



Vermont Pension Investment Committee

# CLIMATE RISK DIVESTMENT DISCUSSION

February 8, 2017

PCA

PENSION  
CONSULTING  
ALLIANCE

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## Acknowledgements

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In PCA's opinion, VPIC stands among the leaders of U.S. public pension funds in its efforts to consider and to address potential climate change risks and their potential impacts on the VPIC portfolio. PCA is honored that VPIC retained our firm to examine the potential impact on the VPIC portfolio of divestment from one or more of the following: a) coal, b) ExxonMobil, and c) fossil-fuel investments, and to work with the Treasurer, VPIC staff and NEPC LLC to try to seek consensus recommendations for consideration by VPIC.

We thank the VPIC, the Vermont Treasurer, and VPIC staff for their inputs throughout this process; the 26 U.S. public pension funds that responded to PCA's survey of VPIC peers on climate change related investing strategies (Appendix 1); MSCI for providing lists of fossil fuel and thermal coal securities derived from the MSCI ACWI IMI universe, which PCA distributed to all VPIC managers for the sole purpose of preparing information for this report; every VPIC investment manager for their time and effort in contributing information for this report; FTSE/Russell, MSCI, SPDJI for providing information on new ESG indexes; MSCI, Northern Trust, Rhumblin, and SSGA for providing information on potential new passive ESG investment vehicles; CERES/INCR and the Sustainable Accounting Standards Board ("SASB") for their input; and Allan Emkin, PCA founder and Managing Director, for his insights and support.

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## Forward

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Eighteen of the past 19 years have been the hottest on record. In our opinion, whether or not you are convinced of humanity's role in climate change, there is a preponderance of evidence for climate change and its potential risks. We believe climate risks to investments, including potentially stranded assets, have become a potentially material investment issue to the degree that the question has become: why would you not seek to understand and manage these risks? We believe VPIC should continue its effort to address and manage climate and other ESG risks and opportunities, and stay abreast of ever-changing assessments of risks and approaches to managing them. In our opinion, divestment of fossil fuels for VPIC is one possible strategy to mitigate one, potentially significant, climate risk – possible stranded assets of fossil fuel suppliers.

This report addresses the impact on the VPIC investment portfolio of divestment from fossil fuels, thermal coal, and ExxonMobil. We analyze these divestment strategies' potential impact on the expected returns, risks and costs to the VPIC investment portfolio, and the potential impacts of divestment phased in over time; consider divestment within the context of the VPIC's governance structure, including its asset allocation, investment strategy within public equities, proxy voting and engagement policy, and in the context of other investment management tools available to VPIC.

By the numbers, the larger the scope of any divestment, the larger the expected potential impact on returns and risk to the portfolio. For this report we employed a narrower definition of fossil fuels and of coal than was analyzed by VPIC staff in its 2015 study of divestment. We include only companies that own fossil fuel reserves rather than the full GICS energy sector; thermal coal rather than all coal; and we exclude utilities. VPIC invests in commodities via futures. Thus commodities are not relevant to this definition of fossil fuels. As a consequence of these differences in definition, this report finds a smaller fossil fuel and coal exposure and a smaller potential risk-return impact on the VPIC portfolio than the results reported by staff. A second consequence is that our report is less consistent than the VPIC staff report with the underlying general themes – divest from all fossil fuels and divest from all coal. In our opinion, our results and conclusions are consistent with those found by VPIC staff.

Second, VPIC's overall investment strategy is designed to diversify among asset classes to balance overall market risks. In our opinion, fossil fuel supplier divestment can be a tool primarily in public equities to remove exposure to potentially stranded fossil fuel owner assets. In our opinion, other portfolio-wide potentially material financial risks and opportunities posed by climate change are not addressed by fossil fuel divestment. Divestment does not: address climate change material risks (including technological, policy, and physical) evident in other industries from agriculture and forestry to infrastructure, buildings and insurance. Divestment does not provide enhanced exposure to companies involved in energy efficiency and renewable energy. Publicly held equity divestment only transfers ownership of fossil fuel securities; it cannot provide fossil fuel alternatives with any new financial resources. In our opinion, addressing potential climate change risks and opportunities in the VPIC portfolio is best accomplished through a bottom up analysis within each asset class.

Third, within VPIC's equity asset class, we find that divestment adds ongoing costs to portfolio management that are proportionally greater the smaller the fossil fuel divestment strategy (i.e., it is most expensive relative to the market value of the assets divested, to divest from ExxonMobil). We find that investment conflicts with VPIC's equity asset class governance structure, including its investment strategy, and proxy voting and engagement approach. VPIC allocates its publicly held equity assets primarily towards passively managed funds to gain inexpensive overall market exposure. VPIC complements these investments with actively managed investments in discrete market segments where VPIC believes active management can increase its risk-adjusted returns, net of fees. Divestment constrains active managers in their mandate to: find the best investment opportunities; distinguish

among differing magnitudes of risk by type of fossil fuel; weigh stranded asset risks at each company with other risks in security selection; and time buy/sell decisions.

For passively managed, market-wide equity investments, the risk of stranded assets is one of many potential long-term risks that VPIC must consider, including other climate risks. VPIC's passive equities are managed against market-cap weighted indexes. These indexes do not separately account for potentially stranded asset risks, over and above any stranded asset risk embedded in a company's market cap. These indexes include other biases. There exists a multitude of market-wide benchmarks that seek to offer investors better overall risk-adjusted returns than market-cap weighted indexes. These include fundamental, equal-weighted, smart-beta, and a burgeoning plethora of Environmental, Social and Governance ("ESG") indexes. We believe benchmarks other than ex-fossil fuel, or ex-coal can better balance potential stranded asset risk with the multitude of climate, ESG and macro risks (an ex-Exxon benchmark must be custom developed). Divestment of fossil fuels, thermal coal, or ExxonMobil, even within the equity asset class, requires costly restructuring of investments from inexpensive comingled funds, to higher cost separately managed accounts ("SMA"). In our opinion, divestment from fossil fuels or ExxonMobil would negate a critical element of VPIC's proxy voting efforts on these matters - VPIC's voting and co-sponsoring of shareholder proxies at fossil fuel companies (Appendix 2).

