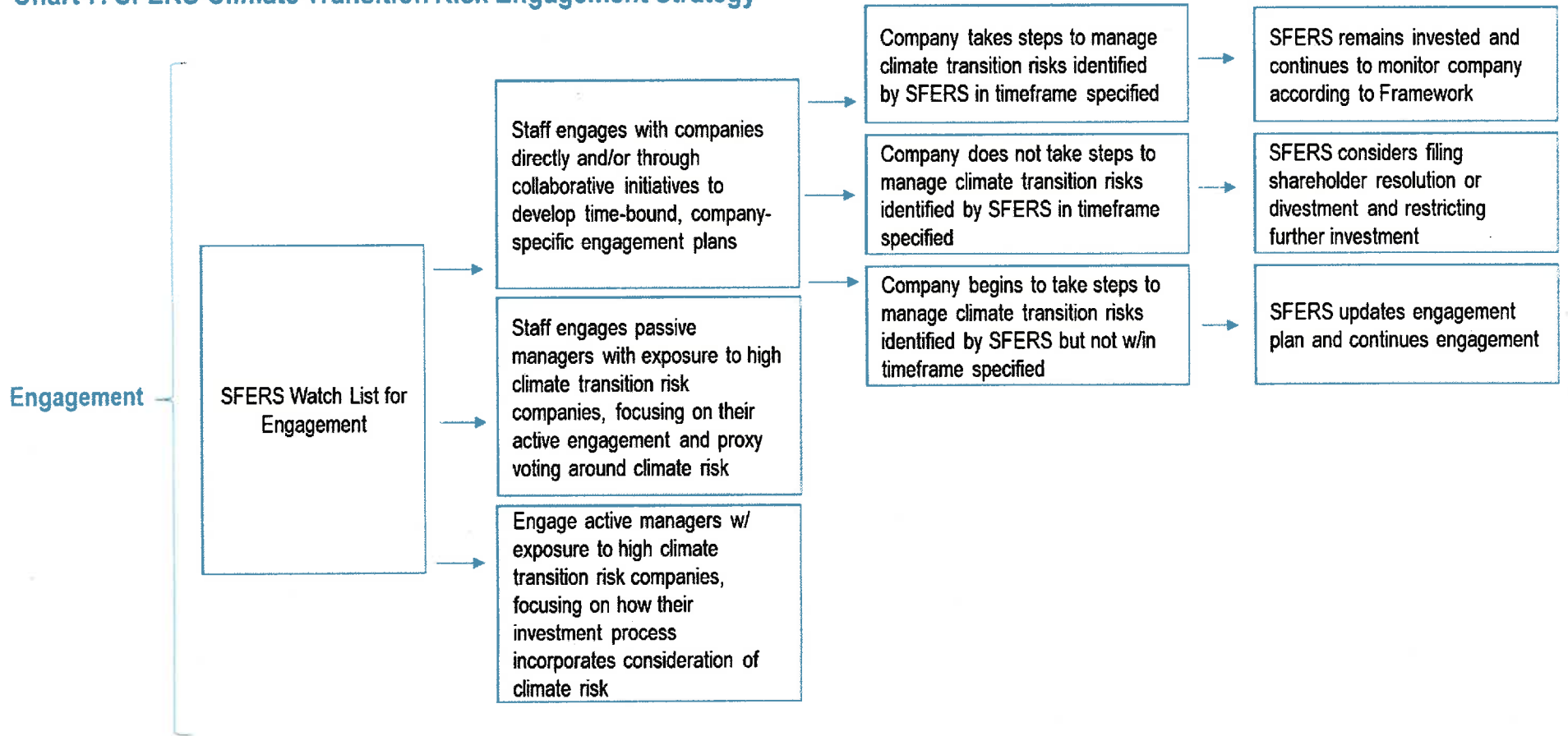
- For fundamental active managers on how they assess risks and opportunities faced by fossil fuel companies, including their consideration of factors in the Framework.
- For quantitative and model driven active managers on how their quantitative investment process and risk management account for future 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.

Chart 6. Applying the SFERS Climate Transition Risk Framework



\* Based on other circumstances, such as if a company was previously subject to investment restriction, or is currently part of an ongoing SFERS engagement, Staff may retain addition company for the Watch List

**Chart 7. 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 “prudently 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**

If the Board wishes to continue with “prudently phased divestment” and agrees with Staff’s recommendation for doing so, and if the Board agrees with Staff’s recommendations for engagement, then the following motions are recommended:

1. Move that in order to fulfil the Board’s request for “prudently phased divestment”, divest positions in four companies, restrict further investment in those companies as well as six additional companies identified in Table 10 of this memorandum.
2. Move that SFERS should adopt the SFERS Climate Transition Watch List, 2019 (Table 12), and that Staff should engage with companies on that list, focusing resources and efforts on companies where SFERS has current, material investment (as identified in Table 13).
3. Move that Staff should engage with existing and potential external managers that hold positions in fossil fuel companies, beginning with those that are invested in companies on the SFERS Climate Transition Watch List, 2019 (Table 12), to understand how they are including considerations of climate risk in their investment process.

## **Appendix A. Description of Climate Transition Risk Framework**

As approved at the October 10, 2018 Board Meeting, annually, SFERS will utilize the Framework to re-run an analysis of its fossil fuel investments, adding and removing companies to its Watch List for engagement as warranted and considering companies for “prudently phased divestment” as warranted. In addition, SFERS will continue to update and improve the robustness of the climate transition risk framework through evaluating additional categories of risk, improving data quality, and improving data coverage.

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**

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

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**

<p><b>A priori assumption</b></p>	<p>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</p>
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	(e.g., deepwater, Arctic).
<b>Metrics</b>	% of projected capex through 2025 stranded in SDS vs. NPS  % of projected capex through 2025 stranded in B2DS vs. NPS
<b>Data Source</b>	Carbon Tracker Initiative
<b>Description of Metrics</b>	<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"> <li>(1) New Policies Scenario (NPS), which is aligned with 2.7°C of global warming</li> <li>(2) The Sustainable Development Scenario (SDS), aligned with 2°C of warming and consistent with the aims of the Paris Agreement, and</li> <li>(3) The Beyond 2 Degrees Scenario (B2DS), aligned with a 1.75°C global warming outcome.</li> </ol> <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, Carbon Tracker Initiative</i>, 08 March 2018</p>

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

<b>A priori assumptions</b>	<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>
<b>Metrics</b>	<p>Scope 1 + 2 CO<sub>2</sub>e / \$MM rev</p> <p>Change in Scope 1 + 2 CO<sub>2</sub>e/ \$MM rev over one year</p>
<b>Data Source</b>	CDP
<b>Description of Metrics</b>	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

	<p>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 CO<sub>2</sub>-e/\$MM revenues is measured as the percentage change in emissions intensity over a one-year period.</p>
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**Table 2c. Framework Part 3 – Climate Policy Approach**

<b>A priori assumption</b>	Companies asserting influence against climate regulations may be unprepared to transition their business model to a low carbon economy.
<b>Metric</b>	InfluenceMap Total Score
<b>Data Source</b>	InfluenceMap
<b>Description of Metric</b>	<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"> <li>▪ 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.</li> <li>▪ 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.</li> </ul>

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

<b>A priori assumptions</b>	Companies with a better picture of financial health may be more resilient over the long-term, including to climate related risks.
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	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.
<b>Metrics</b>	Altman Z-score  Free Cash Return on Assets (ROA)
<b>Data Source</b>	Thompson Reuters Worldscope
<b>Description of Metric</b>	<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><math>x_1 = \text{Working Capital} / \text{Total Assets}</math></p> <ul style="list-style-type: none"> <li>Measures liquid assets in relation to the size of the company; the ability to meet short-term obligations</li> </ul> <p><math>x_2 = \text{Retained Earnings} / \text{Total Assets}</math></p> <ul style="list-style-type: none"> <li>Measures profitability and the reliance on debt to fund assets</li> </ul> <p><math>x_3 = \text{Earnings Before Interest and Taxes (EBIT)} / \text{Total Assets}</math></p> <ul style="list-style-type: none"> <li>Also referred to as return on total assets (ROTA), measures operating efficiency apart from tax and leveraging factors</li> </ul> <p><math>x_4 = \text{Market Value of Equity} / \text{Book Value of Total Liabilities.}</math></p> <ul style="list-style-type: none"> <li>Incorporates security price fluctuations relative to liability as a measure of market confidence</li> </ul> <p><math>x_5 = \text{Sales} / \text{Total Assets S}</math></p> <ul style="list-style-type: none"> <li>Standard measure for total asset turnover or how efficiently the company is using assets to generate sales</li> </ul> <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**

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

**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).



## **Appendix B. Collaborative Engagement Initiatives**

### **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.

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**To:** Retirement Board

**Through:** Jay Huish *JH*  
Executive Director

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

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

**From:** Andrew Collins *AC*  
Director of ESG Investing

Luke Angus, CFA *LA*  
Security Analyst, ESG Investing

**Date:** October 9, 2019

**Agenda Item:**

Analysis of Utility Companies: Level II of SFERS ESG Investment Policy

**Introduction:**

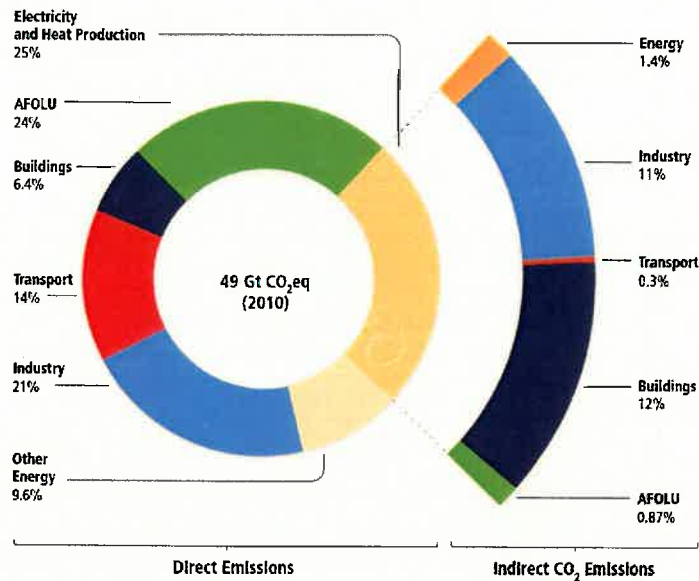
This report investigates financial risks arising from climate change within the GICS utilities sector, which includes independent power producers and electric, multi, gas and water utilities. It analyzes these risks in the context of SFERS' investments in the sector, which are global in scope and mainly concentrated in the Public Equity portfolio. This report then outlines a framework for assessing the climate-related financial risks to these companies' electricity generation activities in order to inform decisions around investment in the sector, direct company engagement and proxy voting.

