SFERS
San Francisco Employees' Retirement System

City and County of San Francisco
Employees' Retirement System

To: Retirement Board

Through: Jay Huish
Executive Director

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

Kurt Braitberg, CFA, CAIA
Managing Director, Public Markets

From: Andrew Collins
Director of ESG Investing

Adrienne von Schulthess
Security Analyst, ESG Investing

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Agenda Item:

Update on Strategies to Address Climate Risk in the SFERS Portfolio – Climate Action Plan

Executive Summary

Since 2015 SFERS has made significant progress in integrating consideration of the risks and opportunities from climate change into its investment process, culminating in the March 2020 ambition to become a net zero asset owner by 2050.

Cumulatively, SFERS has invested over $1 billion of its public equity portfolio in fossil fuel free and low-carbon passive strategies as well as a low carbon active mandate. At the same time SFERS has divested from thermal coal companies and select oil and gas companies across its public equity and fixed income portfolios. In other asset classes such as private credit, private equity, and real assets, SFERS has opportunistically gained exposure to climate opportunities.

SFERS climate strategy is guided by a Climate Action Plan that outlines the steps to achieve the ambition for SFERS' portfolio to have net-zero greenhouse gas emissions by 2050. The Climate Action Plan cuts across each of the three pillars of the SFERS ESG Platform. Those three pillars and the key climate-related activities under each include:

1. Active Ownership
    - Engagement – Engaging with companies in SFERS' underlying portfolio to encourage them to incorporate considerations of climate risk into their strategy, governance, and operational management.
    - Proxy Voting – Supporting relevant shareholder proposals related to climate and carbon risk management, disclosure, governance, goal setting, and strategy.

2. ESG Investment Management
    - Investment & Divestment – Investing in strategies that are aligned with the transition to a low-carbon economy and divesting from companies and/or industries that have high, unmitigated investment risk due to climate change.
    - Manager Due Diligence & Monitoring – Engaging existing and potential external managers across asset classes to understand their process for incorporating consideration of climate risk (among other ESG factors) into their investment process.
    - Metrics & Target Setting – Utilizing metrics, analytics, and targets to measure risk and opportunity with respect to climate change and progress toward net zero.
    - Analytics & Modeling – Using SFERS' Climate Transition Risk Frameworks and a variety of third-party carbon and climate risk data.

3. ESG Collaboration & Communication
    - Policy Advocacy – Advocating for policy efforts at that promote a sustainable financial system that is focused on a just and orderly transition to a low-carbon and resilient economy.
    - Net Zero Investor Dialogue – Collaborating with others in the financial services ecosystem that also have set ambitions to be net zero investors.

During 2019-2020 Staff made progress in each of the abovementioned areas and has set priority areas of focus for 2020-2021 including:

- Researching and outlining additional climate transition risk frameworks for carbon intensive sectors and establishing sectoral decarbonization expectations;
- Building on progress made in 2020 engaging with its public equity and fixed income managers around how they incorporate climate risks into their investment processes;
- Continuing to engage with oil & gas, utility, and other companies (as relevant) around climate risk management, often through collaborations like the Climate Action 100+ initiative and Ceres Carbon Asset Risk Working Group;
- Identifying and evaluating data and analytical tools that may provide deeper insight into climate risk exposure for the Plan, such as Science Based Targets initiative (SBTi) Finance Tool for Temperature Scoring & Portfolio Coverage and the newly launched Climate Action 100+ Net Zero Company Benchmark; and
- Establishing a suitable interim target (or targets) for 2030 based on a trajectory towards net zero emissions by 2050.

While the Climate Action Plan seeks to address the range of climate risks (transition, regulatory, and physical) across all sectors and asset classes, SFERS continues to pay close attention to risks associated with the fossil fuel sector.

The last year saw significant upheaval in oil and gas markets due to mounting oversupply and significant demand destruction resulting from the global coronavirus pandemic. Oil futures went negative in April before a partial rebound through the second half of 2020. For the one-year period through September 30, 2020, the MSCI AWCI Energy Sector returned -38.36% and the MSCI ACWI Oil, Gas, & Consumable Fuels Industry returned -37.92% versus a positive 10.11% return for the broader MSCI ACWI IMI.

There is uncertainty around the future of fossil fuel demand due to a variety of factors. These factors include what path global climate regulation takes in achieving the objectives of the 2015 Paris Agreement, the rate with which the power sector replaces coal (and gas) with cost-favorable renewables, how oil demand growth plays out in non-OECD countries, and the pace of adoption of electric transportation technologies.

Globally, most public pension peers continue to invest in the oil & gas sector for a variety of fiduciarily motivated reasons. At the same time, many recognize the risks to the sector around the climate transition and directly engage with public oil & gas companies to address it. Agreements from numerous companies including Shell, BP, Eni, Equinor, Total, and Repsol to achieve net zero emissions by 2050 highlight the ability of climate-aware institutional investors to influence corporate climate strategy and the importance of maintaining "a seat at the table".

As of June 30, 2020, SFERS had less than half the amount invested in publicly traded oil & gas companies than it did a year prior. At approximately $108 million, SFERS has less than half a percent of plan assets invested in public oil & gas companies. Despite this small absolute exposure, SFERS continues to implement the Board's directive of "prudently phased divestment" using the Climate Transition Risk Framework.

In 2020, the overall "riskiness" of oil & gas companies according to the Framework remained similar to 2019, with the important caveat that the overall universe shrank by 25% (i.e., due to bankruptcies, delistings, etc.). Applying the Framework in 2020, Staff identified one additional company it recommends adding to the list of ten currently restricted oil & gas companies. Staff does not recommend removing any companies from the list at the present time. As of June 30, 2020 SFERS, had $466,934 of direct ("divestible") exposure to the newly identified company.

In addition, based on the results of the Framework, Staff has identified 24 companies to place on a "Watch List" due to elevated climate transition risk. Staff intends to engage with these companies as part of the 2020-2021 Climate Action Plan priorities discussed above, focusing on 11 companies where SFERS has more meaningful equity, long exposure. Most of the companies on the "Watch List" and those prioritized for engagement are consistent with those identified in 2019.

Overall, SFERS has made meaningful progress in addressing climate-related investment risks. Staff believes the priorities for the coming year will further achieve SFERS' objectives to understand and manage climate risk, identify climate-related opportunities, and make progress towards a net zero 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.

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[1];
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 and made initial progress on Strategies 3, 4, and 5.

At the October 10, 2018 Board Meeting, the Board accepted Staff's recommendations on Strategy 6, approving a Climate Transition Risk Framework ("the Framework") to guide shareholder engagement activities as well as investment restrictions in oil & gas companies. This resulted in the divestment of seven (7) oil & gas companies that displayed the highest climate transition risk according the Framework. SFERS began engagement activities with other oil & gas companies that display climate transition risk.

At the October 9, 2019 Board Meeting, Staff presented recommendations based on the first annual review of oil & gas company exposures against the Framework. The Board accepted Staff recommendations to restrict investment in 10 oil & gas companies and to engage on around climate transition strategies with another set of companies. In addition, Staff introduced a framework to assess climate transition risk within the Electric Utilities sector, which resulted in the prioritization of certain utility companies for shareholder engagement.

[1] At the October 9, 2019 meeting, the Board approved the modification of Strategy 1 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.

At the March 11, 2020 Board Meeting, the Board adopted the ambition to be a net zero carbon asset owner by 2050 in line with the objectives of the 2015 Paris Agreement. This ambition expands climate risk analysis across all asset classes comprising the SFERS Plan as well as expands analysis across all sectors facing climate risk (beyond Oil & Gas and Utilities).

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, referred to as SFERS' Climate Action Plan.

Introduction to the SFERS Climate Action Plan

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 1.5ºC and 2ºC. In October 2018, the IPCC released a special report "Global Warming of 1.5ºC" showing that even the difference between 2ºC and 1.5ºC of warming is significant.

The report forecasts that 0.5ºC of additional warming beyond 1.5ºC 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 4ºC of warming by the end of the century, which would result in catastrophic impacts[2]. Global emissions were roughly 52 $GtCO_2$-e in 2016 and are projected to be 52-58 $GtCO_2$-e by 2030. Annual emissions need to be about half that (25-30 $GtCO_2$-e/year on average) by 2030 to limit warming to 1.5˚C (with low chance of overshoot).

Climate change poses significant risk as well as creates opportunities for long-term investors like SFERS due to:

- The technological transition from a fossil-fuel based economy to a low-carbon economy;
- The increasingly inevitable regulatory, political, and legal liability responses to climate change; and
- The physical impacts of climate change.

These shifts pose specific/idiosyncratic risks to certain companies, industries, and commodities and are understood by academics, global investors, financial regulators, and others to pose systematic/market risk. Further, macroprudential regulators and others also identify the possibility that climate risk may be a systemic risk.

SFERS has taken a variety of steps to manage climate transition risks in its portfolio, including addressing risks to the Oil & Gas and Utilities sectors in its public markets portfolio, allocating to carbon-constrained and low-carbon technology opportunities, engaging directly with companies that display high climate risk, restricting investment in certain industries and companies with unmitigated climate transition risk, and advocating for sustainable public policy efforts.

Due to the breadth of potential ways climate risk can manifest (transition, regulatory, and physical) and climate change's ability to have impacts across geographic regions, sectors, and asset classes, SFERS believes it appropriate to adopt a Plan-wide approach for consideration of climate risk.

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[2] https://climateactiontracker.org/global/temperatures/

The 2015 Paris Agreement puts forth a downwards emissions trajectory, reaching net zero global greenhouse gas emissions in 2050, as the appropriate target to avoid catastrophic effects of climate change. As the 189 countries that have ratified the Paris Agreement enact policies to meet this target, a variety of other entities (corporations, states, municipalities) are putting in place ambitions to reduce their carbon emissions along the same trajectory and timeline.

SFERS believes it is prudent, therefore, and consistent with fiduciary duty to acknowledge and evaluate the risks arising from global progress towards the goals outlined in the Paris agreement.

All else equal, SFERS believes that investors that are able to successfully navigate the risks and opportunities arising from climate policy, the energy transition, and physical climate risks are likely to increase returns and reduce risk.

SFERS, therefore, has adopted the plan-wide ambition that the SFERS Trust has net-zero greenhouse gas emissions by 2050.