We believe that VPIC's significant proxy voting and engagement efforts on climate risk issues at fossil fuel companies, including ExxonMobil, and investment strategies other than divestment, are better suited than divestment for VPIC to manage risks and opportunities posed by climate change within its role as fiduciary of a U.S. public pension fund.



# Executive Summary

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## Conclusions

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

Each of the three divestment tracks carry different degrees of these central concerns.

- Fossil fuel divestment may introduce meaningful diversification risk, increase costs - including cost to restructure the VPIC portfolio from commingled funds into to SMAs, higher management fees, and operational costs, reduce VPIC's proxy voting and engagement opportunities across an entire sector of the economy, introduce a slippery slope potential for other restrictions, particularly for other aspects of today's carbon economy. Fossil fuel divestment does not reduce the global economic dependence on, or demand for, fossil fuels, or impact the financing of the targeted companies.
  - Thermal coal divestment would entail higher proportional costs to VPIC than fossil fuel divestment, because the full costs of transitioning out of inexpensive commingled funds and paying the ongoing management fees of more expensive SMA's would be incurred for a much smaller divestment.
  - ExxonMobil divestment would entail the highest costs proportional to the size of the assets divested and reinvested, and would introduce a single company precedent for exclusion that would dramatically widen the opportunities for demands for exclusion from VPIC's investment universe despite increased costs to the plan. Exxon divestment would negate the proxy voting and engagement efforts at Exxon that VPIC and the Vermont Treasurer undertake (Appendix 2), and thereby potentially work against the broader institutional investor climate change related efforts that have gained traction among Exxon shareholders.
- **Markets now offer meaningful tools to address climate risk other than divestment**, from coordinated proxy voting and corporate and public policy engagement, to passive and active low carbon alternatives that avoid the broad market exit risk inherent in near-term divestment approaches.
  - **Divestment conflicts with VPIC governing policies:** Given the financial and governance costs that come with fossil fuel divestment, in PCA's opinion, divestment of fossil fuels, thermal coal, or Exxon has not been shown to be in the best interests of VPIC pension beneficiaries, and conflicts with VPIC governance structure.

## Recommendations

- **Be an active shareowner of fossil fuels in the VPIC portfolio.**
- **Continue VPIC's active shareowner proxy voting, and engagement** with both companies and public policy regulators regarding climate risk matters; maintain ongoing manager monitoring of climate change risk and opportunity management. Consider integrating distinctions between material and immaterial ESG risks, such as those defined by the Sustainable Accounting Standards Board ("SASB"), into VPIC's manager monitoring, and decisions over which shareholder proposals to invest VPIC's corporate engagement time and resources.
- **Continue VPIC's active engagement in institutional investor organizations** such as Ceres, INCR and SASB to further leverage VPIC's efforts.
- **Conduct a thorough review of VPIC's passive equity manager's proxy voting.** In the event that VPIC conducts a search for a passive equity manager, include consideration of managers' proxy voting policies and actual votes on climate change and other ESG issues to potentially further broaden VPIC's alignment of interests with the proxy voting done on VPIC's behalf by passively managed equity managers.
- **Reach out to other state public pension funds to explore possibility of creating a new passive equity investment vehicle that VPIC could potentially seed, designed to more closely align with VPIC's proxy voting** and engagement. The investment vehicle could be designed for VPIC and other U.S. public pension funds that do not have the resources to bring their passive equity investing in-house. Such a vehicle would offer long-term ongoing opportunity, regardless of market change, including long-term transformations in global energy. There appear to be options that could keep costs in line with VPIC's current passive equity comingled fund cost structure. Depending on how a fund was implemented, a new investment vehicle may involve higher management fees or costs than VPIC's current passive equity comingled funds.

As of June 30, 2016, 53% of VPIC equities were passively managed (\$806.5 million). PCA requested information from VPIC's current passive equity manager – SSGA, and from Northern Trust ("NT") on a potential new comingled vehicle. SSGA responded that it is not an option at this time for SSGA to launch a fund that implemented either custom public fund proxy voting guidelines, or guidelines of a third party proxy voting entity, as SSGA believes that their corporate policy is strong on ESG/climate issues (Appendix 3).

Northern Trust offered a few options: VPIC could invest in NT's existing R3000 Labor Select Index Fund, which votes proxies according to ISS's Taft Hartley proxy voting guidelines and outsources the proxy voting to ISS; NT could open a new comingled passive equity fund for public fund investors to either invest according to a specialized proxy voting guideline from a proxy service provider, (such as the ISS' or Glass Lewis' public fund or ESG guidelines), or to invest in a new vehicle that votes proxies according to a new public fund custom proxy voting guideline developed by VPIC (or developed jointly with other public funds). The preliminary fee schedules for these options are set forth in Appendix 4. They assume a minimum of \$250 million in assets to launch a new fund. The fee schedule is 3 basis points per annum for an S&P 500 (with securities lending) index fund, dropping to 2 basis points per annum for any investment \$500 million or more. Implementation of a non-U.S. fund is more expensive. A final alternative might be for VPIC and other funds to set up their own investment management entity, such as a limited partnership, then retain the appropriate resources for legal, custody to operate the fund, conduct an RFP for a manager to passively invest in a comingled fund the new entity's assets, and conduct a search to retain a proxy service provider to implement the custom proxy voting guidelines.