Climate change and the associated "inevitable policy response"<sup>1</sup> represent significant challenges to utility companies for two main reasons. First, the sector represents a significant source of global carbon emissions, with emissions from electricity and heat production contributing 25% of global GHG emissions according to the Intergovernmental Panel on Climate Change (IPCC)'s 2014 report<sup>2</sup>. Second, there are economically viable alternatives to reducing emissions while still providing reliable and affordable electricity and heat. For these two reasons it's expected that new climate policies will focus on mandating and incentivizing low carbon power generation. Future policy responses, beyond those already in place, have already been signaled in the Nationally Determined Contributions for the 185 countries that have ratified the Paris Agreement.

<sup>1</sup> <https://www.unpri.org/climate-change/the-inevitable-policy-response-to-climate-change/3578.article>

<sup>2</sup> [https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc\\_wg3\\_ar5\\_full.pdf](https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_full.pdf)

## Greenhouse Gas Emissions by Economic Sectors



Source: IPCC Fifth Assessment Report (2014)

Policy responses may take the form of carbon pricing, which is already the case in Europe and 10 US states. They may also include taxes, disincentives or restrictions placed directly on the emitters, or indirectly through portfolio standards or incentives for clean energy, such as in the US at both the state and federal levels. All these policy responses represent potential harm for those electric utilities that are poorly positioned to transition to producing lower carbon electricity.

Utilities involved in the generation of electricity from fossil fuel sources, especially coal, are particularly vulnerable because the intensity of emissions are high relative to the value of the product. Switching away from the burning of coal for electricity generation is one of the "lowest hanging fruits" in reducing greenhouse gas emissions.

Staff note that there are other significant risks facing the utility industry over the next few decades. These include non-climate regulatory change (including on air quality, water and monopoly regulation), technology disruption, the impact of climate on energy demand, physical climate risks (including the vulnerability of the distribution networks to more extreme events). These areas are beyond the focus of this report. In addition, Staff have not focused on the risks that gas utilities are facing due to the reasons outlined in this report.

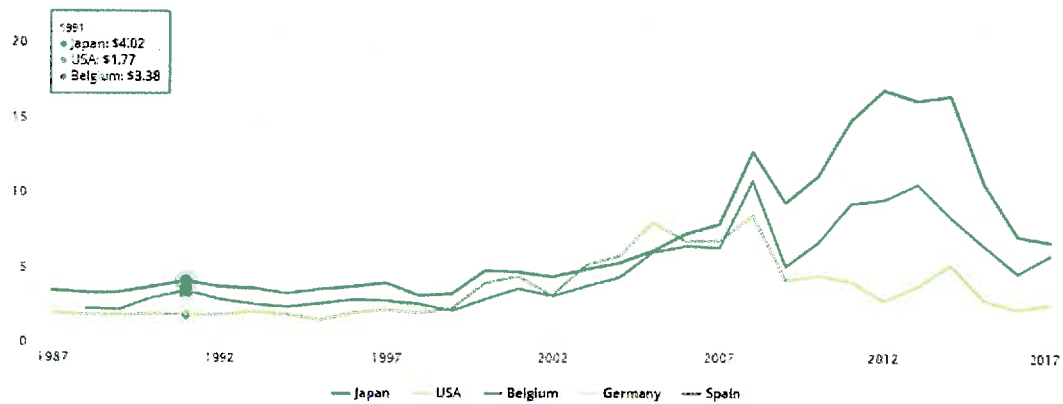
SFERS' exposure to the utility sector across all asset classes is modest at \$378m at June 30, 2019. The exposure within the Public Equity portfolio was \$235m, or 2.7% of the asset class, below the MSCI ACWI IMI weight of 3.3%. The portfolio compares favorably to the index on several environmental metrics including generation mix and carbon intensity. Further details are included in Appendices 1 and 2.

### **Background - Electricity Generation:**

The world's electricity supply has historically been dominated by thermal generation, particularly coal and natural gas, and large-scale centralized facilities that are owned by regulated utilities. To a large extent this is still the case, with smaller amounts contributed by hydro, nuclear and renewables. Notable themes include:

- Most of the world either already has or is moving towards a regulatory model in which electricity generation and / or retailing operate in competitive markets, while transmission and distribution are regulated as natural monopolies. This started with the UK's move in 1989 towards electricity industry deregulation along with a parallel but patchy path in the US towards deregulation (which has origins in the 1970's). The US remains a mix of models, while Japan and China are in the process of shifting.
- In the US, natural gas has become the leading source of electricity generation on account of its abundance, efficiency and low cost (with Henry Hub spot at ~\$2.20 / mmBtu).
- In global markets, natural gas and LNG prices were significantly higher from 2011 to 2014, partly owing to disruption caused by the Fukushima disaster resulting in rapid switching from nuclear generation in Japan and Germany. Meanwhile, significant investment in LNG export capacity has been occurring in Australia, Russia and more recently the US which has increased the depth of the LNG market. Spot LNG prices fell to near \$4.30 per mmBtu in March 2019.<sup>3</sup> This is to the advantage of importers such as China, India, South Korea and Japan. However, based on the futures curve, this price decline is likely to be temporary and seasonality continues to have a material impact on prices. For example, the February 2020 Japan / South Korea LNG futures contract was priced at \$6.74 on August 27, 2019, versus the July 2020 contract at \$5.675.<sup>4</sup>

Average natural gas import prices, USD/MBtu



Source: IEA

- Russia has been expanding natural gas pipeline access into Europe and China.
- Renewables have emerged to be globally significant, particularly wind and solar photovoltaics (PV) with additions of 49 GW and 94 GW in 2018 according to IRENA.<sup>5</sup> This is a 53% share of total power capacity additions in 2018, though capacities of wind and solar PV are not strictly comparable to hydro and thermal generation. Prior to 2018, wind and solar PV development was heavily reliant on subsidies, but unsubsidized levelized costs for both technologies have fallen significantly and in some areas are now the lowest cost source of new electricity generation.
- The rise of intermittent renewables has placed increasing flexibility demands on the rest of the dispatchable generation base. While gas and hydro generators can provide flexibility to varying extents, this is problematic for nuclear and coal generation which typically provide baseload

<sup>3</sup> <https://www.reuters.com/article/asia-lng-prices/asian-lng-prices-fall-to-near-three-year-low-as-buyers-shun-spot-cargoes-traders-idUSL3N21E14D>.

<sup>4</sup> [https://www.cmegroup.com/trading/energy/natural-gas/lng-japan-korea-marker-platts-swap\\_quotes\\_globex.html](https://www.cmegroup.com/trading/energy/natural-gas/lng-japan-korea-marker-platts-swap_quotes_globex.html)

<sup>5</sup> <https://www.irena.org/newsroom/pressreleases/2019/Apr/Renewable-Energy-Now-Accounts-for-a-Third-of-Global-Power-Capacity>

power from constant output. Coal is technically capable of higher frequency cycling, but high start-up costs and mechanical wear make this less economically feasible.