SFERS efforts to manage climate risk – its Climate Action Plan – cut across each of the three pillars of the SFERS ESG Platform. These pillars comprise:

1. **Active Ownership**
    - Engagement – 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.
    - Proxy Voting – According to SFERS Proxy Voting Guidelines, SFERS supports relevant shareholder proposals related to climate and carbon risk management, disclosure, governance, goal setting, and strategy. SFERS can and will take voting action against individual Directors or full Boards that are not appropriately managing material climate risks. SFERS will file shareholder proposals where appropriate.

2. **ESG Investment Management**
    - Investment – 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.
    - Divestment – 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.
    - Manager Due Diligence & Monitoring – SFERS engages with existing and potential external managers across asset classes to understand their process for incorporating consideration of climate risk (among other ESG factors) into their investment process.
    - Metrics & Target Setting – Ultimately it is SFERS' ambition that by 2050 the full greenhouse gas footprint of its investment portfolio be net zero greenhouse gas emissions. In the interim, SFERS utilizes other metrics, analytics, and targets to measure risk and opportunity with respect to climate change.
    - Analytics & Modeling – Informing activities in each aspect of SFERS Climate Action Plan are SFERS' use of data and analytics, including the SFERS Climate Transition Risk

Frameworks 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 is considering developing similar frameworks for other high priority sectors.

3. **ESG Collaboration & Communication**
    - Policy Advocacy – 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.
    - Net Zero Investor Dialogue – SFERS collaborates with others in the financial services ecosystem including asset owners, asset managers, service providers, and NGOs that also have set ambitions to be net zero investors and/or invest in alignment with the goal of the Paris Agreement.

2019-2020 Progress

Active Ownership

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 risk 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 include:

- Participation in the Ceres Carbon Asset Risk (CAR) Working Group and the Climate Action 100+ Initiative. SFERS joined, led, or supported over 20 collaborative engagements with oil & gas and utilities companies as part of these initiatives.

- SFERS sent letters to all companies on the SFERS Priority 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 led or supported productive engagement with seven (7) of the companies. Staff did not receive responses from five (5) of the companies and is considering escalation such as shareholder resolutions or votes against directors.

- 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 September 30, 2020, SFERS voted in support of several climate-related shareholder proposals including those at JP Morgan Chase, United Parcel Service, Dollar Tree, TransDigm, JB Hunt Transport Services, Phillips 66, Ovintiv (formerly EnCana), Barclays, Exxon, and Chevron.

- Staff notes that fewer climate shareholder resolutions came to vote in 2020 as compared to the prior years, again due in large part to withdrawals by proponents after management of companies agreed to address the issues raised.

- SFERS again voted against three Exxon directors, including CEO Darren Woods for failure to adequately address environmental and social risks, including climate change (all directors were re-elected by shareholders). In addition, SFERS supported a proposal to appoint an independent board chair and a proposal to provide a reporting on lobbying activities (including climate lobbying).

ESG Investment Management

Investment

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. Since inception through June 30, 2020 the strategy returned 7.7% outperforming its benchmark by 31 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. Since inception, through June 30, 2020 the strategy returned 10.00% outperforming its benchmark by 575 bps.

SFERS has over $150 million invested in a passive strategy that tracks the MSCI USA Large Cap ex Fossil Fuels index. Since inception through June 30, 2020 the strategy returned 14.45% outperforming its benchmark by 104 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 $78 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 6/30/20, SFERS has at least $1.4 billion invested and committed to low-carbon and renewables-related strategies, or approximately 5.4% of total plan assets.

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

Divestment

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

At the October 9, 2019 board meeting the Board approved Staff's recommendation to divest its current positions and restrict future investment in ten (10) 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 majority revenue from the mining of thermal coal or those that receive between 10-50% of revenue and have not announced plans to exit the business segment. Annually Staff updates the set of companies subject to this investment restriction (most recently at the October 9, 2019 Board meeting).

ESG Collaboration & Communication

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 is 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 is 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.

SFERS is 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 Climate Action Plan 2020-2021 Priorities

1. Private Markets Data Transparency – Staff will work to be build capabilities to obtain actual greenhouse gas emissions data associated with its private markets portfolio.

2. Industry Frameworks – Staff will continue to implement its Oil & Gas and Utilities Climate Transition Risk Frameworks and begin to build out similar frameworks for other carbon intensive sectors (i.e., Materials and Industrials), establishing sectoral decarbonization expectations.
3. Manager Engagement – Through 2020, Staff has made significant progress in engaging with its public equity and fixed income managers around how they incorporate climate risks into their investment processes. Staff will continue this engagement and consider engagement with relevant managers in other asset classes.
4. Engagement – Staff will continue to engage with oil & gas, utility, and other companies (as relevant) around their strategy, governance, target setting, and disclosure of climate risk management. Staff will continue to be active in the Climate Action 100+ initiative, Ceres Carbon Asset Risk Working Group, and engage individually with (as warranted).
5. Analytics – Staff will continue to identify and evaluate data and analytical tools that may provide deeper insight into climate risk exposure for the Plan, such as Science Based Targets initiative (SBTi) Finance Tool for Temperature Scoring & Portfolio Coverage and the newly launched Climate Action 100+ Net Zero Company Benchmark.
6. Interim Target Setting – Based on sector exposures and reasonable assumptions, the equity portion of the SFERS' plan (including private equity, public equity, and real assets) has a significantly lower carbon footprint compared to the MSCI ACWI IMI. This likely puts SFERS on a favorable trajectory to net zero by 2050. Staff will establish a suitable interim target (or targets) for 2030 based on a trajectory towards net zero emissions by 2050.

Update on Oil & Gas Markets

2019-2020 Developments

The last year saw significant upheaval in oil and gas markets, with headline grabbing declines in April as American oil futures went negative paired with a suite of bankruptcies in the oil and gas sector. For the one-year period through September 30, 2020, the MSCI AWCI Energy Sector returned -38.36% and the MSCI ACWI Oil, Gas, & Consumable Fuels Industry returned -37.92% versus a positive 10.11% return for the broader ACWI IMI. Returns over 3, 5, 10, and 15-year periods have all been negative:

Table 1. Annualized Returns for MSCI ACWI IMI and Select Components, through 9/30/20

Index/Component	1 year	3 year	5 year	10 year	15 year
MSCI ACWI IMI	**10.11%**	7.02%	10.55%	9.04%	7.07%
MSCI ACWI Energy	**-38.36%**	-14.79%	-4.44%	-3.14%	-1.20%
MSCI ACWI Oil, Gas, & Consumable Fuels	**-37.92%**	-13.64%	-3.28%	-2.45%	-0.73%

Crude oil futures prices spent October 2019 - February 2020 between $50 - $70 / barrel (WTI). However, with the onset of COVID-19 and slowing economic activities, crude oil futures prices faced a shock in April 2020 going negative, after falling in March to $20 / barrel (WTI). While the market quickly rebounded, prices hovered at $30 - $50 / barrel between June - August 2020.[3]

With the oil price collapse in early 2020, US shale plays fell sharply. SPDR S&P Oil & Gas Exploration & Production ETF hit all-time lows in 2020 dropping to below $44 compared with highs above $325 in mid-2014 and prices above $75 in early 2020. Haynes and Boone, a US law firm representing oil and gas clients in bankruptcy court, has counted 500 bankruptcies in oil and gas companies since 2015 with 60 in 2020 (through August). Two large Chapter 11 filings in July, California Resources Corporation and Denbury Resources, held a combined $7.7 billion in debt, with Chesapeake Energy (shale gas) filing Chapter 11 in June with $9.17 billion in debt.[4] The firm expects these numbers to rise as many companies in the US shale industry rely on business models based on oil prices at $140 a barrel and are facing debt maturities in the billions due in the next 2-3 years.[5] Most bankruptcies to date have been pure-play exploration & production companies, but the firm expects stress amongst midstream companies later in 2020.

Continued disruptions due to COVID-19 along with changing patterns of economic activity led the Wall Street Journal to remark that there is "an unusual degree of uncertainty into estimates for how much the world will consume in the remainder of 2020." The International Energy Agency (IEA)'s Director of Energy Markets and Security notes that "uncertainty has prompted companies to slash their investments in oil-and-gas projects, potentially paving the way for higher prices down the line." Furthermore, looking past 2020, prices are unclear due to "the transition away from fossil fuels and the pandemic-triggered economic downturn."[6]

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[3] https://www.eia.gov/outlooks/steo/marketreview/crude.php

[4] https://www.reuters.com/article/us-north-america-oil/u-s-energy-bankruptcy-surge-continues-on-credit-oil-price-squeeze-idUSKCN25727W

[5] https://wtop.com/arts/2020/08/insider-qa-more-oil-and-gas-bankruptcies-coming/

[6] https://www.wsj.com/articles/oil-market-flies-blind-as-covid-19-clouds-demand-outlook-11600767600

Over the long-term there is consensus that primary energy demand will continue to rise but questions remain around how that demand will be met. The U.S. Energy Information Administration (EIA) projects in its International Energy Outlook 2019 that world energy consumption will grow by nearly 50% between 2018 and 2050 with demand being driven by non-OECD countries. In this scenario, petroleum liquids see slowing but rising demand through 2050 at 20% above 2019 levels. As global electricity demand drives overall energy demand, the EIA projects renewables will make up 28% share (up from 15%) with petroleum liquids at 27% (down from 32%) and natural gas staying essentially flat at 22%.

Some analysts, however, see liquids (i.e., oil) demand as either already at its peak or hitting its peak within the next decade. Notably, in two of the three scenarios described in its Energy Outlook 2020, BP finds that the oil market peak was in 2019, and projects a 10% decrease in demand over the next decade and a 50% decrease by 2040.[7] In the face of shrinking demand, researchers expect prices to trend downwards and experience increased volatility, following the pattern of coal. This future, with increased competition among countries to avoid stranded assets, threatens to weaken OPEC+'s influence which has already waned in the face of US shale production.[8]

Further complicating the picture, China, representing 28% of global emissions, recently committed to carbon neutrality by 2060. With this commitment, China joins dozens of countries committing to net zero or carbon neutral targets while also providing a long term signal to oil and gas exporters to expect slowing demand from one of their biggest markets.[9] Details on China's commitment will be published as part of China's 14th Five-Year plan.