For the custom public proxy voting guideline option, that utilizes NT, rather than going through a new entity, the participating funds would not need to establish a more expensive independent investment partnership. In PCA's opinion, a challenge may be reaching agreement among a sufficient number of public funds on a new custom public fund proxy voting policy to seed a new passive commingled equity fund. The participating pension plans could consider establishing an entity to manage their collective process and collaborations.

- **Work with VPIC custodian to explore custodial reporting on ESG factors in VPIC portfolio compared to market**, possibly including ESG corporate ratings, and carbon footprint analysis to further support VPIC manager monitoring efforts.
- **Consider shifting a portion of VPIC assets to strategies that are expected to stimulate and benefit from long-term shifts to a low-carbon economy.**
  - Public equities - consider shifting a portion of VPIC's passively managed assets to a fund benchmarked to an index such as MSCI's Low Carbon Index, or FTSE's Green Revenue Index. Neither index divests from fossil fuels. Instead, they reweight securities in the underlying benchmark to either reduce the economy-wide carbon footprint, or increase the green exposure, while optimizing to maintain a close tracking to their core underlying benchmarks. Today, low carbon indexes provide meaningful reduction in exposure to carbon emissions. Over time, we expect low carbon indexes to more closely resemble the carbon exposure of the underlying market cap weighted benchmark as the world moves towards a low carbon economy. At this point in time, a VPIC investment in such a passive equity fund would increase VPIC's management fees. There are not yet commingled passive equity funds in which VPIC could invest based on either benchmark. An ETF does exist based on MSCI's Low Carbon Index.

PCA requested information from SSGA, Rhumblin (specializes in passive index funds) and MSCI on potential management fees to establish a new comingled low carbon fund. We used MSCI's Low Carbon Target Index as an example. Potential fee schedules are listed in Appendix 3 (SSGA), and Appendix 4 (Rhumblin). Any fund of this sort would include additional fees compared to VPIC's current passive equity, including index fees wrapped in due to the additional three to four basis points that MSCI currently charges for their custom ESG indexes.

Private equities - consider shifting a portion of VPIC's allocation to a strategy that includes a higher portion of clean technology investments. The costs involved in this strategy include the staff and Board time to determine a strategy, the costs and time of issuing an RFP, and may involve ongoing higher private equity management fees because VPIC's current sole private equity manager does not have an offering of this type.

## **Findings**

**As of June 30, 2016, VPIC held 3.6% of its \$3.74 billion total portfolio in fossil fuels.** This percentage is based on the MSCI ACWI IMI universe (broader than the VPIC MSCI ACWI reference benchmark because it includes securities for small cap companies, while the MSCI ACWI focuses on the large/mid cap universe), and defines fossil fuel companies as any company with proven fossil fuel reserves. Coal companies are defined using the California list of thermal coal companies, as provided by MSCI.

|                     |                      |
|---------------------|----------------------|
| Fossil fuels:       | 3.6% (\$134 million) |
| Thermal coal:       | 0.6% (\$22 million)  |
| ExxonMobil ("XOM"): | 0.3% (\$10 million)  |



At 3.6%, VPIC's actual exposure to fossil fuels was significantly lower than the benchmark. VPIC fossil fuel exposure was approximately half (54%) the 6.6% exposure of the MSCI ACWI exposure. Similarly, VPIC's Exxon exposure was 0.3% of its total portfolio, compared to 1.1% of the MSCI ACWI. VPIC's 0.6% exposure to thermal coal companies was below the 0.8% of the MSCI ACWI 0.8%.

Equities represented the largest VPIC asset class:

|                  |     |
|------------------|-----|
| Equities:        | 40% |
| Fixed Income:    | 32% |
| Absolute Return: | 17% |
| Alternatives:    | 11% |

The VPIC equity asset class held the vast majority VPIC's fossil fuel exposure:

|  |     |
|--|-----|
| VPIC share of fossil fuels in VPIC Equity Asset Class: | 79% |
| VPIC share of thermal coal in VPIC Equity Asset Class: | 92% |
| VPIC share of ExxonMobil in VPIC Equity Asset Class:   | 92% |

VPIC commingled funds (which includes all passively managed and many actively managed funds) held the largest share of VPIC's exposure to fossil fuels:

|   |     |
|---|-----|
| VPIC commingled funds share of VPIC fossil fuels: | 58% |
| VPIC commingled funds share of VPIC thermal coal: | 78% |
| VPIC commingled funds share of VPIC ExxonMobil:   | 97% |

Active managers held modest to zero fossil fuel and thermal coal positions, and zero Exxon.

VPIC's total percentage exposure to fossil fuels, thermal coal and Exxon were each less than that of an equity reference benchmark presented in VPIC performance reports – the MSCI ACWI.

**Risk and Return:** By definition, divestment reduces diversification and thus increases risk. Going forward rates of return differences between VPIC's actual portfolio and its hypothetical portfolios under divestment cannot be estimated. Future returns cannot be forecast by historic returns. Macro and industry experts have failed to predict dramatic shifts, such as shale production. In our opinion, the potential to accurately predict the timing, industry and company return impacts for VPIC is low, given the high uncertainty in policy, winning technologies, and which companies may successfully adapt. PCA analyzed VPIC managers' hypothetical historic rates of returns for trailing one-year and five-year periods under the three divestment scenarios. The VPIC manager's estimates were self-reported. All managers were asked to use the fossil fuel and thermal coal lists of companies provided by MSCI for all data responses. The results show that under divestment, VPIC managers would have had mixed results compared to their actual performance for VPIC – some marginally better and some marginally worse rates of return than their actual returns.