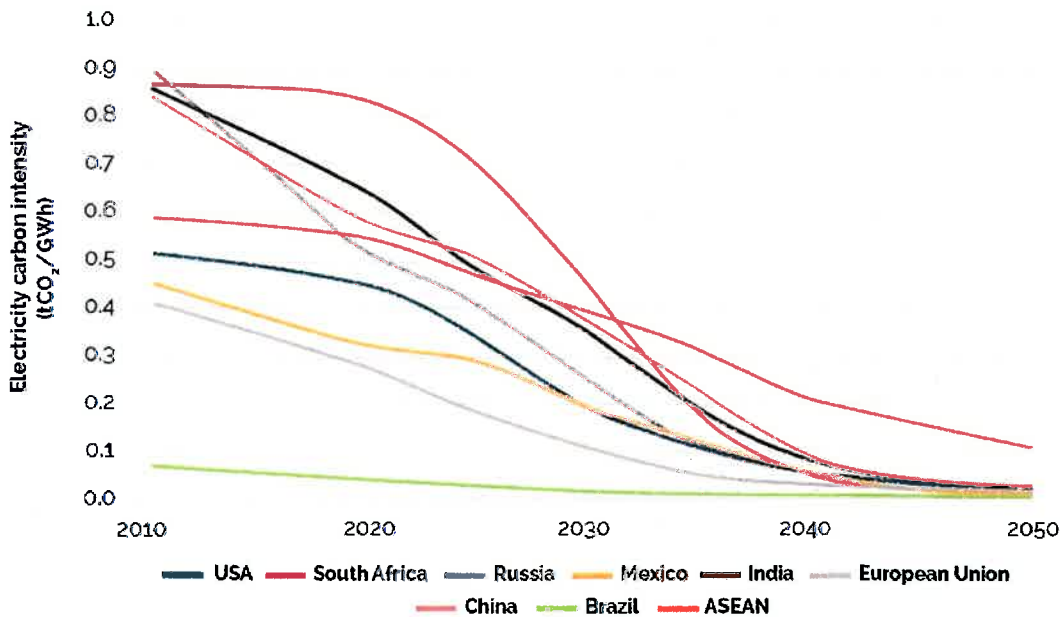
- Long lead times and cost overruns have plagued the nuclear industry.
- In developed markets, electricity demand growth has been subdued or even declining with efficiency gains offsetting economic growth. In emerging markets, electricity demand growth has been significant, particularly in China and India, resulting in substantial capacity additions (especially coal).
- Many emerging market cities have untenable air pollution levels and as such are de-emphasizing coal in the generation mix and increasing efficiency requirements.
- Many financial market participants are moving away from the financing, insuring, and ownership of thermal coal mining and coal electricity generation assets due to evidence that the industry is in decline (mainly in developed markets so far), concerns around climate change, and potential reputational harm.
- Electrochemical energy storage costs have fallen significantly in recent years, though the size of this market currently remains modest. Large scale deployments are now starting to become more commonplace in markets such California, where the uptake of intermittent renewables is advanced, there are price signals in both energy and ancillary services markets and regulators are supportive.

Against this backdrop, climate change is beginning to result in what the UN-supported Principles for Responsible Investing calls an “inevitable policy response.” In fact, early policy changes are already evident in some jurisdictions and are projected to accelerate as urgency increases around climate action.

Based on data from IEA's Two Degrees Scenario (2014), which anticipates decarbonization of the utility sector will be more rapid than other sectors, the Science Based Targets (SBT) initiative provides the below chart of emission reductions pathways for various regions. While there are substantial differences across regions, countries and companies, each pathway shows carbon intensity of electricity nearing zero by mid-century.

Given these pathways, coal generation, with its high emissions and decreasing economics, is particularly vulnerable to climate change and the inevitable policy response. However, even with substantial substitution of coal generation and efficiency improvements at coal plants, electric utilities would still need to replace significant portions of fossil fuel generation with renewables in order to hit the necessary decarbonization pathway. In addition to the challenge of decarbonization of the electricity generation mix, electric utilities will need to be prepared to face growing demand arising from electrification of new sectors like transportation.

Figure 16. Convergence of regional electricity intensity under a zDS scenario



Source: Science Based Targets Initiative, Sectoral Decarbonization Approach (2015)

Approximately one tonne of carbon dioxide is emitted for each megawatt-hour (MWh) of electricity generated from coal, before including mining and transport related emissions.<sup>6</sup> To put this in context, one MWh is equivalent to 0.59 barrels of oil before any efficiency adjustments. Average wholesale electricity prices across the US are generally \$20 to \$40 per MWh<sup>7</sup> though coal generation may be able to achieve moderately higher prices than average during winter and summer seasonal peaks.

Gas-fired generation generally has significantly lower carbon emissions than coal due to two factors:

- Thermal efficiency of combined cycle gas fired plants is very high because much of the waste heat can be recovered through a secondary steam turbine. New combined cycle plants can achieve 60%+ efficiency.<sup>8</sup> Efficiency of traditional gas peaking plants is lower, but new hybrid peaking plant efficiency can also be high.
- Natural gas is predominantly comprised of methane mixed with small proportions of short-chain hydrocarbons. Methane, CH<sub>4</sub>, has an excellent carbon-to-hydrogen ratio, which is crucial since the carbon atom forms CO<sub>2</sub> (if sufficient O<sub>2</sub>) and the hydrogen atoms form water on combustion.

Assuming 55% efficiency and EIA carbon emissions factors<sup>9</sup>, combined cycle gas generation would emit approximately 0.33 tonnes of CO<sub>2</sub> per MWh, not including upstream emissions. In addition to carbon emissions from upstream activities, a major concern with natural gas is fugitive methane emissions.<sup>10</sup> Methane is a potent greenhouse gas and 25 times greater than CO<sub>2</sub> when the impact is spread over a 100-year period.<sup>11</sup> The impacts are greater when measured over 20 years.

<sup>6</sup> This assumes 33% generation efficiency and relies on EIA data for carbon and energy content of coal obtained from: [https://www.eia.gov/coal/production/quarterly/co2\\_article/co2.html](https://www.eia.gov/coal/production/quarterly/co2_article/co2.html)

<sup>7</sup> <https://www.eia.gov/todayinenergy/detail.php?id=37912>

<sup>8</sup> <https://www.ge.com/power/gas/gas-turbines>

<sup>9</sup> [https://www.eia.gov/electricity/annual/html/epa\\_a\\_03.html](https://www.eia.gov/electricity/annual/html/epa_a_03.html)

<sup>10</sup> <https://www.reuters.com/article/us-usa-methane/us-oil-gas-system-methane-leaks-larger-than-epa-estimates-study-idUSKBN1JH2TP>

<sup>11</sup> <https://www.epa.gov/ghgemissions/overview-greenhouse-gases>

Including extraction, processing and transport, the US average methane loss rate of 1.5%, the US Department of Energy, National Technology Laboratory, estimates life cycle impact (with fugitive methane impacts spread over 100 years), to be 0.506 tonnes CO<sub>2e</sub> (equivalent) per MWh from natural gas combined cycle plants. The DoE's corresponding estimate for baseload coal (fleet average) is 1.205 tonnes, below 0.042 tonnes for each of nuclear, hydro, wind and solar, and below 0.25 tonnes for geothermal.<sup>12</sup> With reasonable assumptions around upstream emissions and fugitive methane, natural gas generation results in approximately half of the emissions of coal generation.

Carbon pricing schemes are in place in several significant electricity markets already. The August 2019 carbon auction price in California was \$17.16 per tonne of CO<sub>2e</sub><sup>13</sup> while the June 5, 2019 auction of the Regional Greenhouse Gas Initiative (a collection of nine northeast US states) was \$5.62 per ton of CO<sub>2</sub>.<sup>14</sup> In Europe, with more aggressive reductions in the allowance caps, the Dec19 EUA futures price on May 10, 2019 was EUR25.41 per tonne (US\$28.18).<sup>15</sup> These higher carbon prices are causing a rapid transition away from coal generation in Europe in 2019. Several global oil and gas companies assume a carbon price, including Total which assumes \$25-\$40 per ton. The implementation of carbon pricing at modest levels could significantly impact the economics of coal generation, including existing plants, and cause rapid shutdowns well ahead of scheduled retirements.

Sensitivity to carbon pricing is especially relevant because coal must compete with lower carbon alternatives, including a portfolio of natural gas, renewables, energy storage, demand response and transmission solutions. For markets without access to natural gas, LNG is a viable substitute now that the global market has grown significantly, though it is more expensive and slightly more carbon intensive than natural gas. A portfolio of the above solutions is both highly economic while mitigating the intermittency of renewables and diluting the CO<sub>2</sub> intensity of gas generation.

An important consideration in electricity markets is not just the annual average energy mix but the power capacity. As an instantly perishable commodity, power capacity must exceed demand within every second throughout the year. Redundancies are built into the system through reserve capacity which can be brought online in case of failure or extreme cold or hot weather events.

### **Background - Natural Gas Heating:**

Aside from electricity generation, natural gas is used for industrial applications and space and water heating in residential and commercial markets. Many utilities are involved in the distribution and sale of gas, and for some companies this is a material source of scope 3 emissions. While initially this appears to be a vulnerability from a climate transition perspective, there are several important mitigating factors:

- Natural gas has a low carbon content, as mentioned previously.
- Burning natural gas for heat can achieve efficiencies of 90% or more. This would equate to approximately 0.2 tonnes of CO<sub>2</sub> per MWh equivalent of heat energy (before upstream emissions and fugitive methane).
- Natural gas is a cheap fuel for heat, even if carbon taxes are included. At the retail level in the US, it is approximately 25% of the cost of electricity on an energy equivalent basis. Even an aggressive carbon price of \$100 per tonne would not close this discount.

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<sup>12</sup> <https://www.eia.gov/conference/2015/pdf/presentations/skone.pdf>

<sup>13</sup> [https://www3.arb.ca.gov/cc/capandtrade/auction/results\\_summary.pdf](https://www3.arb.ca.gov/cc/capandtrade/auction/results_summary.pdf)

<sup>14</sup> <https://www.rggi.org/auctions/auction-results>

<sup>15</sup> <https://www.theice.com/products/197/EUA-Futures/data?marketId=400186>



- Solar PV, one of the most important renewable technologies, has a poor correlation between output and demand for heat.