Meanwhile, some European majors have made commitments to achieving net zero carbon emissions by 2050 including Shell, BP, Eni, Equinor, Total, and Repsol. In contrast US-based majors like ExxonMobil and Chevron and State-owned oil companies, including Saudi Aramco and Petrobras, have not made such commitments and remain focused on being least-cost providers of hydrocarbons.[10]

The outcome of the US presidential election creates significant uncertainly around the future of energy and climate policy in the US, the second largest consumer of energy after China. The two candidates have starkly differing views of climate change, which lead to two opposite approaches. On one hand, President Donald Trump pledges to continue deregulating the oil & gas sector, expand on- and offshore drilling, and loosen vehicle fuel economy standards. Opponent Joe Biden's climate plan would move the US towards net zero emissions by 2050, focusing on decarbonization of the power sector by 2035. The multi-trillion-dollar plan would focus on investments and subsidies to hasten electric vehicle adoption, modernize the electricity grid, support climate-resilient infrastructure, and support research into energy storage and carbon capture technologies. However, even in the scenario Biden wins the election in November 2020, gaining congressional support for all components of his agenda is not guaranteed.

Near and Mid Term Outlook

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[7] https://www.weforum.org/agenda/2020/09/oil-bp-report-climate-change-environment-renewable-plastic
[8] https://www.wsj.com/articles/peak-oil-is-already-shifting-markets-11600863067
[9] https://www.ft.com/content/93a15a83-08e8-4293-a12d-e4235edec7ea
[10] https://www.ft.com/content/7571fadc-5889-11ea-abe5-8e03987b7b20

On the supply side, US crude oil production is expected to decrease from an average of 12.2 million b/d in 2019 to 11.4 million b/d in 2020 and 11.1 million b/d in 2021.[11] In April, OPEC along with 10 non-OPEC partner countries (OPEC+) agreed to reduce crude oil output by an initial 9.7 million barrels per day (mb/d). Compared with January 2020, this agreement resulted in partner countries' petroleum liquids output falling by an estimated 5.9 mb/d in May, 7.9 mb/d in June, 7.1 mb/d in July, and 5.6 mb/d in August. Iran, Libya, and Venezuela were exempt from the agreement due to economic sanctions/domestic political instability.[12] These cuts are the largest in history and were relaxed to 7.7 mb/d in August, and will change to 5.8 mb/d starting in 2021.[13] In September, OPEC's Monthly Oil Market Report further revised down demand for OPEC crude in 2020 to 22.6 mb/d, a decrease of 0.7 mb/d from the previous month. This decrease puts demand at 6.7 mb/d lower than 2019 demand.[14]

Longer term, the outlook for WTI crude oil prices shows weakness with the December 2020 futures contract at $42.75 / barrel (compared to December 2019 contract at $52 / barrel) on September 23, 2020, and the curve recovering to $52 / barrel by 2030.[15]

Globally, the EIA forecasts that consumption of petroleum and liquid fuels will average 93.1 million b/d for 2020 (-8.3 million b/d yoy). A partial recovery in demand is expected with an increase of 6.5 million b/d in 2021. While inventories are decreasing from their peak in H1 2020, they remain high and are paired with continued surplus production capacity. Together these factors are expected to limit upward pressure on prices. [16]

Energy was the worst performing sector in the S&P500 in 2018, 2019, and 2020 (through August)[17]. Energy stocks have faced challenges due to weakness in oil prices along with rising costs.[18] The S&P lowered energy to a 2.5% weighting (versus 12% in 2011) and the Dow Jones Industrial Average removed ExxonMobil from their index in 2020. As the Wall Street Journal reported, energy stocks are closely tied to oil prices and face increased competition from renewable energy. The August Bank of America's Global Fund Manager Survey found that the energy sector was the sector with the highest number of managers reporting being underweight.

Looking forward, there is room for some optimism according to a June 22, Goldman Sachs Equity Research note which sees "healthy upside" in the near and medium term across all energy sectors. Goldman analysts believe that demand has likely troughed and will increase with positive vaccine news and reopening progress. This, accompanied by effective production discipline from OPEC+ and shale producers, could result in upward price movement. With valuations sitting at near 25-year lows on an EV/gross cash invested basis, the firm sees opportunities within the sector even if it does not see a return to 2019 demand levels until 2022.[19]

In general, consensus is that investors want to see continued focus on capital discipline, debt reduction, and positive free cash flows from companies. Over the last few years, the oil & gas industry has focused

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[11] https://www.eia.gov/outlooks/steo/report/us_oil.php
[12] https://www.eia.gov/todayinenergy/detail.php?id=45236
[13] https://www.spglobal.com/platts/en/market-insights/latest-news/oil/091420-opec-cuts-global-demand-forecasts-as-supply-recovers-in-us-canada
[14] https://www.opec.org/opec_web/en/publications/338.htm
[15] https://www.cmegroup.com/trading/energy/crude-oil/light-sweet-crude.html
[16] https://www.eia.gov/outlooks/steo/report/global_oil.php
[17] https://www.wsj.com/articles/exxons-departure-from-dow-highlights-markets-retreat-from-energy-bets-11598390465
[18] https://www.wsj.com/articles/energy-stocks-are-black-eye-on-the-s-p-500-again-11580468400
[19] Healthy Energy upside into next leg of oil price recovery, but watchful of valuation; Utilities risk/reward favorable, Goldman Sachs Equity Research, June 22, 2020.

transforming from a focus on production growth to re-centering on "best assets" and emphasizing operational efficiency. More of the same is expected in the future.

Long Term Outlook – Opportunities and Threats

Over the long term, the growth of the oil markets appears to be quite uncertain. On the one hand, global demand for energy is sure to continue rising. The degree to which oil and gas will meet that demand, however, is cloudy. Demand for oil and gas will be influenced by a variety of variables including political and regulatory developments, growth in the supply of renewables to meet future energy demand, the pace of adoption of electric vehicles, and new technological breakthroughs.

The IEA projects a relatively positive long-term picture for oil and gas markets. Demand for petrochemicals (a category including plastics) is expected to increase with naphtha, liquefied petroleum gas (LPG) and ethane responsible for half of expected demand growth through 2025.[20] Furthermore, as Africa urbanizes, increasing demand due to the automotive and food preparation sectors are seen factors in global oil and gas markets.[21] Wood Mackenzie also developed projections with Asia Pacific's oil demand rising by as much as 25% by 2040 (compared to 2019 demand) due mainly to growth in petrochemicals.[22]

Others, like the Carbon Tracker Initiative disagree with the IEA's projections, finding that "mounting pressure to curtail the use of plastics – now a worldwide public concern – could slash virgin plastic demand growth from 4% a year to under 1%, with demand peaking in 2027."[23]

Over the mid to long term, declines in oil demand due to the electrification of road transportation may have significant implications for the sector.

According to BP, road-based transport contributes to 44% of final oil demand (including natural gas liquids) and has contributed to the vast majority of oil demand growth from 2005 to 2020.[24] Given oil is a more valuable commodity than gas, oil-based transportation is crucial for most producers.

Global Electric Vehicle (EV) sales increased to 2.1 million in 2019, accounting for 2.6% of global car sales. The network of publicly accessible chargers increased by 60% in 2019 yoy.[25] This growth comes in the face of a contraction in the global car market and a reduction in subsidies (e.g. US federal tax program ran out for automakers including General Motors and Tesla). Another key statistic for the EV market includes an 85% decrease in battery costs since 2010, a fundamental element to EV price competitiveness.

In 2019, carmakers introduced 143 new electric vehicles (38 of which are hybrid electric vehicles) and have plans to introduce around 450 new models by 2022. New and upcoming regulations in China and Europe are a key factor in launches, with carmakers facing penalties of "up to several billion euros unless they increase their EV penetration rates significantly."[26] Company climate commitments are also increasingly driving purchases of

[20] https://www.iea.org/reports/oil-2020
[21] https://www.iea.org/reports/africa-energy-outlook-2019
[22] https://www.woodmac.com/press-releases/asia-pacifics-oil-demand-to-fall-in-2020-but-could-rise-25-by-2040/
[23] https://carbontracker.org/oil-industry-betting-future-on-shaky-plastics-as-world-battles-waste/
[24] https://www.bp.com/en/global/corporate/energy-economics/energy-outlook.html
[25] https://www.iea.org/reports/global-ev-outlook-2020
[26] https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/mckinsey-electric-vehicle-index-europe-cushions-a-global-plunge-in-ev-sales#

electric fleets with Amazon ordering 1,800 delivery vehicles from Mercedez-Benz along with 100,000 vans from Rivian Automotive.[27] In September, California's governor signed an executive order to phase out sales of all gas powered vehicles by 2035, representing the most ambitious EV policy in the US.[28]

The industry has faced some headwinds with slowing growth rates. As with other sectors EV sales saw a slowdown in early 2020, compounded by slowdowns in 2019 where global light vehicle EV sales grew by 9% yoy compared to 65% from 2017-2018.[29]

In the medium term, Bloomberg NEF forecasts that EVs hit 10% of global passenger vehicle sales by 2025, rising to 28% in 2030 and 58% in 2040.[30]

The Carbon Tracker Initiative analyzes how this growth in EVs over the next two decades will displace oil demand. Using Statoil's Reform scenario projections for growth in EVs along with conservative assumptions for increases in mileage and efficiency, EV's will be displacing 3.3 mb/d by 2030. This level of displacement is material for the market as an imbalance of only 2 mb/d caused dramatic price declines in 2014.[31]

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[27] https://www.reuters.com/article/us-amazon-com-daimler-electric-vehicles-idUSKBN25O0TC

[28] https://www.npr.org/2020/09/23/916209659/california-governor-signs-order-banning-sales-of-new-gasoline-cars-by-2035

[29] https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/mckinsey-electric-vehicle-index-europe-cushions-a-global-plunge-in-ev-sales#

[30] https://about.bnef.com/electric-vehicle-outlook/

[31] https://carbontracker.org/electric-vehicles-displacement-chart/

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 2020), and indications are this is likely to occur around the world. Further observations about global thermal coal markets are detailed in a separate memo.

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.

Despite a positive outlook at the beginning of 2020 due to the completion of long-lead time projects along with lowering of cost structures and improving free cash flows, IHS Markit estimates Canadian oil sands production at 175,000 b/d lower in 2020 compared to 2019. While output is expected to recover in 2021, the decline in investment since 2014 in upstream oil sands has led to a reduction in the number of projects under development. No new projects are currently under construction. This trend is expected to continue in the face of low prices. IHS Markit expects Canadian oil sands output to be at 3.8 mb/d in 2030 due to regional price insecurity hampering investments along with a lack of clarity around pipeline export capacity.[32]

The Carbon Tracker Initiative's analysis of Paris compliance in the oil and gas sector finds that no new development of oil sands projects is possible in a 2 degree world in the next 20 years.[33] Even in a scenario with 2.7 degrees warming, which is not Paris aligned, very few new oil sands projects are needed. Carbon Tracker's conclusion is based on the high production costs and relatively high carbon intensity in oil sands, which is a risk factor with the spread of carbon pricing.