**Costs:** The largest measurable explicit costs of divestment to VPIC would be ongoing increased management fees. **Management fees would increase under each of these three divestment scenarios** because VPIC commingled funds, where the bulk of VPIC's fossil fuel were held, would have to be restructured into materially higher-cost SMA funds. The ongoing higher fees are proportionally higher for the divestment scenario with the lowest amount of assets to be divested - Exxon - because the fee changes would be the same, whether VPIC restructured and set up an SMA to divest just from ExxonMobil, or to divest from all fossil fuels. For two of VPIC's four commingled equity funds, the commingled fund manager, SSGA, responded that VPIC cannot be moved to an SMA for those funds because the current level of AUM in those two accounts is too small, and such a transition would be cost prohibitive. VPIC's current SMA managers that held any fossil fuels reported that management fees would remain largely unchanged. **Transaction costs:** VPIC's commingled fund managers, which held the vast majority of VPIC's fossil fuel positions, cannot divest VPIC from individual securities, because VPIC does not hold direct ownership of individual securities in a commingled fund. Thus these funds

would have to be closed and restructured as SMAs. In addition to the ongoing higher management fees of a new SMA, the costs to close down these funds and reopen SMAs, where possible, would include the administrative costs of opening an SMA, new custodial costs to allow VPIC to hold the individual securities, and transaction costs to buy in VPIC's name the full set of ex-fossil fuel, ex-thermal coal, or ex-Exxon securities. The fossil fuel companies in the MSCI ACWI IMI trade in highly liquid markets. Consistent these market dynamics, and reflecting the small exposure to fossil fuels and thermal coal in VPIC SMAs, the combined transaction costs to divest (sell) were estimated by VPIC SMA managers: VPIC SMA fossil fuels, \$185,422, and VPIC SMA thermal coal, \$35,914.

VPIC private equity fossil fuel divestment would require selling all holdings on the secondary market, likely at a significant discount to Net Asset Value (NAV). **Monitoring costs** would increase to insure compliance throughout the portfolio of VPIC manager's compliance with VPIC-specific divestment lists. **Opportunity costs** are expected to vary depending on the manager's target market, and timing.

**Phase-in: A short-term divestment** phase-in would incur essentially the same magnitude of costs, including transaction costs and management fees, as immediate divestment, and may be at a poor time in the energy market. **A long-term divestment period**, could be designed to divest more in line with a long-term technological shift to a lower carbon economy. For example, Vermont's energy policy sets forth a 30-year period for the state to transition to 90% reliance on renewable energy. A 30-year divestment period might harmonize better with a shift from global dependence on fossil fuels to a degree that renewables become a larger share of global energy consumption. Such a long-term divestment period, if implemented in incremental steps throughout the portfolio, with regular review and reassessment, could smooth out divestment impacts and reduce the impact of near-term market timing. The increases in management fees required to dismantle VPIC's inexpensive commingled funds, and restructure those assets into more expensive SMA's would still be borne by VPIC, but would be spread out over time, if VPIC did not dismantle and restructure all commingled funds at one time. In our opinion, extending divestment over five-to-seven-year business cycle would do little to address the key underlying global dependence on fossil fuels, although, depending on timing, it could potentially contribute to smoothing out return impacts somewhat.

Additional divestment from VPIC's commodity asset class would allow VPIC to completely exit all fossil fuel related exposure. We agree with VPIC's staff analysis that such divestment would undermine the strategic benefits including inflation protection and diversification that the asset allocation to commodities brings VPIC and require a reassessment of VPIC's asset allocation strategy.

**Divestment would negate VPIC's and the Vermont Treasurer's considerable efforts in proxy voting at fossil fuel companies**, even as climate change related shareholder proxies are expanding in voting share. VPIC's efforts went beyond voting their proxies and included in 2016 co-filing six proxy proposals at major oil companies, including Exxon. Engagement at the regulatory level, and through general letters with broad institutional investor organizations of which VPIC is a member could still be undertaken.

**Climate change risk is ubiquitous. Divesting from fossil fuels can reduce stranded asset risk, but does not address other climate change risks.** Divesting from fossil fuel suppliers:

- Has little proven impact on fossil fuel corporate policies, or on government policies.
- Increases investments in: sectors whose products and services generate demand for fossil fuel energy including utilities and transportation, sectors that generate significant CO2 emissions, such as construction, sectors that finance fossil fuel development, and sectors facing material physical risks of climate change including real estate and consumer goods.
- Retains investments in oilfield services and equipment, necessary to fossil fuel production.
- Does not overweight VPIC's exposure to companies potentially stimulating and benefitting from low-carbon and renewable energy solutions.

**Divestment from fossil fuels sets a 'slippery slope' precedent for VPIC to restrict its manager's stock selection based on criteria that are not proven to benefit VPIC.** Divesting Exxon, as a single company, and then excluding it going forward from VPIC's securities universe, would open VPIC to an entirely new degree of precedent setting for demands for individual companies to be excluded for many varieties of reasons.

## Introduction

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VPIC's mandate to PCA for this project was to review potential divestment and its potential impacts on the VPIC portfolio, and to work with Treasurer staff and NEPC LLC to seek to come to consensus recommendations, for consideration by the VPIC subcommittee that was formed to examine the potential impact of divestment from one or more of the following: a) coal, b) ExxonMobil, and c) fossil-fuel investments from equities, fixed income, commodities, and other investment classes. For this report, VPIC requested that: "Specifically, this study would look at all three tracks (coal, ExxonMobil, and fossil fuels) and would consider a) the impacts, if any, on the return and risk characteristics of the VPIC portfolio, b) impact on costs, if any, including transaction costs, c) impacts on the governance structure of VPIC, including construction, management and oversight, and d) impacts that phase-in of various divestment strategies could have on the previously identified considerations."