Nevertheless, heat pumps are a disruptive technology for space heating and cooling and water heating to a lesser extent. In many climates these operate at effective efficiencies of 300%<sup>16</sup> or more, by using a small electrical input to shift thermal energy by expanding and compressing gases. Even when the temperature outside 'feels' cold, there is heat energy available in the outside air to shift inside. This is possible even in temperatures well below freezing, though efficiencies decline towards 100%. Ground-source heat pumps utilize the more constant underground temperatures and are a good option in severe winter climates.

Despite the advantages of heat pumps, Staff do not consider the conversion of natural gas heating to be amongst the lowest hanging fruit or the most vulnerable to climate change policy. This will change as the energy transition progresses, and the wisdom of developing new gas infrastructure, with an economic life of perhaps 50 years is questionable when it may only be useable for 20 or 30 years (though the first 20-30 years will contribute most of the present value).

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<sup>16</sup> This is more accurately described as a coefficient of performance and does not include losses in the electricity generation, transmission or distribution.

**Framework to Assess Climate Risk:**

Staff has developed a two-stage process work to assess climate risks facing the over 300 utilities in SFERS' Public Equity portfolio. The first stage is a review of all companies in the Public Equity portfolio and MSCI ACWI IMI using a quantitatively based framework, presented below. The second stage will involve more detailed reviews of a narrower set of companies that have been prioritized based on weights within the SFERS portfolio and the relative risks identified in the first stage. Staff presents below the topics that will be considered during stage two of the process.

This work will inform Staff's understanding of vulnerabilities in the SFERS portfolio and allow SFERS to prioritize topics for monitoring and engagement, will inform proxy voting decisions, and will inform any potential investment related decisions.

**Stage 1 – Quantitative Assessment Framework**

In the first stage, a quantitative framework that blends several data sources to assess companies' exposures to climate risk is proposed for identifying the most vulnerable utilities. The use of multiple datapoints recognizes that each of the available metrics has advantages and disadvantages. In particular certain metrics are backwards looking in nature while others are more forward looking. A core objective of this analysis is to gain understanding of not only a utility's current exposure to climate risk, but also to use a forward-looking lens to assess each utility's willingness and ability to mitigate its future climate risk.

The framework assesses the following key areas and questions:

1. Generation Mix – How reliant is the company on coal and fossil fuel electricity generation?
2. Emissions Intensity – How carbon intensive are operations?
3. Management of Climate Risks – How is management positioning the company to address climate risks?
4. Financial Health – Does the company have financial flexibility to invest in new generation, transmission and distribution infrastructure?

Parts 1 and 2 capture the current climate risk exposure of the company. Parts 3 and 4 capture the willingness and ability to address climate risks, respectively. Companies that perform well on all four parts collectively are likely to be well positioned for a low-carbon future, while those that perform poorly are likely not. However, the framework is intended to identify companies with vulnerabilities in any of the key areas.

**Part 1: Generation Mix**

<b>A priori assumptions</b>	Coal fired electricity generation, as the most carbon intensive energy source, is very exposed to climate change policies. Gas and oil generation are also exposed to carbon related regulations, but to a lesser extent, due to the advantages of gas generation mentioned previously (including combined cycle efficiency and the low C-H ratio) <sup>17</sup> .
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<sup>17</sup> Staff considers it more appropriate to measure the electricity mix based on generation rather than capacity as this is more closely aligned with carbon emissions, revenue and risk to shareholders. Staff notes that some revenues are linked to capacity, but this will vary by company and market. Staff considers it a potentially viable interim (not permanent)

<b>Metrics and Critical Level</b>	Adjusted Carbon Intensive Generation = % of coal generation * 1 + percent of gas and oil generation * 0.5  Companies with a blended weight greater than 50% are considered highly vulnerable to carbon related regulations. Based on average carbon intensities of coal and gas, this critical level is broadly consistent with a carbon intensity of 0.5 tonnes per MWh in 2017 under the Below Two Degrees scenario according to the Transition Pathway Initiative (TPI).
<b>Data Source</b>	MSCI
<b>Description of Metrics</b>	Generation is measured in energy output, not power, and the proportion is calculated over a year.
<b>Data Coverage</b>	81% weighted portfolio

## Part 2: Emissions Intensity

<b>A priori assumption</b>	Companies with high emissions relative to revenue are more vulnerable to changes in climate policy, including carbon pricing. A high emissions intensity can indicate that the value of output is low, reliance on carbon intensive fuels is high, or that generation assets are inefficient (or a combination of these factors).  Companies with integrated transmission, distribution and/or retail operations "dilute" the impact of carbon emissions in electricity generation from a financial perspective (i.e, because they have relatively higher revenue without proportionally more emissions). Likewise, utilities "dilute" their carbon intensity through water or gas distribution and retailing businesses. Such diversified companies may be more resilient to changes in policies in response to climate change. Similarly, generation targeting peak prices are less vulnerable to carbon pricing than baseload generation which is reliant on low average wholesale prices.
<b>Metrics and Critical Level</b>	Scope 1 & 2 emissions in tonnes per \$ million of revenue in USD.  Companies with intensity above 4,000 tonnes per \$m revenue are considered highly vulnerable. This level is almost double the weighted average for the utility sector of the MSCI ACWI IMI. <sup>18</sup>
<b>Data Source</b>	MSCI
<b>Description of Metrics</b>	The metric captures the efficiency and mix of the electricity generation based and the reliance of the company on electricity generation. Scope 1 & 2 emissions are direct emissions and includes those from electricity generated internally and electricity purchased. This does not include Scope 3 emissions, such as those arising from the retailing of natural gas or coal mining production sold externally.
<b>Data Coverage</b>	98% weighted portfolio

strategy for coal plant owners to reduce generation and emissions through lower capacity factors, while keeping the plant's capacity available for peak winter and summer needs. Fossil fuel power capacity is important for grid reliability. Wind and solar are intermittent and non-dispatchable without energy storage and lean on flexible generation. Nuclear is typically operated as baseload and is less suitable for fulfilling this need. For the most part, energy storage is not capable of resolving the seasonal variability of wind and solar.

<sup>18</sup> For reference, a hypothetical company 100% reliant on coal generation trading only in the wholesale electricity market at an average price of \$30 / MWh and assuming efficiency of 33%, the carbon intensity would be ~32,000 metric tonnes per million dollars of revenue.

**Part 3: Management of Climate Risks**

<b>A priori assumption</b>	Navigating climate policy and undertaking decarbonization efforts are fundamental challenges within the utilities sector and should therefore be addressed at the board and senior management levels. Forward-looking management may be able to adopt strategies to reduce climate vulnerabilities, including through setting targets and incorporating climate into decision making, particularly around long-term capital planning. Companies that disclose emissions, reduction targets, governance structures and management strategies around climate change signal to investors that they are strategically addressing climate risk.
<b>Metrics and Critical Levels</b>	1) Transition Pathway Initiative (TPI) Management assessment score – companies with scores of 2 or lower (on scale of 0-4) are considered highly vulnerable.  2) Transition Pathway Initiative (TPI) Carbon performance for 2030 – companies targeting above 0.23 tonnes per MWh are considered highly vulnerable. This is chosen as it is the level consistent with a “Below 2 Degrees” scenario according to TPI. It is important to note that since this relies on IEA scenarios, this level is not necessarily “aligned” with the Paris Agreement and the IPCC’s 2018 report: “Global Warming of 1.5°C”. The critical level may be lowered as the IEA, SBT and TPI update their analysis.
<b>Data Source</b>	TPI, an institutional investor initiative that assesses companies’ preparedness for the transition to a low-carbon economy. TPI sources underlying company disclosure data from FTSE Russell.
<b>Description of Metrics</b>	TPI’s management scores are based on 17 questions on the company’s acknowledgement of climate risk, emission reduction targets, disclosure, governance and strategy. As of September 2019, 62 of the largest global utilities are covered by TPI.  Carbon performance is measured in tonnes of CO <sub>2</sub> e per MWh of electricity generated. 2030 targets are available for 34 utilities. 2020-2025 targets are available for a further 19 utilities, and these may be used in place of 2030 targets since the trend is for stricter targets in later years. 8 utilities have historical data available but no targets. TPI publishes levels required for consistency with the 2 Degrees and Below 2 Degrees scenarios.
<b>Data Coverage</b>	Management score - 70% weighted portfolio Carbon performance - 61% weighted portfolio

**Part 4: Financial Health**

<b>A priori assumption</b>	A successful energy transition requires utilities to survive potential policy shocks and technology disruption and invest substantial amounts of capital in the development of renewable generation and transmission and distribution infrastructure. This may be sourced through internal cash generation or via external capital raisings. Financial ratios and credit worthiness will influence companies’ ability to raise new capital to finance capex.
<b>Metrics and Critical Levels</b>	Net Debt / Enterprise Value - above 70% is considered highly vulnerable.
<b>Data Source</b>	Bloomberg

<b>Description of Metrics</b>	<p>The net debt to EBITDA ratio is commonly used in assessing the debt levels of utilities, however, there is significant variance in debt bearing capacity of utilities that are exposed to electricity price volatility and competitive markets versus regulated utilities and infrastructure owners.</p> <p>Enterprise value reflects the total market value of the company, including net debt. This is more consistent across companies than net debt to EBITDA and has better coverage than credit ratings.</p>
<b>Data Coverage</b>	98% weighted portfolio

### Results of Stage 1 Assessment

The framework was applied to all portfolio and index utilities except water and gas utilities with immaterial electricity generation exposures and scope 1 & 2 carbon intensities below 1,000 tonnes per \$ million revenue. This universe is 272 companies, after the removal of 38 water utilities and 59 gas utilities with immaterial electricity generation and low carbon intensity. Staff have assumed that water utilities have minimal climate risk, at least of the type investigated in this report. For the reasons outlined previously, Staff believe gas utilities are less vulnerable compared to utilities with fossil fuel electricity generation.