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[32] https://ihsmarkit.com/research-analysis/longer-term-outlook-for-canadian-oil-sands.html

[33] Based on two scenarios: Beyond 2 Degrees Scenario (B2DS) which is consistent with a 50% chance of 1.6 degree Celsius warming, and Sustainable Development Scenario (SDS) which is comparable to 1.7-1.8 degrees Celsius through 2040.

In recent years, pipeline and rail capacity issues have been a concern for oil sand operations and caused significant discounts versus other benchmarks such as (WTI).

Pipelines for oil sands continue to face delays and barriers. Keystone XL, proposed in 2008, rejected by President Obama in 2015, revived in 2017 by President Trump, paused again in 2018 due to permitting, saw construction resuming in April 2020 to the backdrop of a ruling in Montana that blocked construction in hundreds of locations where the pipeline would cross water or wetlands. The US Supreme Court upheld the decision requiring individual permits for any water crossing. As a result, the pipeline developer noted, "Following yesterday's Supreme Court ruling, we are reviewing our U.S. 2020 construction schedule."[34]

Meanwhile, in August 2020 the Minnesota Department of Commerce challenged the approval of another major project, the Line 3 oil replacement project, at the Minnesota Court of Appeals. The department is arguing that Enbridge Energy failed to prove that there is adequate demand for the oil.[35]

However, another major pipeline expansion, Tans Mountain, is on schedule for completion by the end of 2022, despite continued protests from indigenous groups and environmentalists.[36] While, another reprieve for the oil sands industry over the last year has been the sharp decline of heavy oil production from Venezuela,[37] Iran is now working with Venezuela to reverse this trend by supplying dilutants along with technical expertise.[38] These heavy grades are substitutes and are in demand from refineries that have existing capacity to produce high value transport fuels.

In terms of emissions intensity, reporting by IHS Markit finds continued decreases for the Canadian oil sands. The carbon intensity of these oil sands varied considerably by operation with the most intensive operations four times as carbon intensive as the least intensive operations. The report finds that "the average life-cycle intensity of the Canadian oil sands in 2018 to range from 1.6% below the US average[39] to 19% above—the greatest variation to date."[40] The report also tracks a continued trend of decreasing emissions intensity in oil sands with the overall weighted average of the upstream GHG intensity of Canadian oil sands falling 20% between 2009 and 2018. In contrast a 2019 article in Nature found that estimates of oil and gas emissions rely upon bottom-up approaches, and when the study deployed atmospheric measurements over the Canadian oil sands, results indicated that CO2 emission intensities for oil sands facilities are 13–123% larger than those estimated using publicly available data.[41] Furthermore, 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.

In situ production potentially could be increasingly more efficient and less impactful than mining. Additionally, Staff's analysis of Suncor's financials reveals challenges in the face of the pandemic, resulting in an operating loss of $1.489 billion in Q2 2020, however the company was on track to achieve the $1 billion operating cost

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[34] https://www.nationalgeographic.com/science/2020/07/keystone-xl-stalls-again-along-with-other-pipelines/
[35] https://www.mprnews.org/story/2020/08/20/another-line-3-appeal-4-things-to-know
[36] https://globalnews.ca/news/7336917/trans-mountain-pipeline-expansion-on-budget/
[37] https://www.forbes.com/sites/arielcohen/2019/06/25/will-canadas-oil-industry-get-a-pipeline-lifeline/#70bf3ca748ee
[38] https://oilprice.com/Latest-Energy-News/World-News/Iran-And-Venezuela-Defy-US-Sanctions-In-Bilateral-Oil-Trade.html
[39] US Average refers to the emissions intensity of crude oil refined and processed in the US
[40] https://ihsmarkit.com/products/energy-industry-oil-sands-dialogue.html?ocid=cera-osd:energy:print:0001
[41] https://www.nature.com/articles/s41467-019-09714-9

reduction target and $1.9 billion capital cost reduction target by the end of 2020. The company has taken multiple write downs in 2020 due to low oil prices, with an impairment in February of $2.11 billion on its oil sands site, Fort Hills.[42] The company has also been actively investing in expanding their product mix to less carbon intensive industries including sustainable aviation jet fuel along with investments to eliminate coal fired power at oil sands operations.[43]

Oil and Gas majors are also writing down oil sands assets in the face of continued low oil prices. Total in July wrote down the value of its oil and gas assets by $8.1 billion due to lowering oil price expectations. The majority ($7 billion) of the write down applies to the company's Canadian oil sands assets. Total also said it will not approve any new projects to increase production in their Canadian assets.[44] Meanwhile, BP in June took a $17.5 billion write down which included Canadian oil sands assets.[45] Oil sands also face a movement among financial institutions limiting funding for oil sands projects, with Deutsche Bank ending financing for oil sands in July.[46] However, as the majors exit oil sands operations, specialized Canadian companies are filling the gap and buying up the oil sands assets.[47]

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[42] https://www.reuters.com/article/us-suncor-results-oil/low-oil-prices-for-foreseeable-future-led-to-suncor-writedown-ceo-idUSKBN2002GU

[43] The company had an operating loss of $1.489 billion ($0.98 per common share) in the second quarter of 2020.

[44] https://www.wsj.com/articles/total-takes-8-billion-write-down-as-coronavirus-undercuts-oil-price-forecast-11596051239

[45] https://www.reuters.com/article/us-bp-strandedassets-analysis-idUSKBN23V1ZY

[46] https://oilprice.com/Latest-Energy-News/World-News/Deutsche-Bank-Immediately-Ends-Funding-For-Oil-Sands-And-Arctic-Oil-Projects.html

[47] https://www.cbc.ca/news/canada/calgary/total-fort-hills-richard-masson-kevin-birn-shell-exxon-1.5671376

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

New York State Common Retirement Fund has over $215 billion in assets as of June 2020.[48] In July 2020, the Common Retirement Fund announced that it had divested from 22 thermal coal companies. This divestment is part of the fund's Climate Action Plan, which was released in 2019.[49]

Following the focus on thermal coal companies, the fund is evaluating transition risk the oil sands sector and will follow that work with an analysis of other high-risk sectors including energy, utilities and transportation.[50]

The Common Retirement Fund hired its first director of Sustainable Investments and Climate Solutions in January 2020. The director is tasked with implementing the Climate Action Plan. The core of the Climate Action Plan is identification and assessment, investment, along with engagement and advocacy, but there is also the option for divestment if this is judged to be in the fiduciary interest of the plan.[51] This work includes divesting from companies that do not meet minimum carbon-emissions standards and doubling the fund's allocation under its Sustainable Investment-Climate Solutions Program over the next decade to $20 billion.[52]

As of February 2020, $8.5 billion was allocated including recent investments of $300 million to Avenue Capital Sustainable Solutions Fund, $250 million to Calvert Core Bond Strategy (green bonds and affordable housing), and Nuveen Core Impact Bond Strategy (including climate change and conservation).[53] The fund also has $4 billion in a low emissions index, and $400 million with Generation Investment Management.[54]

The bill, S2126, which would require the Common Retirement Fund to divest from fossil fuel companies included in the Carbon Underground 200 list 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. As noted above the fund has a sustainable investment program. 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 are as well as with appointed external asset managers with low scores relating to climate risks.

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[48] https://www.osc.state.ny.us/press/releases/2020/08/nys-common-retirement-fund-reports-first-quarter-results

[49] https://www.osc.state.ny.us/press/releases/2020/01/nys-comptroller-dinapoli-announces-coal-investments-under-review

[50] https://www.timesunion.com/opinion/article/N-Y-pension-fund-one-of-world-s-most-responsible-15403354.php?utm_source=Energy+News+Network+daily+email+digests&utm_campaign=805e84ab82-EMAIL_CAMPAIGN_2020_05_11_11_42_COPY_01&utm_medium=email&utm_term=0_724b1f01f5-805e84ab82-89268807

[51] https://osc.state.ny.us/pension/climate-action-plan-2019.pdf

[52] https://www.ai-cio.com/news/new-york-appoints-first-ever-esg-director/

[53] https://www.osc.state.ny.us/press/releases/2020/01/nys-comptroller-dinapoli-announces-coal-investments-under-review

[54] https://www.osc.state.ny.us/press/releases/2018/01/ny-state-comptroller-dinapoli-doubles-low-emissions-index-investment-4-billion

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."*[55]

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.

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. In January 2020, the city selected Meketa Investment group (and also contracted with BlackRock) to 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 plan is due by end of 2020 and the city plans to execute on the plan in 2021.[56]

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.

California Pension Funds

In September 2020, the California Department of Finance released the California Climate Investment Framework. The framework drives integration among the state's largest pension funds' climate risk strategies. Based on the framework the governor has called for a working group to develop a climate risk disclosure

[55] https://osc.state.ny.us/reports/decarbonization-advisory-panel-report.pdf
[56] https://www.ai-cio.com/news/new-york-city-takes-major-next-step-fossil-fuel-divestments/

standard, increase low-carbon strategies in pension funds, and joined the Coalition for Climate Resilient Investment.[57]

CalSTRS

CalSTRS' $260+ billion fund (as of August 2020) has invested and committed approximately $5.4 billion to low-carbon, renewable energy, and energy efficiency investments across its portfolio (as of June 2019). This includes $691.6 million in private equity clean energy investments and over $2.6 billion in a public equity low-carbon index.[58]

In September 2019, California State Treasurer and ex officio CalSTRS Board Member, Fiona Ma, demanded the fund divest from fossil fuels. In June 2020, CalSTRS published a perspective on fossil fuel divestment on their website which includes the factors they consider with investing and engaging fossil fuel companies.[59] CalSTRS laid out their position to prioritize engagement over divestment noting "we believe divestment is a last resort action that can have a lasting negative impact on the health of the fund, while severely limiting our ability to shape corporate behavior for long-term sustainable growth."[60] CalSTRS also added a low carbon investment belief in January 2020. Investment beliefs are the foundational elements that guide all investment decision-makers at CalSTRS.