In our review of the considerable prior work and discussion by VPIC on potential divestment of fossil fuels, we found the reports by VPIC Staff to provide thorough and thoughtful analysis of the potential impacts of fossil fuel divestment. We find the related memorandums and comments by NEPC well-reasoned. PCA's findings are consistent with the findings and recommendation of VPIC staff. As summarized in the July 28, 2015 staff report to VPIC: "*Staff recommends that proposals for fossil-fuel/energy divestment be rejected. Staff believes that analysis demonstrates that such divestment fails to satisfy the criteria set forth in the VPIC ESG Policy, presents significant governance challenges, and is not in the best interest of the pension beneficiaries.*"

For this report, we seek to expand on the existing VPIC body of research by analyzing additional input from VPIC's managers on their estimates of return, risk, transaction costs, opportunity costs and management fees under three different scenarios: divestment from fossil fuels, thermal coal, and ExxonMobil. Managers were asked to estimate what hypothetical changes in their historic returns to VPIC under divestment, using their June 30, 2016 assets, and using June 30, 2016 as the endpoint for historic analysis. Similarly, managers were asked to estimate potential costs of potential divestment.

We further analyze divestment within the context of comparison to VPIC peer public pension funds actions regarding climate change issues. This report also assesses divestment strategies compared to other market alternatives available to institutional investors to address climate change issues, highlighting key parameters for institutional investors.

### The VPIC Regulatory Framework

The framework for PCA's review is the legal and regulatory framework that guides VPIC. VPIC and its investment managers are required to make VPIC's investments in accordance with the standards of care established by the prudent investor rule under 14A V.S.A. 902. As noted in staff reports, the VPIC is "required to consider general economic conditions, the possible effect of inflation or deflation, the total role that each investment or course of actions plays within the overall trust portfolio, the expected total return from income and the appreciation of capital, and an asset's special relationship or special value, if any, to the purposes of the trust or to one or more of the beneficiaries.

The State retirement plans are subject to Section 401 (a) of the Internal Revenue Code which provides that the plans must be maintained and the trustees must act for the exclusive benefit of the plan's beneficiaries. The exclusive benefit rule is codified in Vermont state law as follows:

Under any trust or custodial account, it shall be impossible at any time prior to the satisfaction of all liabilities with respect to members and their beneficiaries for any part of the corpus or income to be used for, or diverted to, purposes other than the exclusive benefit of members and their beneficiaries (3 V.S.A. 472a(b)).

VPIC's ESG policy, adopted November 2013, further states that: the Committee may choose to consider ESG Initiatives, provided they are consistent with the Committee's obligations to the members and beneficiaries of the participating retirement systems and with the standard of care established by the prudent investor rule. In cases where investment characteristics, including return, risk, liquidity, and compliance with the allocation policy are appropriate for the Portfolio, the Committee may consider ESG Initiatives that have a substantial, direct and measurable benefit to the interests of the Portfolio.

The VPIC ESG Policy states that ESG Initiatives will be evaluated according to five specific factors:

- 1) Any ESG Initiative must add to or complement and not dilute or compromise the overall Portfolio strategy. ESG Initiatives will be evaluated within the context of the Portfolio as a whole and not in isolation. The Committee is a long-term investor that strives to maximize investment returns without undue risk of loss.
- 2) The ESG Initiative must target risk-adjusted, market-rate returns and provide net returns equivalent to or higher than other available investments at commensurate levels of risk. Social benefits of the ESG Initiative will not justify lower risk adjusted returns or higher investment risk for the Portfolio or any asset class within the Portfolio.
- 3) ESG Initiatives must not exceed a reasonable weighting in the Portfolio, or skew a reasonable weighting in the Portfolio as a result of investment in or divestment from any one investment strategy, sector or geographic locations. ESG Initiatives should maintain the overall Portfolio's compliance with its asset allocation strategy. Social benefits of an ESG Initiative will not justify deviation from the Asset Allocation Plan adopted by the Committee.
- 4) ESG Initiatives requiring an investment should be managed by qualified discretionary investment managers. The Committee will not make any direct investments. Similarly, any divestment of Portfolio assets should be accomplished by a qualified discretionary investment manager in a manner designed to minimize transactional costs and minimize losses to the Portfolio.
- 5) Any benefits of ESG Initiatives should be able to be quantified, reviewed and monitored by the Committee, State Treasurer's staff and third-party consultants without inappropriate expenditure of time and resources. A review of both the investment performance and the collateral benefits will be undertaken for the purpose of determining whether the Committee will maintain and ESG Initiative. The collateral benefits of an ESG Initiative shall be measured, in terms of foregone return, transaction costs and monitoring costs, alongside the estimated return of the ESG Initiative.

Reductions in expected returns to VPIC, whether from investment return downturns or increased costs, could increase the unfunded liability of the pension plans managed by VPIC, and potentially negatively affect the plans' funded status. As of June 30, 2016, the funded status of the State Employees', State Teachers' and Municipal Employees' plans were 75%, 58%, and 86% respectively. Vermont State Employees' and Teachers' plans are considered mature pension plans. For example, the ratio of retirees and beneficiaries to active employees was reported at 78% for the Vermont State Employees, and 88% for the Teacher's as of June 30, 2016. The Vermont Municipal Employees Retirement plan ratio of retirees and beneficiaries to active employees was 39% as of June 30, 2016. The more mature a plan, the less flexibility it typically has to recover from any market downturn.

## The Numbers: Defining Fossil Fuels, Coal and ExxonMobil

VPIC allocates the largest share of its assets to the Equities asset class (40%), followed by Fixed Income, Absolute Return, Real Estate, Commodities, and Private Equity, as indicated below.