Overall, about 26% of SFERS' tested exposure to the utilities sector showed low vulnerability to climate transition risk. Nearly half (47%) of SFERS' exposure showed higher vulnerability to climate transition risk according to the framework. For the remaining percentage (27%), data availability was lacking, so a conclusion about climate vulnerability could not be reached.

Table 1: Framework Result Summary

<b>Result</b>	<b>Implication</b>	<b>Portfolio Weight</b>	<b>Sector Weight</b>	<b>Count</b>	<b>Contribution to Carbon Intensity</b>
Better Placed than Thresholds	Low Vulnerability	0.67%	28%	10	11%
Worse Placed than Thresholds	High Vulnerability	1.20%	50%	120	84%
Insufficient Data	-	0.54%	22%	142	5%
Total Tested		2.41%		272	

The 28% of SFERS' exposure with low vulnerability was concentrated in ten companies. These companies are better placed than the critical levels of all four parts of the framework, so Staff considers them to be well-placed to manage the climate transition. While few in count, these are amongst SFERS' largest holdings. No further engagement or action is suggested for these companies. However, Staff notes that seven of these companies are being engaged through collaborative initiatives of which SFERS is a part.

Table 2: Positions with Low Climate Transition Vulnerabilities

Company	Public Equities	MSCI			Engagement Groups	Coal Gen %	O&G Gen %	Part 1:	Part 2:	Part 3A:	Part 3B:	Part 4:
		ACWI	IMI	Country				Industry	Coal + 0.5 O&G	Carbon Intensity	Mgmt Score	Target
ENEL - SPA	0.26%	0.11%	IT	Electric	CA100+	26	25	38	1,214	4	0.23	0.37
E.ON SE	0.12%	0.04%	DE	Multi	CA100+	2	6	5	229	4	0.03	0.09
EXELON CORPORATION	0.10%	0.09%	US	Electric	CA100+, CAR	0	11	5	499	4	0.05	0.41
IBERDROLA SA	0.07%	0.11%	ES	Electric	CA100+	1	40	21	678	4	0.15	0.42
SEMPRA ENERGY	0.06%	0.07%	US	Multi		0	53	26	479	4	0.22	0.37
EDISON INTL	0.03%	0.04%	US	Electric		0	20	10	260	3	0.12	0.36
SSE PLC	0.02%	0.03%	GB	Electric	CA100+	4	68	38	251	4	0.15	0.40
FORTUM OYJ	0.01%	0.02%	FI	Electric	CA100+	14	45	36	3,370	4	0.11	0.23
ELECTRICITE DE FRANCE SA	0.01%	0.01%	FR	Electric	CA100+	1	8	6	620	4	0.04	0.34
ORSTED A/S	0.00%	0.03%	DK	Electric		15	5	17	314	4	0.02	-0.01

There is incomplete data for 142 companies, so SFERS is unable to reach a conclusion about their climate vulnerability. This is largely due to a lack of TPI management scores and a 2030 target for carbon intensity. Importantly, this set of companies does not display vulnerabilities in any of the categories for which SFERS has data coverage.

The top 12 companies in the grouping (in terms of SFERS' exposure) are shown below. The largest position, China Yangtze Power, is primarily involved in hydropower and it is therefore less concerning that there is no MSCI generation or TPI coverage for this company.

Table 3: Largest Positions with Incomplete Data but no Vulnerabilities Identified

Company	Public Equities	MSCI			Engagement Groups	Coal Gen %	O&G Gen %	Part 1:	Part 2:	Part 3A:	Part 3B:	Part 4:
		ACWI	IMI	Country				Industry	Coal + 0.5 O&G	Carbon Intensity	Mgmt Score	Target
CHINA YANGTZE POWER CO	0.16%	0.00%	CN	Independent					4			0.19
RED ELECTRICA CORP	0.04%	0.02%	ES	Electric					423	4		0.35
CENTRICA PLC	0.03%	0.01%	GB	Multi	CA100+	0	16	8	46	4		0.33
PUBLIC SERVICE ENTERPRISE GROUP	0.03%	0.06%	US	Multi		10	34	27	1,436	4		0.34
CENTRAIS ELETR BRAS SA - ELETROBRAS	0.02%	0.01%	BR	Electric		1	4	3	673			0.53
TRANSMISSORA ALIANCA DE ENEG ELEC	0.02%	0.00%	BR	Electric					385			0.27
NATIONAL GRID PLC	0.02%	0.07%	GB	Multi	CA100+	0	100	50	360	4		0.46
EQUATORIAL ENERGIA SA	0.02%	0.01%	BR	Electric		0	100	50	488			0.22
ENEL AMERICAS SA	0.02%	0.01%	CL	Electric		2	39	21	715			0.24
ORMAT TECHNOLOGIES, INC.	0.02%	0.00%	US	Independent		0	0	0	20			0.26
CIA TRANSMISSAO ENER ELETR PAULISTA	0.02%	0.00%	BR	Electric					0			0.12
EDP ENERGIAS DO BRASIL SA	0.02%	0.00%	BR	Electric		47	0	47	1,535			0.28

120 companies were flagged for vulnerability in one or more of the framework categories and are therefore considered to have high climate transition vulnerability. Staff has focused on the top 21 companies by portfolio weight as shown below because these represent 84% by portfolio value of companies flagged for high climate transition vulnerability.

Table 4: Largest Positions with High Climate Transition Vulnerabilities

Company	Public Equities	MSCI		Country	Industry	Engagement Groups	Coal Gen %	O&G Gen %	Part 1:	Part 2:	Part 3A:		Part 4:
		ACWI	IMI						Coal + 0.5 O&G	Carbon Intensity	Mgmt Score	Part 3B: Target	Net Debt / EV
NEXTERA ENERGY INC	0.12%	0.18%	US	Electric	CA100+	2	48	25	2,350	2	0.13	0.26	
DOMINION ENERGY, INC.	0.12%	0.12%	US	Multi	CA100+, CAR	12	40	32	2,400	3	0.24	0.33	
THE SOUTHERN COMPANY	0.09%	0.11%	US	Electric	CA100+, CAR	30	46	53	4,406	3	0.38	0.42	
ENGIE SA	0.06%	0.05%	FR	Multi	CA100+	10	51	36	999	4	0.26	0.33	
ENDESA SA	0.06%	0.02%	ES	Electric		41	15	48	1,436	4	0.30	0.16	
AMERICAN ELECTRIC POWER	0.06%	0.08%	US	Electric	CA100+, CAR	65	16	73	5,946	4	0.59	0.34	
FIRSTENERGY CORP.	0.06%	0.04%	US	Electric	CA100+, CAR	52	0	52	3,034	3	0.33	0.44	
CENTERPOINT ENERGY, INC.	0.06%	0.03%	US	Multi		97	2	98	2,616	2		0.15	
THE AES CORPORATION	0.06%	0.02%	US	Independent	CA100+, CAR	57	27	71	6,052	4	0.21	0.54	
EVERSOURCE ENERGY	0.05%	0.05%	US	Electric		59	5	61	162	3		0.35	
DUKE ENERGY CORPORATION	0.04%	0.12%	US	Electric	CA100+, CAR	30	32	46	4,102	2	0.32	0.45	
CONSOLIDATED EDISON, INC.	0.04%	0.05%	US	Multi		0	44	22	337	3	0.25	0.40	
NRG ENERGY, INC.	0.03%	0.02%	US	Independent	CA100+, CAR	55	28	69	4,873	4	0.60	0.39	
ENTERGY CORPORATION	0.03%	0.04%	US	Electric		10	40	30	3,006	4	0.24	0.45	
CLP HOLDINGS LTD	0.02%	0.03%	HK	Electric		62	15	70	4,479	3	0.56	0.17	
RWE AG	0.02%	0.03%	DE	Multi	CA100+	54	28	68	2,681	3	0.50	-0.27	
XCEL ENERGY INC.	0.02%	0.06%	US	Electric	CA100+, CAR	33	29	48	4,243	3	0.24	0.34	
WEC ENERGY GROUP INC.	0.02%	0.05%	US	Multi	CA100+, CAR	68	26	81	3,959	3	0.57	0.31	
DTE ENERGY COMPANY	0.02%	0.04%	US	Multi	CAR	63	5	66	2,670	4	0.44	0.37	
HUANENG RENEWABLES CORP	0.02%	0.00%	CN	Independent					4			0.70	
PPL CORPORATION	0.02%	0.04%	US	Electric	CA100+, CAR	81	18	90	3,847	3	0.43	0.48	

Of note, there are several companies that perform well in terms of current generation mix and carbon intensity, but lag in terms of management and governance of climate risk (i.e., TPI management scores) and/or have not set carbon intensity targets for 2030 below 0.23 tonnes per MWh.

Fourteen of the above companies are currently engaged through either Climate Action 100+ (CA100+) or Ceres' Carbon Asset Risk (CAR) working group. The seven companies above that are not currently engaged through a collaborative initiative are candidates for SFERS to engage with individually.