CalPERS

CalPERS' $385+ billion fund integrates ESG considerations in its manager selection and internal investment process. In December 2019, CalPERS produced its first public report on climate-related financial risk.[61]

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 public markets 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 500 investors representing $47 trillion in assets that are systematically engaging over 160 companies.[62]

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.

The pension fund is close to completing a carbon footprint for its entire fund and is currently finalizing the private equity allocation.[63] Their Real Estate Energy Optimization Initiative, that works to reduce the

[57] https://www.gov.ca.gov/2020/09/24/governor-newsom-releases-california-climate-investment-framework/#:~:text=SACRAMENTO%20%E2%80%93%20Recognizing%20that%20climate%20change,Framework%2C%20which%20integrates%20the%20climate

[58] https://www.calstrs.com/low-carbon-economy

[59] https://www.calstrs.com/post/calstrs-perspective-fossil-fuel-divestment

[60] https://www.ai-cio.com/news/calstrs-rejects-fossil-fuel-divestment/

[61] https://www.calpers.ca.gov/docs/forms-publications/addressing-climate-change-risk.pdf

[62] http://www.climateaction100.org/

[63] https://www.top1000funds.com/2020/09/calpers-simpson-on-climate-action-100/

carbon intensity of real estate investments in order to help mitigate the systemic risk of climate change to investments along with enhance returns and long term value through energy cost savings.[64]

University of California

UC Investments manages the University of California Retirement Plan – covering the $70 billion UC pension, the $14 billion UC endowment, and the $17 billion in its working capital pools.

In May 2020, UC Investments announced a fossil free investment portfolio across the pension, endowment and working capital pools. This achievement came after the sale of $1 billion in pension funds previously invested in fossil fuels. In the announcement, the Chief Investment Officer noted "we remain convinced that continuing to invest in fossil fuels poses an unacceptable financial risk to UC's portfolios."[65] Additionally, investments clean energy stood at just over $1 billion in May 2020.

A recent Institutional Investor article reported that UC Investments continues to have some commingled investments in oil production and exploration companies. UC clarified that its definition of "fossil free" applies to public asset separate accounts (meaning it does not apply to comingled funds) and focuses on companies with reserves due to stranded asset risk. The distinction also clarified that the fossil free designation does not equate to divestment from fossil fuels as that would require a formal policy change.[66]

Norwegian Government Pension Fund Global (CPFG)

In March 2019, Norway's Government Pension Fund Global (GPFG), 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.[67]

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 stated 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.

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

[64] https://www.calpers.ca.gov/page/investments/sustainable-investments-program/climate-change
[65] https://www.universityofcalifornia.edu/press-room/uc-s-investment-portfolios-fossil-free-clean-energy-investments-top-1-billion
[66] https://www.institutionalinvestor.com/article/b1nmg2glqbddtf/The-University-of-California-s-Investment-Chief-Said-It-s-Fossil-Free-So-Why-Does-It-Own-Oil-Companies
[67] https://www.ai-cio.com/news/norway-approves-sovereign-wealth-fund-fossil-fuel-divestment/

(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.*

NBIM also maintains ethically motivated guidelines with respect to climate risk. These guidelines focus on the observation and exclusion of mining companies/power producers with 30%+ in revenue or operations from thermal goal. Over the last year the fund is also excluding or monitoring companies that produce 20 million tonnes of thermal coal / year or have coal-based power generation capacity of 10,000 MW+. NBIM reports that these exclusions are the largest contributors to reducing the carbon emissions from find investments.[68] Between 2012-2019 69 companies have been excluded under this criterion and 14 were under observation as of the 2019 Responsible Investment Report.[69]

There is also interesting work in process for the unlisted real estate investments where the fund is developing a platform with data on energy and water consumption, waste management and environmental certification.

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[68] https://www.nbim.no/en/publications/submissions-to-ministry/2019/government-pension-fund-global--account-of-work-on-climate-risk/

[69] https://www.nbim.no/en/publications/reports/2019/responsible-investment-2019/

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 and 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 identifies the climate risk areas where a Watch List company lags its peers, enabling SFERS to prioritize topics for engagement.

Staff screens SFERS public markets investments in oil and gas companies using the Framework annually. Most recently at the October 9, 2019 Board meeting, Staff proposed a Watch List of 36 oil and gas companies (Table 2 below), a Priority Watch List of 12 companies within the broader Watch List where SFERS had greater than $1 million of net exposure (Table 3 below), and recommended 10 companies for investment restriction based on the analysis using the Framework (Table 4 below).

Table 2. SFERS Climate Transition List Watch, 2019

	Engagement Focus Areas							
Company Name	Reserve Viability	Lobbying & Regulatory Influence	Operational Efficiency	Strategy for Use of Cash	Mgmt of Debt Burden	Tar Sands	Engagement Mechanism	Reason
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.

Table 3. Companies Prioritized for SFERS Engagement, 2019

	Engagement Focus Areas						
Company Name	**Reserve Viability**	**Lobbying & Regulatory Influence**	**Operational Efficiency**	**Strategy for Use of Cash**	**Mgmt of Debt Burden**	**Tar Sands Activities**	**Engagement Mechanism**
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.

As described on pages 8-9 above, since October 2019, Staff has made progress on engaging with companies placed on the Priority List as well as several of those on the broader Watch List.

Table 4. Companies Subject to 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.	$ -	$ -
Total	$ (5,289,581)	$ 3,910,704

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.

Since October 2019, three companies on the SFERS restricted list are no longer in the universe of companies screened using the Framework: Chesapeake Energy Corp, QEP Resources, and Baytex Energy. Chesapeake filed for Chapter 11 protection on June 28, 2020. On April 10, 2020, QEP Resources received delisting notice from NYSE because the company's common stock has fallen below the minimum $1 per share for over a period of 30 consecutive trading days. The share price recovered in June 2020 but as of September 28, 2020 it has fallen below $1 per share again. Similarly, Baytex Energy received delisting notice from NYSE because the company's common stock is out of compliance with minimum price per share requirements.

In order to evaluate the performance impacts arising from restricting investment in the select Oil & Gas companies over time, 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 select oil & gas companies since November 30, 2018 has had minimal but positive impact on the total fund through June 30, 2020.

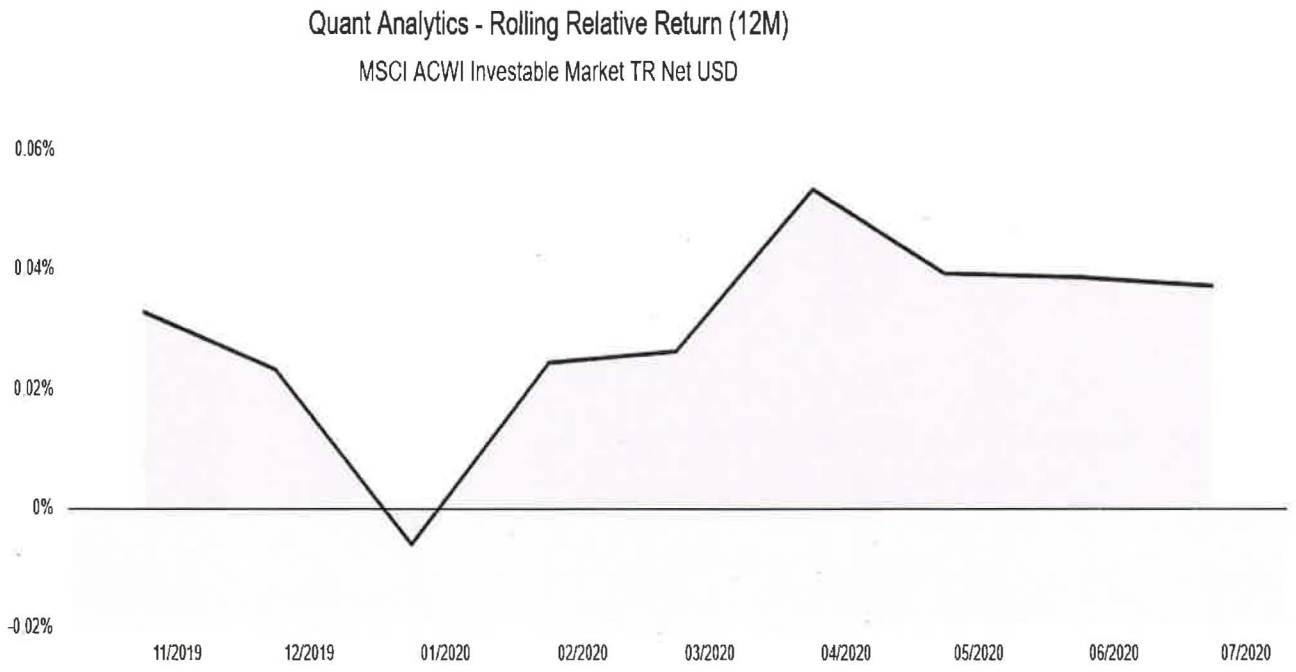
Table 5. Estimated Impact on Relative Returns and Volatility from Oil & Gas Restriction

Index Name	Restriction Weighting*	Cumulative Return**	Annualized Return**	Annualized Volatility**	Dollar Impact
ACWI IMI ex (select) Energy	0.06%	+0.06%	+0.04%	-0.03%	+$5.0m

* Weightings of restricted stocks in the generic MSCI ACWI IMI Index at June 30, 2020.

** Relative returns and volatility are against the MSCI ACWI IMI Index through to June 30, 2020.

ACWI IMI ex (select) Energy Rolling 12 Month Relative Returns vs. MSCI AWCI IMI TR (net)



Total returns (net dividends) in USD.

Source: MSCI. The MSCI data is comprised of a custom index calculated by MSCI for, and as requested by, SFERS. The MSCI data is for internal use only and may not be redistributed or used in connection with creating or offering any securities, financial products or indices. Neither MSCI nor any other third party involved in or related to compiling, computing or creating the MSCI data (the "MSCI Parties') makes any express or implied warranties or representations with respect to such data (or the results to be obtained by the use thereof), and the MSCI Parties hereby expressly disclaim all warranties of originality, accuracy, completeness, merchantability or fitness for a particular purpose with respect to such data. Without limiting any of the foregoing, in no event shall any of the MSCI Parties have any liability for any direct, indirect, special, punitive, consequential or any other damages (including lost profits) even if notified of the possibility of such damages.