**VPIC Asset Allocation (June 30, 2016)**

| Asset Class            | Assets Under Management |              |
|------------------------|-------------------------|--------------|
|                        | (%)                     | (\$Millions) |
| <b>Total Plan</b>      | 100.0%                  | \$3,743.2    |
| <b>Equities</b>        | 40.0%                   | \$1,507.7    |
| <b>Fixed Income</b>    | 32.0%                   | \$1,194.4    |
| <b>Absolute Return</b> | 17.0%                   | \$647.8      |
| <b>Alternatives</b>    | 11.0%                   | \$393.2      |
| Real Estate            | 6.4%                    | \$239.9      |
| Commodities            | 2.8%                    | \$104.4      |
| Private Equity         | 1.3%                    | \$48.9       |

A reference portfolio for VPIC's Composite portfolio, as presented in NEPC's 2Q2016 Performance Report for VPIC, is 60% MSCI All Country World Index ("MSCI ACWI"), and 40% Barclay's Global Aggregate. To analyze manager estimates of divestment impacts based on consistent definitions of the set of securities to be divested, this analysis relies on an MSCI ACWI IMI ex-fossil fuel list of fossil fuel companies, and the MSCI ACWI IMI ex-thermal coal list of thermal coal companies.

The data analyzed in this report differs from that employed by staff in its 2015 analysis of the impact of divestment from fossil fuels and from coal. Staff's report identifies VPIC holdings by the Global Industrial Classification Standard ("GICS") codes. The GICS codes included in the VPIC study were energy (ex-Coal), Coal, and Utilities. Today's report concentrates on a narrower set of holdings, as outlined above. In particular, this study identifies fossil fuel holdings as only those companies that hold fossil fuel reserves, rather than the full GICS energy sector; we focus on thermal coal holdings, rather than the full GICS coal sector. Thermal coal is the coal used to produce energy, and generates high CO<sub>2</sub> emission, as compared to metallurgical coal, which is used primarily in the production of steel, and generates relatively little carbon emissions. The thermal coal list from MSCI is the list adopted by California pension fund CalSTRS in its restriction on domestic U.S. thermal coal companies from the CalSTRS portfolio. Third, we identify utilities as users of fossil fuels, rather than suppliers, and include utilities as major contributors to carbon emissions, but exclude them from this analysis of divestment, focusing on suppliers of fossil fuels. The narrower definitions in this report result in smaller estimates of VPIC total exposure to fossil fuels and coal than staff reports. In our opinion, these studies are consistent with each other.

We note a few particulars that result in differences in the number of fossil fuel companies excluded from the MSCI ACWI compared to the MSCI ACWI IMI related list that was shared with VPIC managers. First, the MSCI ACWI index is composed of large/mid cap stocks and had 2,468 constituents. The ACWI IMI list includes large/mid/small cap and had 8,616 constituents (as of Nov. 30). With the more comprehensive list, we were able to query VPIC managers that may have held small cap names in their portfolios.

Second, the list of fossil fuel companies sent to VPIC managers, and those that are excluded from the MSCI ACWI IMI in the MSCI ACWI ex-Fossil Fuels Index can differ due to the type of fossil fuel reserves. The MSCI ACWI IMI ex-Fossil Fuels Index removes companies that have *proven fossil fuel reserves used*



for energy purposes. There are companies that have reserves but don't use them for energy. This broader list, based on all proven fossil fuel reserves, was sent to VPIC managers.

Both MSCI ACWI IMI fossil fuel and thermal coal divestment lists relate to investable equity benchmarks. MSCI does not publish an index that just excludes ExxonMobil. No comparable fossil fuel divestment lists of securities exist for the Barclay's Global Aggregate. MSCI provided PCA with the relevant equity and bond security identifiers for all of the companies included in its fossil fuel lists, so that we could request comparable information from VPIC's equity and fixed income managers, and from any absolute return managers that invest in company-level securities. The lists were distributed to all VPIC managers, for the sole purpose of preparing materials for this report.

The divestment analysis in this report is constrained to company-level securities of publicly traded securities. Thus, MSCI fossil fuel lists were not applicable to VPIC's Commodities asset class, which is invested through commodities futures. VPIC's Real Estate asset class holds no fossil fuel securities. VPIC's private equity asset class holds none of the publicly traded companies on the fossil fuel divestment lists used here. However, VPIC's private equity manager, Harbourvest, reviewed all eight of its funds in which VPIC is invested, and provided information on the market value of any private equity securities that might be deemed fossil fuels. We incorporate Harbourvest's estimates into our overall analysis of VPIC's exposure to fossil fuels.

## VPIC Exposure to Fossil Fuels

To measure the VPIC exposure to ExxonMobil ("XOM", or "Exxon"), Thermal Coal ("ThC") and Fossil Fuel ("FF") holdings, we used the securities in the MSCI ACWI IMI Index of companies that held proven reserves of fossil fuels. All information is as of June 30, 2016 and provided by each VPIC manager. In total, VPIC held 3.6% (\$134 million) of its \$3.74 billion in assets under management ("AUM") in fossil fuel securities, 0.6% (\$24 million) in thermal coal securities, and 0.3% (\$11 million) in Exxon securities.

**VPIC Total Plan Exposure to XOM, Thermal Coal and Fossil Fuel Holdings**  
(June 30, 2016)

|                                | VPIC Assets Under Management |                 |            |                 |            |                 |            |                 |
|--------------------------------|------------------------------|-----------------|------------|-----------------|------------|-----------------|------------|-----------------|
|                                | Total Plan                   |                 | XOM        |                 | ThC        |                 | FF         |                 |
|                                | \$Millions                   | % of Total Plan | \$Millions | % of Total Plan | \$Millions | % of Total Plan | \$Millions | % of Total Plan |
| <b>Assets Under Management</b> | \$ 3,743                     | 100%            | \$11       | 0.3%            | \$24       | 0.6%            | \$134      | 3.6%            |

As shown below, equities comprise the vast majority of VPIC's fossil fuel, thermal coal, and Exxon investments. Equities accounted for 79% of VPIC's total fossil fuel investments. In both thermal coal and Exxon, 92% of VPIC's investments were in the Equity asset class. Commingled funds made up the bulk of these investments. Equities in commingled funds garnered 50% of the total FF investments, 71% of the thermal coal exposure and 89% of VPIC's investments in Exxon.