Under a "worst of the worst" approach, the below 22 companies are highlighted as exceptionally vulnerable to carbon risks, with carbon intensity above 10,000. Fortunately, the weights of these companies in the portfolio and index are immaterial at 0.04% and 0.07% respectively. Most of these companies are in emerging markets, particularly India and China. The risk of carbon-specific regulation is arguably lower in emerging markets since governments have greater competing priorities of encouraging economic development and energy access. However, air pollution regulations, which Staff consider to be inevitable due to severe public health impacts, is closely aligned with carbon regulation and will likely target reduced reliance on coal in favor of gas and renewables.



Table 5: Most Carbon Intensive Utilities

Company	Public Equities	MSCI ACWI		Industry	Engagement Groups	Coal Gen %	O&G Gen %	Part 1:	Part 2:	Part 3A:		Part 4:
		IMI	Country					Coal + 0.5 O&G	Carbon Intensity	Mgmt Score	Part 3B: Target	Net Debt / EV
VISTRA ENERGY CORP	0.01%	0.02%	US	Independent	CA100+	37	47	60	11,397	2		0.49
CHINA RESOURCES POWER HLDGS CO	0.01%	0.01%	HK	Independent		93	0	93	18,823	1		0.56
HUANENG POWER INTERNATIONAL INC	0.01%	0.00%	CN	Independent		93	5	95	14,352			0.71
CK INFRASTRUCTURE HOLDINGS LIMITED	0.00%	0.01%	HK	Electric		28	55	56	11,899	1		0.12
CHINA POWER INTERNATIONAL DEVELOP	0.00%	0.00%	HK	Independent		78	0	78	11,661			0.69
NTPC LIMITED	0.00%	0.01%	IN	Independent	CA100+	95	4	96	18,694	1		0.54
MPX ENERGIA S/A	0.00%	0.00%	BR	Independent		35	65	67	13,527			0.33
ADANI POWER LIMITED	0.00%	0.00%	IN	Independent		100	0	100	13,326			0.70
JSW ENERGY LTD	0.00%	0.00%	IN	Independent		61	16	69	14,051			0.42
TRANSALTA CORPORATION	0.00%	0.00%	CA	Independent		69	12	75	16,239			0.44
ELECTRICITY GENERATING PUBLIC CO	0.00%	0.01%	TH	Independent		35	47	58	14,177			0.24
HUADIAN POWER INTERNATIONAL CORP	0.00%	0.00%	CN	Independent		88	5	91	12,206			0.70
HUANENG PWR INTL INC	0.00%	0.00%	CN	Independent		93	5	95	14,352			0.71
DATANG INTERN'L POWER GENERATION	0.00%	0.00%	CN	Independent		83	4	85	17,023			0.76
RELIANCE POWER	0.00%	0.00%	IN	Independent		100	0	100	27,841			0.89
ZHEJIANG ZHENENG ELECTRIC POWER CO	0.00%	0.00%	CN	Independent		100	0	100	14,390			0.22
INNER MONGOLIA MENGDIAN HN(THE)	0.00%	0.00%	CN	Independent		97	0	97	25,016			0.46
GD POWER DEVELOPMENT CO	0.00%	0.00%	CN	Independent		71	0	71	15,895			0.53
CAPITAL PWR CORP		0.00%	CA	Independent		63	25	75	11,506			0.38
ENEL RUSSIA PUBLIC JOINT STOCK COMP		0.00%	RU	Electric		47	53	73	24,751			0.29
MOSENERGO PJSC		0.00%	RU	Electric		2	98	51	11,862			-0.34
UNIPRO PUBLIC JOINT STOCK COMPANY		0.00%	RU	Independent		13	87	57	21,475			-0.03

Vistra Energy (\$0.8m exposure), TransAlta Corporation (\$0.1m exposure) and Capital Power Corporation (no exposure) are the high carbon intensity outliers amongst companies in developed markets. These companies are reliant on fossil fuel generation for 83%, 73% and 88% of generation respectively. For TransAlta and Capital Power, this is unusual given 81% of Canada's electricity generation is from non-carbon emitting sources.

Vistra Energy is a US-based integrated electricity retailer and generator. Its retail businesses operate in 20 states and the District of Columbia while the generation assets are focused in competitive markets including ERCOT (Texas), MISO (focusing on Illinois) and PJM (Ohio and Pennsylvania). The company has 14.4GW of operating coal plants, though 2GW is expected to close by the end of 2019 as a result of regulatory changes in Illinois. With an EV to EBITDA ratio of 5.7 times at August 26, 2019, which is the single lowest amongst US utilities including others in competitive markets, it appears that the market is already indicating concern with the company's reliance on coal generation (amongst other factors). This represents an opportunity for the company to improve shareholder value through the transition. Vistra is one of four utility companies that Staff plans to engage with through CA100+.

TransAlta operates in Canada, the US and Australia. TransAlta also has coal mining operations with annual output of 8 million tonnes (reserves are not disclosed). According to the company's website "We are planning the conversion of two coal units at Sundance, Alberta and three coal units at Keephills, Alberta to gas-fired generation in the 2021 to 2022 timeframe. By 2025, 100 per cent of our owned net generation capacity will be from clean power (renewables and gas)."

Capital Power Corporation is a specialist power generator in North America. The company has coal mining interests with reserves of 37 million tonnes. The company has been investing in renewable energy and gas generation and has a "potential" development pipeline of >2.25 GW of wind and >3.5 GW of gas. These projects will reduce the carbon intensity and coal dependence through growth, but the company has not committed to retire or sell coal assets.

Reliance Power is the single worst company on the carbon intensity measure at 27,841 tonnes per \$m. Based on MSCI data, this company is 100% reliant on coal generation in terms of the energy mix and

revenue. According to the company's website, the business is diversifying into gas and hydro as well as growing its generation base to increase the power supply in India. The company also has significant coal reserves of 2,575 million tonnes.

## **Stage 2 – Detailed Assessments:**

In Stage 1, Staff conducted an analysis of the utility sector exposures against a framework comprised of climate and financial risk indicators. The framework has prioritized companies by the vulnerabilities they face and is intended to inform Staff's efforts to engage with companies on management of those vulnerabilities and monitor progress over time.

Staff has focused on SFERS' 21 largest exposures that were determined to have high vulnerabilities in the transition to a low-carbon economy according the framework (Table 4). A secondary focus is an additional 18 portfolio companies that have exceptionally high climate transition vulnerabilities (Table 5). SFERS' intends to focus on mitigating its climate-transition vulnerabilities within the utility sector that arise through investment exposure to these sets of companies by focusing on active voting of proxies and active engagement with the companies.

Since the investment profile of utilities is dependent on many other factors not addressed through the framework, Staff will undertake a second stage of analysis that will include more detailed assessments of the following risks/aspects to better inform proxy voting decisions and productive engagements. In this detailed analysis, emphasis will be placed on the following:

1. Near term capital expenditure plans: As part of the transition to a low-carbon economy, companies are likely to be recycling significant capital into less carbon-intensive, but more capital-intensive forms of generation. This may place a strain on cashflow and balance sheet metrics. As detailed in Appendix 2, 25 portfolio companies were developing new coal plants as recently as January 2019. Staff consider that developing new coal plants, even in emerging markets, is likely to be a misallocation of capital. Given the long lives of generation assets (20-40+ years), near term capital expenditure decisions are crucial for the ability to reach long-term carbon targets.
2. Coal retirements and phase-outs: As the most carbon intensive form of generation, Staff expects coal plants to be highly vulnerable to becoming uneconomic. Companies' ability to shut down or reduce operation of these plants will be important for reducing vulnerabilities from future carbon and climate regulations.
3. Carbon intensity targets: Staff consider 2030 targets for carbon intensity reductions as being particularly relevant as these directly impact immediate capital expenditure plans and retirements. Staff are less concerned with 2050 targets as current boards and management teams are unlikely to be accountable for delivering on those plans.
4. Access to renewable resources and other decarbonization options: Access to renewable resources will vary significantly across utilities' areas of operations. For example, the US has lower population density and access to far greater renewable resources than Singapore, South Korea or Japan. Nevertheless, these heavily populated countries can decarbonize in the initial steps through further coal-to-LNG substitution. US electric utilities also have access to a significant natural gas market to replace coal.

5. Energy poverty issues: Access to electricity and energy are crucial for economic and social development. There are significant needs to increase electricity access and total generation across much of the world. High income countries are in a better position to decarbonize and policymakers in these countries are likely to act earlier and more firmly than the global average. Conversely, policymakers in nations with energy poverty issues may prioritize these issues over climate policies. However, solving energy poverty is not simply about building more coal-fired centralized generation as the issue is frequently more about the cost, reach and reliability of the distribution grid. Decentralized generation such as solar PV coupled with storage, supported by social programs, may be far more effective at reducing energy poverty in some nations. Air quality issues may also result in tighter regulations for coal fired generation in many emerging markets.
6. Valuation: Companies that are vulnerable to climate risks may already trade at discounted or distressed valuations. This may partly or fully mitigate the risk to prospective returns and needs to be considered before any divestment occurs. This also represents an opportunity as companies may be able to improve shareholder returns and reduce risk through a responsible transition plan.

### **Conclusion:**

SFERS' overall exposure to the utilities sector is modest. The Public Equity portfolio is moderately well placed relative to benchmark with respect to the climate transition risks of the utility sector. Nevertheless, the Public Equity portfolio's utility sector exposure is carbon intensive overall and is facing significant transition challenges.