APPLICATION OF THE FRAMEWORK – 2020:

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 114 companies globally (shrinking from 153 in 2019 and 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. The threshold 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 6. Thresholds to Identify Climate Transition Risk Outliers

1. Fossil Fuel Reserve Mix	
Metric	**Outlier Threshold**
(1a) % of projected capex through 2025 stranded in SDS vs. NPS	**45% of planned capex** (2019- 46% of planned capex)
(1b) % of projected capex through 2025 stranded in B2DS vs. NPS	**67% of planned capex** (2019 - 70% of planned capex)

2. Operational Emissions & Efficiency	
Metric	**Outlier Threshold**
(2a) Scope 1 + 2 CO_2e / $MM rev	**687 CO_2e / $MM rev** (2019 - 1,051 CO_2e / $MM rev)
(2b) Percentage change in Scope 1 + 2 CO_2e/ $MM rev over 3 year	2.5% 3-year increase (2019 - 11% 2-year increase in 2 year; 2018 - 27% 1-year increase)

3. Climate Policy Approach	
Metric	**Outlier Threshold**
(3a) InfluenceMap Total Score	**36.1 score** (2019 – 33.6 score)

4. Financial Health & Capital Discipline	
Metric	**Outlier Threshold**
(4a) Altman Z-score	<1.80
(4b) Free Cash Return on Assets	<0.00

The thresholds for "Category 1. Fossil Fuel Reserve Mix" are similar to the values in 2019 after rising significantly from 2018 due to an update in assumptions used in the Carbon Tracker Initiative model.

The threshold for Category (2a) in Operational Emissions & Efficiency decreased meaningful from 2019 and 2018 levels, perhaps reflecting overall improving energy efficiency across the sector. The threshold for Category (2b) representing the trend in emissions intensity dropped again from 11% to 2.5%. With the threshold approaching zero, companies will be flagged unless they show decreases in operational emissions over a three-year period.

The threshold for "Category 3. Climate Policy Approach" was raised from an Influence Map Total Score of 33.6 to a Total Score of 36.1. This reflects another tightening of the threshold on an absolute basis, which indicates a general improvement in Influence Map scores across the universe of companies analyzed. As Staff anticipated in 2019, this average score may continue to rise over time as companies adjust their approach to

climate lobbying and policy. More companies are facing calls to review their approach to climate lobbying and rationalize divergent views with trade associations on which they are members. SFERS supported the Investor Expectations on Corporate Climate Lobbying.

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 is a large average increase in the Free Cash Return on Assets metrics – from -2.38 in 2018 to -0.40 in 2019 to +1.06 in 2020. 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 increased in 2020 to 1.92 from 1.54 in 2019. This indicates that solvency risk, on average, has decreased with the universe. However, this figure does not reflect Alman Z-Scores for those companies that suffered bankruptcy during the period or otherwise fell out of the investment universe. The second quarter of 2020 saw 18 bankruptcies of oil and gas producers, the highest quarterly total since 2016, followed by 12 additional bankruptcies in Q3[70].

Application of the Framework resulted in 28 companies being identified as high risk in 2020.

Each company's risk score is summarized below in Table 7, along with SFERS' net equity and debt exposure (as of 6/30/20) to the company. The table additionally indicates if the company was identified as high risk during 2019.

Table 7. Companies Identified for High Climate Transition Risk, 2020

		Fossil Fuel Reserve Mix		Climate Policy Approach	Operational Efficiency		Financial Health & Capital Discipline		
Company Name	Net Exposure (as of 6/30/20)	**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**	**Identifie in 2019**
Origin Energy	$238,113	45.47%	45.47%	53.35	1837.54		1.77	1.62	Y
Canadian Nat. Res.	$651,110	14.15%	15.36%	36.10	1541.38	37.95	5.75	1.73	Y
Crescent Point Energy*	-	92.93%	92.98%		1538.92	51.98	-2.34	-1.21	Y
MEG Energy Corp	$420,480				1069.21	36.91	-4.18	0.55	Y
Tourmaline Oil Corp	$400,031	6.75%	6.75%		1046.01	30.01	-1.10	1.35	Y
Enerplus Corporation	$75,403				1034.42	31.32	3.26	2.16	Y
Gazprom	$3,553,182	24.37%	36.55%	36.20	976.29	19.34	-1.43	1.80	Y
Occidental Petroleum	$5,416,705	42.08%	70.52%	38.38	811.83	25.36	-1.39	2.94	Y
PTT E&P Public Co Ltd	$1,886,689				778.80	22.41	7.85	1.75	Y
Hess Corporation*	$(2,358,029)	56.54%	77.93%	44.56	613.81	17.00	-2.36	2.25	Y
Rosneft	$534,262	21.16%	24.46%	26.43	585.66	13.76	0.43	1.41	Y
EOG Resources	$4,998,209	49.49%	91.33%	33.46	364.29	7.90	3.70	3.89	Y
WPX Energy, Inc.*	-	69.10%	97.76%				-7.36	1.08	Y

[70] https://www.haynesboone.com/publications/energy-bankruptcy-monitors-and-surveys

PDC Energy, Inc.*	$309,282	66.37%	88.44%				-5.46	1.21	Y
Apache Corp	$1,716,684	47.94%	69.87%	45.84			-1.74	1.26	Y
Matador Resources*	$102,495	91.81%	94.34%				-26.64	1.47	Y
Diamondback Energy *	$27,876	72.32%	96.87%				-0.67	1.65	Y
Parsley Energy*	$117,062	61.34%	86.70%				-8.53	1.86	Y
Concho Resources	$4,766,559	87.72%	94.03%				-0.62	2.35	Y
Pioneer Nat. Res.	$3,426,287	32.42%	94.42%				-3.33	3.98	Y
Suncor Energy	$342,315	15.29%	18.62%	52.61	739.20	14.46	3.18	1.76	N
ARC Resources	-	19.64%	41.95%		766.96	22.54	-0.49	1.10	N
Vermilion Energy	$201,570	28.02%	42.04%		691.16	20.93	-5.10	0.94	N
Devon Energy	$2,930,897	44.72%	67.67%	27.63	627.53	15.27	0.53	2.01	N
Lundin Energy AB	$(153,960)	45.81%	45.81%		149.82	4.12	8.47	1.52	N
Noble Energy, Inc.	$400,060	40.92%	67.42%				-5.48	1.32	N
Murphy Oil Corp	$295,738	46.11%	53.67%				-7.96	1.92	N
Marathon Petroleum	$(1,501,922)	40.02%	66.71%	21.98			1.32	2.17	N
Total	$28,797,097								

* Company subject to investment restriction

Sources: GSAM as of 9/29/20; holdings data as of 6/30/20 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 20 companies that were identified in 2019 and 8 companies that were not previously flagged.

Fourteen companies that were identified as high-risk during 2019, were not identified as high risk during 2020. Eight of these companies are no longer flagged because they are no longer in the investment universe either due to bankruptcy or sustained low share price:

Company Name	Comment
Baytex Energy Corp.	Has fallen out of universe; received delisting warning
California Res. Corp	Filed for Chapter 11
QEP Resources*	Has fallen out of universe; received delisting warning
Chesapeake Energy	Filed for Chapter 11
Aker BP ASA	Has fallen out of universe
Centennial Res Dev, Inc.	Has fallen out of universe; received delisting warning
Premier Oil	Has fallen out of universe due to sustained low share price
Whiting Petroleum	Filed for Chapter 11 (however, company emerged from bankruptcy on 9/1/20)

Six of these companies were no longer flagged because their risk profile change and/or they lost data coverage from one or more providers during the period:

Company Name	Comment
Santos Ltd	Previously flagged for operational efficiency and Z-Score; continues to have Z-Score flag but has lost CDP data coverage
Tullow Oil	Previously flagged for operational efficiency, stranded capex, and Z-Score. Z-Score and operational efficiency remain high risk, but has lost Carbon Tracker coverage for stranded capex

Cairn Energy	Previously flagged for operational efficiency, stranded capex, and Z-Score. Z-Score remains high risk, operational efficiency has improved, and has lost Carbon Tracker coverage for stranded capex
Cimarex Energy Co	Previously flagged for stranded capex and OCF; OCF remains high risk, but stranded capex has improved
Medco Energi	Previously flagged for operational efficiency and financial health. Financial health remains high risk but has lost CDP data coverage.
EnCana Corp	Reorganized into Ovintiv and new company is no longer flagged

SFERS does not have material exposure to any of these companies.

Additional Flags

Previously, SFERS identified companies for the Climate Transition Watch List if they have material tar sands activities 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.

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

For 2020, Staff does not recommend adding tar sands companies to the Watch List unless they are identified as high risk according to the Framework. It is Staff's believe that the four risk categories should adequately reflect the tar sands companies as it does with other oil & gas companies. The fact that the three tar sands companies mentioned above are identified by the Framework validates this approach.

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 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 displayed risk in one category (Climate Policy Approach), so were recommended for continued engagement as both companies were currently on the SFERS Watch List.

The following table shows the composition of SFERS' top 10 holdings in public oil & gas companies as of June 30, 2020 and each company's associated risk score.

Table 8. SFERS' Top 10 Public Market Oil & Gas Exposures, 2020

			Fossil Fuel Reserve Mix		Climate Policy Approach	Operational Efficiency		Financial Health & Capital Discipline	
Company Name	Net Exposure (6/30/20)	Net Exposure (6/30/2019)	**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	$13,713,726	$28,447,268	29.69%	62.52%	35.95	-	-	0.76	3.40
Chevron	$11,381,226	$25,213,374	16.79%	42.63%	29.77	-	-	3.34	3.60
Lukoil	$4,797,265		17.21%	20.19%	47.23	290.00	5.67	6.26	2.86
EOG Res.	$4,998,209	$5,882,382	49.49%	91.33%	33.46	364.29	7.90	3.70	3.89
Concho Res.	$4,766,559	$(4,549,069)	87.72%	94.08%		-	-	-0.62	2.35
Royal Dutch Shell	$3,847,371	$25,171,215	30.76%	39.89%	52.89	-	-	2.93	3.20
Gazprom	$3,553,182	$9,628,066	24.37%	36.55%	36.20	875.29	19.34	-1.43	1.80
Pioneer Nat. Res.	$3,426,287	$596,142	32.42%	94.42%		-	-	-3.33	3.98
Occidental	$5,416,705	$8,159,422	42.08%	70.52%	38.38	811.83	25.38	-1.89	2.94
Devon Energy	$2,930,897	$3,724,050	44.72%	87.87%	27.63	627.53	15.27	0.53	2.01
Total	$55,895,615								

In 2020, six of SFERS top 10 holdings were identified by the Framework as high climate transition risk companies: Occidental Petroleum, Gazprom, EOG Resources, Devon Energy, Concho Resources, and Pioneer Natural Resources. ExxonMobil and Chevron again 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 9, 2019 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 ten companies being added to SFERS investment restrictions:

Table 9. SFERS Restricted Oil & Gas Companies, 2019

Company Name	Net Direct Exposure (as of 6/30/19)
Chesapeake Energy Corp	$ 1,983,096
Diamondback Energy Inc.	$ 1,369,553
Matador Resources Co.	$ -
Parsley Energy Inc	$ 366,653
PDC Energy Inc.	$ -
Baytex Energy Corp	$ 191,402
Crescent Point Energy	$ -
Hess Corp	$ -
QEP Resources Inc.	$ -
WPX Energy Inc.	$ -
Total	$ 3,910,704

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 2020, five of the currently restricted companies continue display high risk of potential stranded capex, bankruptcy risk, and high-risk use of operating cash flows.