## VPIC Asset Class Exposure to XOM, Thermal Coal and Fossil Fuel Holdings

(June 30, 2016)

| VPIC Assets Under Management |            |                 |            |                 |            |                 |            |                 |
|------------------------------|------------|-----------------|------------|-----------------|------------|-----------------|------------|-----------------|
|                              | Total Plan |                 | XOM        |                 | ThC        |                 | FF         |                 |
|                              | \$Millions | % of Total Plan | \$Millions | % of Total Plan | \$Millions | % of Total Plan | \$Millions | % of Total Plan |
| <b>Total Plan</b>            | \$3,743    | 100%            | \$11       | 0.3%            | \$24       | 0.6%            | \$134      | 3.6%            |
| VPIC Assets Under Management |            |                 |            |                 |            |                 |            |                 |
|                              | \$Millions | % of Total Plan | \$Millions | % of Total XOM  | \$Millions | % of Total ThC  | \$Millions | % of Total FF   |
|                              |            |                 |            |                 |            |                 |            |                 |
| <b>Total Plan</b>            | \$3,743    | 100%            | \$10.9     | 0.3%            | \$23.9     | 0.6%            | \$134.0    | 3.6%            |
| <b>Asset Class</b>           |            |                 |            |                 |            |                 |            |                 |
| <b>Equities</b>              | \$1,508    | 40%             | \$10.0     | 92%             | \$21.9     | 92%             | \$106.1    | 79%             |
| Equities Commingled          | \$878      | 23%             | \$9.7      | 89%             | \$17.0     | 71%             | \$66.9     | 50%             |
| <b>Fixed Income Total</b>    | \$1,194    | 32%             | \$0.9      | 8%              | \$2.0      | 8%              | \$19.3     | 14%             |
| Fixed Income Commingled      | \$694      | 19%             | \$0.9      | 8%              | \$0.4      | 2%              | \$12.7     | 9%              |
| <b>Absolute Return</b>       | \$648      | 17%             | \$0.0      | 0%              | \$0.0      | 0%              | \$7.8      | 6%              |
| <b>Alternatives</b>          | \$393      | 11%             | \$0.0      | 0%              | \$0.0      | 0%              | \$0.7      | 1%              |

The fixed income asset class held no positions in Exxon or thermal coal companies, and accounted for 2% of VPIC's exposure to fossil fuel companies. Absolute return strategies held no positions in Exxon or thermal coal companies. The absolute return asset class held \$7.8 million, or 6% of VPIC's exposure to fossil fuel companies. Among the alternative investments – commodities, real estate and private equity, none of these asset classes held any of the fossil fuel companies under review. VPIC's private equity manager, Harbourvest, estimated that across all VPIC private equity funds, there were investments in private fossil fuel companies estimated at approximately \$0.7 million of the total \$48 million allocated to private equity within the \$393 million allocated to Alternatives. Private equity accounted for approximately 1% of VPIC fossil fuel exposure. The commodities strategies do not invest in companies, but in commodities futures. VPIC's Real Estate managers only invest in real estate, not fossil fuel companies.

Due to the concentration of VPIC's fossil fuel investments in equities, SSGA holds the largest share of VPIC's fossil fuel investments. SSGA manages five passive equity funds for VPIC, and one passive bond fund. Combined, SSGA manages approximately 25% of VPIC's total assets, and held 100% of VPIC's exposure to XOM, 36% of the exposure to thermal coal, and 44% of its exposure to fossil fuel securities.

VPIC's total percentage exposure to fossil fuels, thermal coal and Exxon were each less than that of an equity reference benchmark presented in VPIC performance reports – the MSCI ACWI. At 3.6%, VPIC's actual exposure to fossil fuels was significantly lower than the benchmark. VPIC fossil fuel exposure was approximately half (54%) the 6.6% exposure of the MSCI ACWI exposure. Similarly, VPIC's Exxon exposure was 0.3% of its total portfolio, compared to 1.1% of the MSCI ACWI. VPIC's 0.6% exposure to thermal coal companies was below the 0.8% of the MSCI ACWI 0.8%.

## VPIC Manager Exposure to XOM, Thermal Coal and Fossil Fuel Holdings

(June 30, 2016)

| VPIC Total Actual Exposure to Fossil Fuels<br>(June 30, 2016) |  |  |   | VPIC Equity Reference Benchmark Exposure to Fossil Fuels<br>(June 30, 2016) |  |  |   |
|---|--|--|---|---|--|--|---|
|   | Total<br>number of<br>ACWI IMI<br>companies    | VPIC Market<br>Value<br>(\$millions)                 | Percent of<br>VPIC Market<br>Value                |   | Total<br>number of<br>companies                | VPIC Market<br>Value<br>(\$millions)                 | Percent of<br>VPIC Market<br>Value                |
| <b>VPIC Total</b>   |  | \$3,743.2  | 100%  | <b>MSCI ACWI</b>  | 2,481  | \$2,433.0  | 100%  |
| VPIC Equity Reference Fossil Fuel Divestment Scenarios        |  |  |   | VPIC Equity Reference Fossil Fuel Divestment Scenarios                      |  |  |   |
|   | Number of<br>companies<br>removed<br>from ACWI | Assets<br>reallocated<br>within ACWI<br>(\$millions) | Percent of<br>VPIC Market<br>Value<br>Reallocated |   | Number of<br>companies<br>removed<br>from ACWI | Assets<br>reallocated<br>within ACWI<br>(\$millions) | Percent of<br>VPIC Market<br>Value<br>Reallocated |
| <b>MSCI ACWI ex-Exxon</b>                                     | 1  | \$10.0   | 0.3%  | <b>MSCI ACWI ex-Exxon</b>   | 1  | \$ 26.5  | 1.1%  |
| <b>MSCI ACWI ex-Thermal Coal</b>                              |  | \$ 22.2  | 0.6%  | <b>MSCI ACWI ex-Thermal Coal</b>  | 42   | \$ 20.0  | 0.8%  |
| <b>MSCI ACWI ex-Fossil Fuels</b>                              |  | \$ 134.0   | 3.6%  | <b>MSCI ACWI ex-Fossil Fuels</b>  | 128  | \$ 161.3   | 6.6%  |

Source: MSCI and VPIC managers.