Staff has the following near-term plan for managing climate transition risk within the utilities sector:

1. Analyze and Report: Adopt the above framework for assessing vulnerability to climate transition risk, rerun this analysis annually, and consider updates and improvements to the framework over time (i.e., with availability of new and better datasets).
2. Direct Engagements: For 2019/20, prioritize direct engagements with portfolio companies shown in Tables 4 and 5. One aspect of the direct engagements will be Staff requesting each company set a 2030 carbon intensity target that is equal to or lower than the Below 2 Degrees Scenario from Science Based Targets Initiative's Sectoral Decarbonization Approach, or an equivalent level specific to its region. Staff will be encouraging company to set the 2030 target within one year, reflecting the immediacy of the transition within this sector.
3. Collaborative Engagements: Formally contribute to collaborative engagements with Vistra, NRG, AES and NextEra through CA100+. These companies were identified as candidates for engagement as they are significant portfolio positions and have been identified as having high vulnerabilities to climate transition risk. Additionally, Staff have sought to prioritize companies with fewer collaborating investors on the CA100+ teams. While several other companies are significant portfolio positions with identified vulnerabilities (such as Dominion for example), the CA100+ teams are well resourced. Staff will be monitoring the progress of all CA100+ utility engagements.
4. Manager Engagements: Engage with Public Equity managers with the largest exposures to the sector. The objective of these engagements is to understand how they are incorporating climate

considerations into the investment process; building knowledge within their investment teams, engaging with companies and responsibly participating in proxy voting.

5. Voting: Subsequent to engagements, consider if any intervention is appropriate on specific ballot items while ensuring consistency with the proxy voting guidelines.

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## Appendix 1: Portfolio Positions:

SFERS' look-through exposures to the utility sector are detailed below. All position data is net and dated June 30, 2019 and accessed through Caissa.

<b>Asset Class</b>	<b>\$m</b>
Public Equity	234.7
Real Assets	70.7
Absolute Return	43.8
Private Equity	13.0
Fixed Income	11.9
Private Credit	3.6
<b>Total</b>	<b>378.1</b>

The Real Assets' utilities exposure of \$70.7m is 90% comprised of four main holdings. This includes two listed utilities, a company involved in distributed solar and electric vehicle charging infrastructure and a company involved in developing transmission lines associated with wind farms. Since the listed utilities overlap with the analysis provided for Public Equities, and the other two main holdings are contributing towards the energy transition, these exposures have not been considered further.

Look-through exposures are not available for the Absolute Return portfolio. The Fixed Income exposures were investigated and were spread across a range of regions, issuers, securities and external manager portfolios. Since the above exposures were either immaterial, lacking company transparency or less concerning from a climate transition risk perspective, Public Equity is the focus of this report (from here referred to as the portfolio).

The utilities sector was a small component of the portfolio and the MSCI AWCI IMI benchmark at 2.7% and 3.3% respectively. Electricity industries were 90% of the utilities sector and encompassed independent power producers, electric utilities and multi-utilities. The portfolio's underweight of the sector was mainly through the electric utilities industry, and through multi-utilities and gas utilities to lesser extents. The holdings in individual stocks were small, except for Enel.

Utilities by Industry and Top Holdings	Port: Public Equity	MSCI ACWI IMI	Difference	Public Equity \$m
<b>Utilities</b>	<b>2.67%</b>	<b>3.28%</b>	<b>-0.61%</b>	<b>234.7</b>
<b>Independent Power and Renewable Electricity Producers</b>	<b>0.38%</b>	<b>0.22%</b>	<b>0.16%</b>	<b>32.9</b>
CHINA YANGTZE POWE A'CN Y1	0.16%		0.16%	13.9
AES CORP COM	0.06%	0.02%	0.04%	5.0
NRG ENERGY INC SR GLBL COCO 48	0.02%		0.02%	1.6
HUANENG RENEWABLES CNY1 H	0.02%	0.00%	0.01%	1.5
NRG ENERGY INC COM NEW	0.02%	0.02%	0.00%	1.4
ORMAT TECHNOLOGIES INC COM	0.02%	0.00%	0.01%	1.4
VISTRA ENERGY CORP COM	0.01%	0.02%	-0.01%	0.8
<b>Electric Utilities</b>	<b>1.39%</b>	<b>1.73%</b>	<b>-0.34%</b>	<b>122.2</b>
ENEL SPA EUR1	0.26%	0.11%	0.15%	22.6
EXELON CORP COM	0.10%	0.09%	0.01%	8.4
NEXTERA ENERGY INC COM	0.09%	0.18%	-0.09%	8.3
SOUTHERN CO COM	0.09%	0.11%	-0.02%	7.7
IBERDROLA SA EUR0.75	0.07%	0.11%	-0.04%	6.5
ENDESA SA EUR1.2	0.06%	0.02%	0.04%	5.3
FIRSTENERGY CORP COM	0.06%	0.04%	0.02%	5.1
EVERSOURCE ENERGY COM	0.05%	0.05%	0.00%	4.2
DUKE ENERGY CORP NEW COM NEW	0.04%	0.12%	-0.08%	3.8
AMERICAN ELEC PWR CO INC COM	0.04%	0.08%	-0.04%	3.3
RED ELECTRICA CORP EUR0.5	0.04%	0.02%	0.02%	3.1
<b>Multi-Utilities</b>	<b>0.64%</b>	<b>0.85%</b>	<b>-0.21%</b>	<b>56.6</b>
E.ON SE NPV	0.12%	0.04%	0.07%	10.5
DOMINION ENERGY INC COM	0.09%	0.12%	-0.03%	7.5
ENGIE EUR1	0.06%	0.05%	0.01%	5.7
SEMPRA ENERGY COM	0.04%	0.07%	-0.03%	3.4
CONSOLIDATED EDISON INC COM	0.04%	0.05%	-0.01%	3.3
CENTRICA ORD GBP0.061728395	0.03%	0.01%	0.02%	2.9
DOMINION ENERGY INC CORP UNITS	0.03%		0.03%	2.8
PUBLIC SVC ENTERPRISE GRP INC COM	0.03%	0.06%	-0.03%	2.4
<b>Water Utilities</b>	<b>0.12%</b>	<b>0.15%</b>	<b>-0.03%</b>	<b>10.3</b>
<b>Gas Utilities</b>	<b>0.14%</b>	<b>0.34%</b>	<b>-0.20%</b>	<b>12.3</b>
<b>Utilities (Other)</b>	<b>0.00%</b>		<b>0.00%</b>	<b>0.3</b>
<b>Total</b>	<b>101.10%</b>	<b>100.00%</b>	<b>1.10%</b>	<b>8,877.6</b>

The underweight to the utilities sector overall is mainly through an underweight in North American utilities.

Utilities Exposure by Region	Port: Public Equity	MSCI ACWI IMI	Difference	Public Equity \$m
<b>Utilities</b>	<b>2.67%</b>	<b>3.28%</b>	<b>-0.61%</b>	<b>234.7</b>
North America	1.28%	1.87%	-0.59%	112.5
Europe (Developed)	0.76%	0.78%	-0.02%	66.7
Asia (Developed)	0.10%	0.35%	-0.25%	9.1
Asia (Emerging)	0.29%	0.16%	0.13%	25.4
Latin America (Emerging)	0.21%	0.09%	0.12%	18.8
Middle East and Africa (Developed)		0.00%	0.00%	-
Europe (Emerging)	0.02%	0.02%	0.00%	2.1
Middle East and Africa (Emerging)		0.00%	0.00%	-

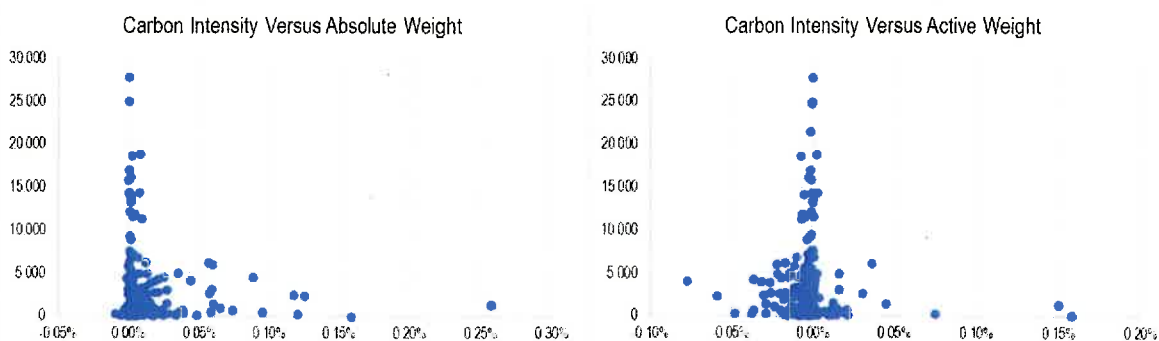
Much of the exposure to utilities was from passive and quantitative managers, particularly those with a value tilt. Several of the growth managers had a zero allocation to utilities. Therefore, the underweight to utilities appears to have been due to manager style more than sector outlook or valuation.

## Appendix 2: Portfolio Metrics:

### Carbon Intensity

Carbon intensity is defined as tonnes of scope 1 & 2 CO<sub>2</sub>-e emissions per million dollars of revenue. The weighted average carbon intensity of the portfolio and index were 1,762 and 2,345 respectively (with 98% and 100% coverage respectively). At these average levels, and assuming companies are impacted on both scope 1 & 2 emissions, a \$20 per tonne carbon tax would be equivalent to 3.5% and 4.7% of revenue for the portfolio and index respectively. The impact on profitability would be larger due to operating and financial leverage.