Two companies, Hess Corporation and Parsley Energy, Inc. continue display high risk of potential stranded capex and high-risk use of operating cash flows, but their Altman Z-Scores improved above 1.8 (the empirically established level that indicates high insolvency risk).

As discussed above, three companies on the SFERS restricted list are no longer in the universe of companies screened using the Framework: Chesapeake, QEP Resources, and Baytex Energy. Chesapeake has filed for Chapter 11 bankruptcy and QEP and Baytex Energy are both at risk of being delisted due to sustained share price below $1 per share.

The 2020 analysis identifies one additional company that has high risk of potential stranded capex, bankruptcy risk, and high-risk use of operating cash flows according to the SFERS Climate Transition Risk Framework: Apache Corporation. Apache was previously on SFERS restricted list of companies in 2018 but was removed in 2019 due to improved stranded capex risk As of June 30, 2020 SFERS had $1.4 million in net exposure to Apache, $466,934 of which was held directly in separately managed accounts (and which could therefore be divested).

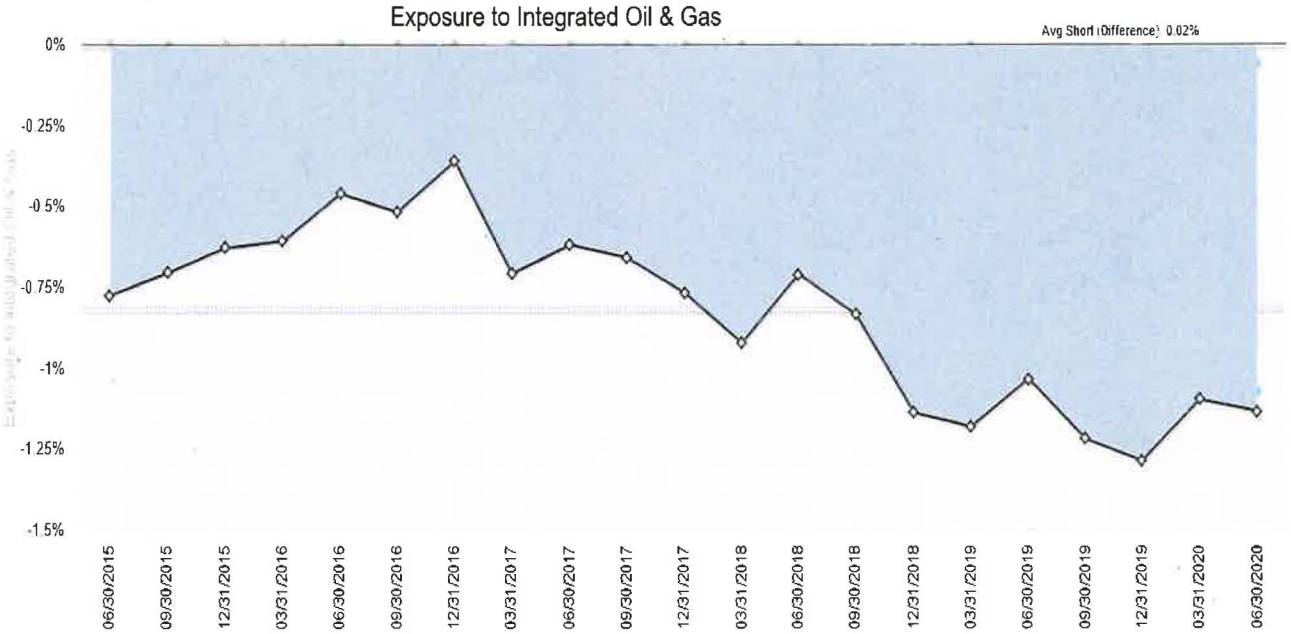
Investment in Public Oil & Gas Companies:

As of 6/30/20 SFERS has approximately $89 million or 0.99% public equity portfolio invested in Integrated Oil & Gas ("IOC") and Oil & Gas Exploration & Production ("E&P") companies. This compares to $224 million, or 2.55%, as of one year prior (6/30/19). Five years prior, as of 6/30/15, SFERS had approximately $408 million, or 3.84%, of the public equity portfolio invested in IOG and E&P companies.

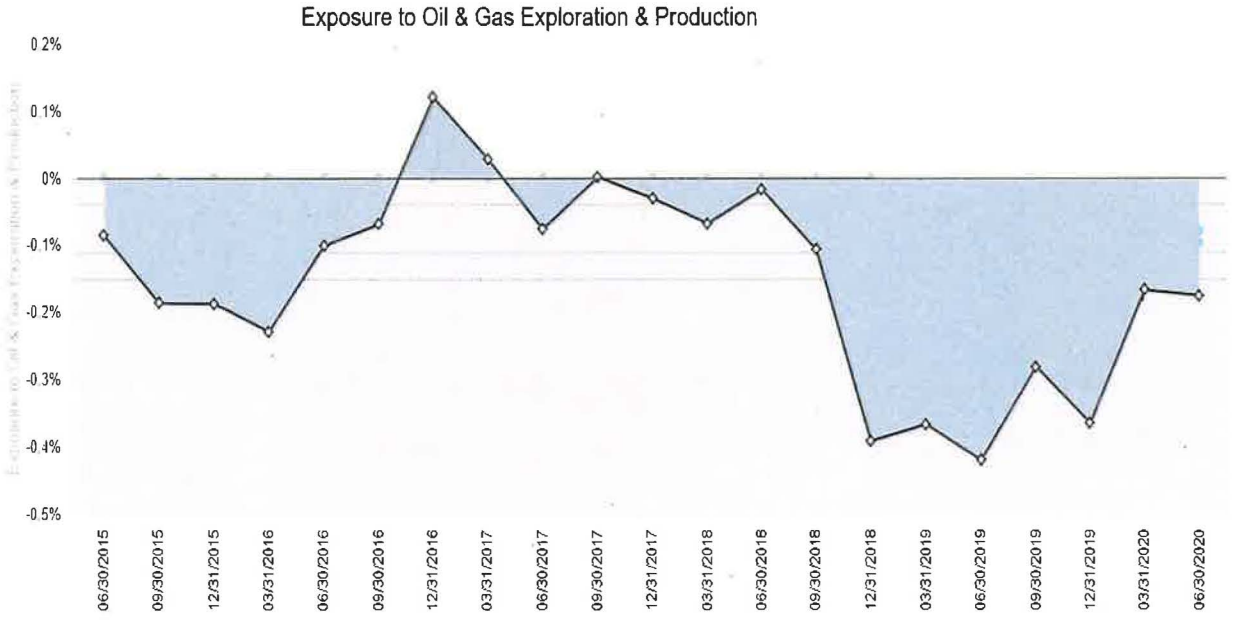
Over the past five years, SFERS' public equity exposure has dropped by nearly 75% when measured as a percentage of the portfolio, and nearly 80% when measured on an absolute dollar basis.

Over this same period, these two industries composition in equity benchmarks also declined. The Integrated Oil & Gas Sector was approximately 3.2% of the ACWI IMI as of 6/30/15, dropping to approximately 1.7% as of 6/30/20. The Exploration & Production Sector was approximately 1.5% of the ACWI IMI as of 6/30/15, dropping to approximately 0.57% as of 6/30/20. Over this period, however, SFERS' public equity portfolio exposure to the IOC and E&P industries has generally been less than the ACWI IMI. The following charts show exposure to each industry relative to the benchmark.

SFERS Integrated Oil & Gas Industry Exposure Relative to MSCI ACWI IMI, 6/30/15 to 6/30/20



SFERS Exploration & Production Industry Exposure Relative to MSCI ACWI IMI, 6/30/15 to 6/30/20



Public Fixed Income exposures similarly have declined over the past five years. As of 6/30/20 SFERS has approximately $18.9 million, or 1.01%, of the public fixed income portfolio invested in IOG and E&P sectors. This compares to $102 million, or 2.65%, as of five years prior (6/30/15).

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 6/30/20 SFERS has approximately $108 million invested in publicly traded oil & gas companies or less than half a percent (0.39%) of plan assets.

SFERS absolute investment in companies identified as having relatively high climate transition risk according to the Framework at $29 million was similar to the amount one year ago (at $27.2 million). However, in 2019 this represented approximately 11% of the $242 million the invested in oil & gas companies in the public markets portfolio. As of June 30, 2020, approximately 27% of the $108 invested in oil & gas companies in the public markets portfolio is in companies identified as relatively high climate transition risk.

Approximately 54% of SFERS investment in oil & gas companies was concentrated in its top 10 holdings (a lower percentage compared to one year prior). On a dollar basis the amount was meaningfully less at $58.8 million as compared to $162.6 million as of 6/30/19.

RECOMMENDATIONS:

Divestment Options

If the Board maintains its request of an option for "prudently phased divestment", Staff recommends that the criteria used in 2018 and 2019 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 recommends that companies no longer meeting the abovementioned criteria due to improvement in risk in one category (Hess Corporation and Parsley Energy) be retained on the restricted list and monitored. If the companies show sustained improvement against the Framework criteria over time, then Staff may recommend removal from the restricted list.

Staff additionally recommends that companies currently on the restricted list that have fallen out of the analysis universe due to bankruptcy or sustained low share price (Chesapeake Energy Corp, QEP Resources, Baytex Energy) be retained on the restricted list.

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.

If the Board agrees to pursue such option, it would be targeted at 11 companies, including one company, Apache Corporation, that was previously subject to investment restriction in 2018 but not 2019. SFERS currently has $466,934 of direct investment (through separately managed accounts) in the company.

Table 10. Recommended Companies for Investment Restriction, 2020

Company Name	Net Direct Exposure (as of 6/30/20)
Chesapeake Energy Corp*	$ -
Diamondback Energy Inc.*	$ -
Matador Resources Co.*	$ -
Parsley Energy Inc*	$ -
PDC Energy Inc.*	$ -
Baytex Energy Corp*	$ -
Crescent Point Energy*	$ -
Hess Corp*	$ -
QEP Resources Inc.*	$ -
WPX Energy Inc.*	$ -
Apache Corporation	$ 466,934
Total	$ 466,934

* Currently subject to investment restriction based on 2019 Board decision

Sources: GSAM as of 9/29/20; holdings data as of 6/30/20 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:

- 20 high climate transition risk fossil fuel companies in SFERS portfolio for engagement; and
- 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.

In addition, there are two companies that were on the SFERS Watch List in 2019 that were not identified by the Framework in 2020 but with which SFERS continues to maintain productive engagement: ConocoPhillips and Petrobras. Staff recommends that engagement with these companies continue.

Staff recommends that the Board direct it to establish a Watch List consisting of 24 companies:

- 20 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
- Two (2) companies originally identified for climate transition risk in 2018 that are not identified as high climate transition risk in 2020, but with which productive engagement is underway.

Staff further recommends that the Board direct it to focus engagement efforts on companies where SFERS has current (as of 6/30/20) 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 originally 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 taking voting action against certain director, 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

Topic	Engagement Objectives	Target Timeframe
Reserves viability	Company demonstrates 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 demonstrates 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 demonstrates a disciplined strategy for deploying cash that balances future growth, shareholder needs, and managing debt.	1-3 years
Management of debt burden	Company demonstrates that it is taking actionable steps to reducing its debt burden, maintaining appropriate liquidity, and improving profitability.	1-3 years

Staff recommends that it continues to 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, 2020

Engagement Focus Areas

Company Name	Reserve Viability	Lobbying & Regulatory Influence	Operational Efficiency	Strategy for use of cash	Mgmt of debt burden
Origin Energy	x		x		x
Canadian Nat. Res.		x	x		x
MEG Energy Corp			x	x	x
Tourmaline Oil Corp			x	x	x
Enerplus Corporation			x		
Gazprom			x	x	x
Occidental Petroleum	x		x	x	
PTT E&P Public Co Ltd			x		x
Rosneft		x	x		x
EOG Resources	x	x			
Concho Resources Inc.	x			x	
Pioneer Nat. Res.	x			x	
Suncor Energy			x		x
ARC Resources Ltd.			x	x	x
Vermilion Energy Inc.			x	x	x
Devon Energy	x	x	x		
Lundin Energy AB	x				x
Noble Energy, Inc.	x			x	x
Murphy Oil Corporation	x			x	
Marathon Petroleum	x	x			
ExxonMobil		x			
Chevron		x			
ConocoPhillips					
Petrobras					x

Sources: GSAM as of 9/29/19; holdings data as of 6/30/20 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 Watch List companies where (as of 6/30/20) 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, 2020

	Engagement Focus Areas						
Company Name	**Reserve Viability**	**Lobbying & Regulatory Influence**	**Operational Efficiency**	**Strategy for Use of Cash**	**Mgmt of Debt Burden**	**Reason**	**Engagement Mechanism**
Gazprom			x	x	x	Climate Framework	CA 100+
Occidental Petroleum	x		x	x		Climate Framework	CA 100+
PTT E&P Public Co Ltd			x		x	Climate Framework	CA 100+
EOG Resources	x	x				Climate Framework	CERES CAR
Concho Resources Inc.	x			x		Climate Framework	Direct
Pioneer Nat. Res.	x			x		Climate Framework	CERES CAR
Devon Energy	x	x	x			Climate Framework	CA 100+
ExxonMobil		x				Top 10 Oil & Gas holding	CA 100+
Chevron		x				Top 10 Oil & Gas holding	CA 100+
ConocoPhillips						Ongoing engagement	CA 100+
Petrobras					x	Ongoing engagement	CA 100+

Sources: GSAM as of 9/29/20; holdings data as of 6/30/20 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 eight of the 11 companies prioritized for engagement remain consistent with those identified in 2019. SFERS has de minimis or net short exposure to each of the four companies on this priority list in 2019 but not in 2020. Of the three newly identified companies, Staff has had dialogue with Concho Resources in the past.

In addition to engaging with companies, Staff plans to continue to advance the Climate Action Plan by continuing to engage with its external managers on climate transition 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.

Summary of Next Steps

1. Take forward the Climate Action Plan 2020-2021 priorities described on pages 10-11.
2. Continue to identify investments in climate solutions (e.g., low-carbon and negative carbon technologies) and pursue these they meet SFERS's risk-return expectations.
3. Adopt the SFERS Climate Transition Watch List for 2020 (Table 12), and engage with companies on that list, focusing resources and efforts on companies where SFERS has more material investment (as identified in Table 13).
4. 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.
5. Continue to improve the robustness of the climate transition risk framework through evaluating additional categories of risk, improving data quality, and improving data coverage.
6. 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, then the following motion is recommended:

> *Move that in order to fulfil the Board's request for "prudently phased divestment", divest positions in one company, restrict further investment in that company as well as ten additional companies identified in Table 10 of this memorandum.*

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

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

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

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

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

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

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

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

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

A priori assumption	Higher cost fossil fuel projects are at higher risk given a decline in price and demand. Higher cost reserves often have higher carbon content (e.g., oil sands, extra heavy oil) and may be in more remote and environmentally sensitive areas

	(e.g., deepwater, Arctic).
Metrics	% of projected capex through 2025 stranded in SDS vs. NPS % of projected capex through 2025 stranded in B2DS vs. NPS
Data Source	Carbon Tracker Initiative
Description of Metrics	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. The demand pathways identify the total demand for oil and gas (or "budget") in three scenarios defined by the International Energy Agency (IEA): (1) New Policies Scenario (NPS), which is aligned with 2.7°C of global warming (2) The Sustainable Development Scenario (SDS), aligned with 2°C of warming and consistent with the aims of the Paris Agreement, and (3) The Beyond 2 Degrees Scenario (B2DS), aligned with a 1.75°C global warming outcome. 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. 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 *Mind The Gap: the $1.6 trillion energy transition risk, Carbon Tracker Initiative*, 08 March 2018

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

A priori assumptions	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. Companies demonstrating improvements in emissions intensity demonstrate a clear strategy to reduce operational costs and manage potential future carbon pricing risks.
Metrics	Scope 1 + 2 CO2e / $MM rev Change in Scope 1 + 2 CO2e/ $MM rev over one year
Data Source	CDP
Description of Metrics	Scope 1 greenhouse gas emissions are greenhouse gas emissions measured in tons of carbon dioxide equivalents that result from the direct combustion of fossil fuels by the company on-site. This includes combustion for the production of energy

	and fuel use in vehicles. 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. The change in Scope 1 and Scope 2 CO_2-e/$MM revenues is measured as the percentage change in emissions intensity over a one-year period.

Table 2c. Framework Part 3 – Climate Policy Approach

A priori assumption	Companies asserting influence against climate regulations may be unprepared to transition their business model to a low carbon economy.
Metric	InfluenceMap Total Score
Data Source	InfluenceMap
Description of Metric	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). ▪ For the organization score, InfluenceMap draws from various publicly available data sources to assess transparency (referring to the availability and accessibility of this information) and performance (referring to the content of an organization's position and engagement) of an organization across four key climate-change related issues. The issue categories assessed are climate science (i.e. support of the Intergovernmental Panel on Climate Change position on climate change science), global treaty (i.e. support of the United Nations Framework Convention on Climate Change Conference of the Parties process), climate change policy and legislation, and disclosure on relationships around business associations and other sources of influence which may impact the climate debate. The organization score is measured on over 10 climate policy-related areas within these categories to determine whether the company exerted obstructive or constructive influence. ▪ In addition to the organization score, a corporation will have a relationship score based on the relationships it holds with external agents exerting influence over climate policy (e.g. trade associations, chambers of commerce, and think tanks) and the relative importance of these influencers in affecting climate policy.

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

A priori assumptions	Companies with a better picture of financial health may be more resilient over the long-term, including to climate related risks.

	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.
Metrics	Altman Z-score Free Cash Return on Assets (ROA)
Data Source	Thompson Reuters Worldscope
Description of Metric	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. It is calculated according to the following formula: $z = 1.2x_1 + 1.4x_2 + 3.3x_3 + 0.6x_4 + 1.0x_5$, where: x_1 = Working Capital / Total Assets • Measures liquid assets in relation to the size of the company; the ability to meet short-term obligations x_2 = Retained Earnings / Total Assets • Measures profitability and the reliance on debt to fund assets x_3 = Earnings Before Interest and Taxes (EBIT) / Total Assets • Also referred to as return on total assets (ROTA), measures operating efficiency apart from tax and leveraging factors x_4 = Market Value of Equity / Book Value of Total Liabilities. • Incorporates security price fluctuations relative to liability as a measure of market confidence x_5 = Sales / Total Assets S • Standard measure for total asset turnover or how efficiently the company is using assets to generate sales Free Cash Return on Assets (ROA) = (Operating Cash Flow – CapEx) / Total Assets

SFERS Climate Transition Risk Framework:

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

Table 3. SFERS Climate Transition Risk Framework

1. Fossil Fuel Reserve Mix	2. Operational Emissions & Efficiency
(1a) % of projected capex through 2025 stranded in SDS vs. NPS (1b) % of projected capex through 2025 stranded in B2DS vs. NPS	(2a) Scope 1 + 2 CO_2e / $MM rev (2b) Percentage change in Scope 1 + 2 CO_2e/ $MM rev over 1 year

3. Climate Policy Approach	4. Financial Health & Capital Discipline
(3a) InfluenceMap Total Score	(4a) Altman Z-score (4b) Free Cash Return on Assets

Expert Consultation:

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

These organizations include:

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

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

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

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

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

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.

Disclaimer