The following charts demonstrate that there is a wide dispersion in carbon intensity across the sector, with a number of utilities with extremely high carbon intensity. Overall, the fund has more exposure to companies with lower carbon intensity, both in absolute and relative terms, and zero or near zero weights in many of the extremely carbon intensive companies.



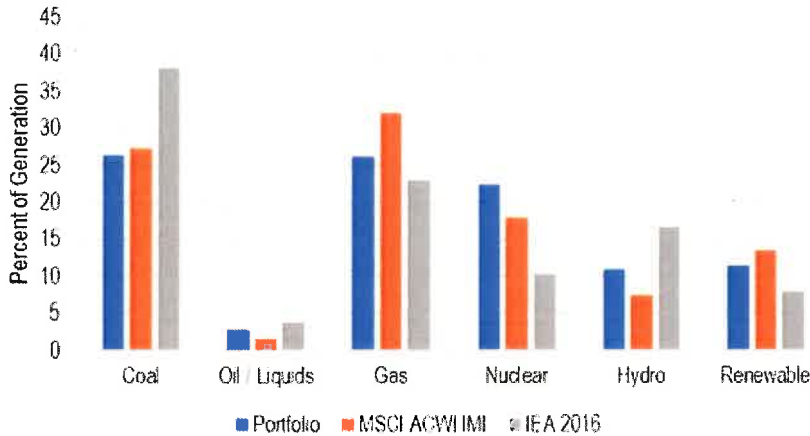
Y axis is the carbon intensity in tonnes of CO<sub>2</sub>e per \$million revenue. X axis are the fund's absolute weight in each utility company (left chart) and active weight in each utility company (right chart).

### Generation Mix

The generation mix of the portfolio was similar to the index, with the main differences being slightly less coal-fired generation and more hydro generation, partly attributable to the holding in China Yangtze Power. The higher liquid fuels generation in the portfolio than the index (and the reverse in natural gas) was related to the underweight exposure to the US. LNG is more prevalent in markets outside of the US such as South Korea and Japan. The portfolio and index had greater generation from gas and less generation from coal. This was likely due to the underrepresentation of developing markets, which are influenced by state ownership, and the high representation of the US, which has a favorable gas market.



### Electricity Generation Mix of Portfolio and Index

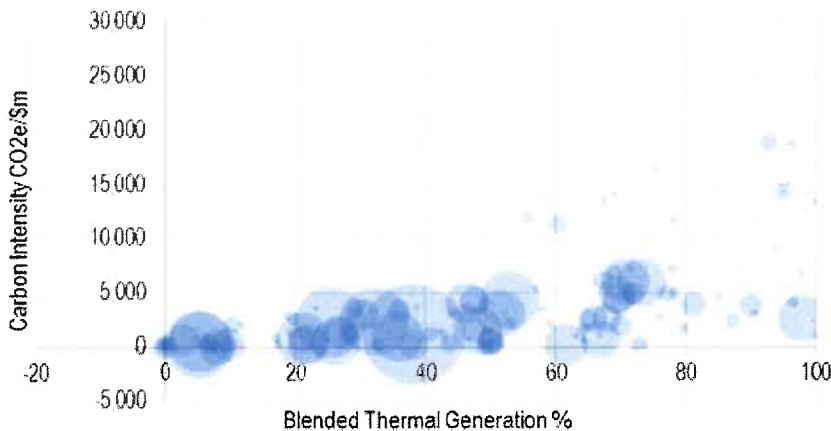


IEA 2016 shows the global electricity mix, including listed and unlisted companies.

The weighted average exposure to coal generation as a proportion of total generation was 26% for the fund and 27% for the index. The portfolio is reasonably placed versus the benchmark with regards to the risk of policy changes to address climate issues in relation to electricity generation.

The following chart shows there is a wide distribution in both the carbon intensity of the individual utilities and the proportion of generation from coal and oil and gas (with oil and gas scaled at a factor of 0.5). This blended generation metric amounts to 41% for the portfolio and 44% for the MSCI ACWI IMI.

### Carbon Intensity vs Blended Thermal Generation



Size of the bubbles is proportionate to portfolio weight.

### Coal Generation Development

Staff considers that developing new coal plants, even in emerging markets, is likely to be a misallocation of capital. Global Energy Monitor is a non-profit organization that tracks companies' involvement in coal generation development. Based on data from Global Energy Monitor's January 2019 update, 25 companies in the portfolio (plus 3 in the index not held), continue to be involved in developing coal plants at either the announced, pre-permit, permitted or under construction phases. The total amongst these companies is 79 GW, or approximately one third of the existing coal fired capacity in the US. Staff note there is a significant overlap with companies not exceeding the

framework criteria. The data is not part of the framework since it is unclear as to the probability that announced, pre-permit or permitted plants will proceed given the rapidly evolving energy transition (even since January 2019). Nevertheless, this will be a useful data point in the engagements and proxy voting decisions.

Company	Public Equities	MSCI ACWI		Country	Industry	Engagement Groups	Coal Gen %	O&G Gen %	Part 1:	Part 2:	Part 3A:		Part 4:	SFERS Framework Result	Coal Development (MW)
		Coal + 0.5 O&G	Carbon Intensity						Mgmt Score	Part 3B: Target	Net Debt / EV				
E.ON SE	0.12%	0.04%	DE	Multi	CA100+	2	6	5	229	4	0.03	0.09	Exceed	363	
ENGIE SA	0.06%	0.05%	FR	Multi	CA100+	10	51	36	999	4	0.26	0.33	Not Exceed	950	
CLP HOLDINGS LTD	0.02%	0.03%	HK	Electric		62	15	70	4,479	3	0.56	0.17	Not Exceed	1,260	
RWE AG	0.02%	0.03%	DE	Multi	CA100+	54	28	68	2,681	3	0.50	-0.27	Not Exceed	1,100	
CHINA RESOURCES POWER HLDGS CO	0.01%	0.01%	HK	Independent		93	0	93	18,823	1		0.56	Not Exceed	7,035	
TOHOKU ELECTRIC POWER CO INC	0.00%	0.01%	JP	Electric		42	44	64	1,703			0.78	Not Exceed	600	
TOKYO ELEC POWER CO HLDGS INC	0.00%	0.01%	JP	Electric		12	81	53	2,187	3	0.34	0.82	Not Exceed	1,056	
OSAKA GAS CO., LTD.	0.00%	0.01%	JP	Gas		5	92	51	423			0.43	Not Exceed	400	
CEZ	0.00%	0.01%	CZ	Electric	CA100+	43	3	44	3,145	2	0.26	0.16	Not Exceed	770	
CHUBU ELECTRIC POWER CO INC	0.00%	0.02%	JP	Electric		27	65	59	2,105	3	0.37	0.71	Not Exceed	2,045	
NTPC LIMITED	0.00%	0.01%	IN	Independent	CA100+	95	4	96	18,694	1		0.54	Not Exceed	25,331	
ENEA SA	0.00%	0.00%	PL	Electric		98	0	98	6,806			0.50	Not Exceed	1,000	
TAURON POLSKA ENERGIA SA	0.00%	0.00%	PL	Electric		90	1	91	3,122			0.66	Not Exceed	910	
ADANI POWER LIMITED	0.00%	0.00%	IN	Independent		100	0	100	13,326			0.70	Not Exceed	3,800	
INTER RAO UES PUBLIC JOINT STOCK CO	0.00%	0.00%	RU	Electric		15	84	57	5,401			-1.03	Not Exceed	2,318	
PGE POLSKA GRUPA ENERGETYCZNA SA	0.00%	0.00%	PL	Electric	CA100+	92	5	94	9,019	1	0.78	0.32	Not Exceed	5,260	
ENERGA SA	0.00%	0.00%	PL	Electric		63	0	63	1,029			0.50	Not Exceed	500	
YTL CORP	0.00%	0.00%	MY	Multi		4	96	52	3,084			0.58	Not Exceed	1,056	
NLC INDIA LTD	0.00%	0.00%	IN	Independent					0			0.63	Uncertain	6,700	
BANPU POWER PUBLIC CO LTD	0.00%	0.00%	TH	Independent					0			0.08	Uncertain	396	
PUBLIC POWER CORP	0.00%	0.00%	GR	Electric		50	38	69	4,463			0.93	Not Exceed	885	
TPI POLENE POWER PCL	0.00%	0.00%	TH	Independent					0			-0.01	Uncertain	150	
KOREA ELECTRIC POWER CORP	0.00%	0.01%	KR	Electric	CA100+	43	28	57	5,778	3		0.69	Not Exceed	7,698	
SHENERGY COMPANY LIMITED	0.00%	0.00%	CN	Independent		64	23	75	2,538			0.25	Not Exceed	1,350	
UNIPER SE	0.00%	0.01%	DE	Independent		28	53	55	669	4	0.52	0.14	Not Exceed	1,100	
EVN AG	0.00%	0.00%	AT	Electric		35	23	46	1,182			0.19	Uncertain	4,720	
GULF ENERGY DEVELOPMENT LTD		0.00%	TH	Independent		0	100	50	81			0.15	Uncertain	210	
SHIKOKU ELECTRIC POWER CO INC		0.00%	JP	Electric		40	17	48	2,032			0.75	Not Exceed	500	