VPIC passive equity funds, consistent with their mandates, hold the greatest number of fossil fuel and thermal coal companies (Appendix 5). XOM, a U.S. large cap security, was held by the two VPIC large cap mandated passive accounts. VPIC had no assets allocated to large cap U.S. active managers, a highly efficient market. Thus, no active equity managers held Exxon securities.

The VPIC S&P500 index account held the largest dollar amount of fossil fuel investments. The SSGA MSCI ACWI ex-US passive account held positions in 147 fossil fuel companies, the highest number of fossil fuel companies. The two SSGA S&P500 accounts held the second highest number of fossil fuel companies - 27 in each portfolio.

VPIC active managers held modest to zero fossil fuel and thermal coal positions. No active equity manager held over 12 fossil fuel companies or over four thermal coal companies. Commingled Emerging Market active manager, Aberdeen, held the largest assets in fossil fuels among active equity managers, with \$24.3 million aggregate invested in six fossil fuel holdings (0.65% of VPIC total portfolio AUM), and \$9.8 million in three thermal coal companies. Among the active fixed income managers, Guggenheim high yield held the most (eight) fossil fuel companies with combined \$4.4 million in fossil fuel assets.

## Potential Impacts of Divestment

The information presented below on the potential financial impacts of divestment seeks to incorporate each individual VPIC manager's assessment of these impacts. This approach allowed us to analyze estimates of a hypothetical impact on historic returns had VPIC mandated divestment, and estimate costs based on each manager's detailed information on their mandate and strategy for VPIC. We confine our financial estimates to the impacts reported by VPIC's managers. Thus, this report excludes estimates of potential returns foregone due to the future value of costs or return losses that cannot be reinvested.

## Financial Risk and Returns

By definition, divestment reduces diversification and thus increases risk. Divestment of a broad set of securities typically introduces a greater reduction in diversification. Among the three divestment tracks, fossil fuels carry the greatest diversification risk, followed by thermal coal, then ExxonMobil. Because of the minimal exposure to thermal coal and ExxonMobil in the VPIC portfolio, in our opinion, the impact of increased diversification risk of either of divestment strategy is not material.

Most of the information we received from the VPIC managers on risk and returns that we found comparable enough to report, concentrated on each manager's historical actual return results compared to the hypothetical results had they excluded fossil fuels, thermal coal, or ExxonMobil from their VPIC investment portfolios.

In our opinion, going forward, rates of return differences between VPIC's actual portfolio and its hypothetical portfolios under divestment cannot be estimated. Future returns and the timing of different returns cannot be projected based on historic returns, either for the fossil fuel industry, or for individual companies, such as ExxonMobil. In our opinion, carbon prices in particular are heavily influenced by government policies. Without consistent international policy frameworks that support a transition to a low carbon economy, we will face continued uncertainty in fossil fuel markets generally. Within that, thermal coal most likely faces the most immediate risks from a global transition to a low carbon economy.

PCA analyzed VPIC managers' hypothetical historic rates of returns for trailing one-year and five-year under the three divestment scenarios. The results show that under divestment VPIC managers would have had mixed results compared to their actual historic performance for VPIC – some marginally better and some marginally worse rates of return than their actual returns.

The VPIC manager managers provided estimates of the impact on returns under the three different divestment scenarios for the trailing one year and five years ending June 30, 2016 (Appendix 6). The equity managers each had a five-year track record for VPIC. Few managers had 10-year or longer term track records with VPIC for the current strategies. The fixed income, absolute return, and alternatives managers often had shorter VPIC track records.

Because each manager determined their hypothetical return estimates under divestment based on assumptions that they felt made the most sense for the fund/s they manage for VPIC, an aggregate total VPIC portfolio return estimate is not available. To provide some VPIC-wide portfolio estimates of divestment returns, we used the VPIC reference portfolio for its overall equity exposure from all asset classes – MSCI ACWI. As shown below, trailing one year returns ending June 30, 2016 for the MSCI ACWI were -3.7%. The MSCI ACWI ex-thermal coal and ex-fossil fuel indexes generated marginally better returns than the underlying benchmark during this period.

### MSCI ACWI Trailing Returns Compared to MSCI ACWI ex-Thermal Coal and ex-Fossil Fuel Indexes

| Asset Class  | Account | Assets Under Mgt | Trailing Returns |            |      |       |        |      |      |       |       |      |
|--|---------|------------------|------------------|------------|------|-------|--------|------|------|-------|-------|------|
|  |         |                  | 1-Year           |            |      |       | 5-Year |      |      |       |       |      |
|  |         |                  | (%)              | (Millions) | ACWI | x-XOM | x-ThC  | x-FF | ACWI | x-XOM | x-ThC | x-FF |
| <b>Total Plan</b>                                  |         | <b>100.0%</b>    | <b>\$3,743.2</b> |            |      |       |        |      |      |       |       |      |
| <b>MSCI ACWI (65% of VPIC Reference Portfolio)</b> |         |                  |                  | -3.7       | -    | -3.5  | -3.4   | 5.4  | -    | 5.7   | 8.0   |      |

Source: MSCI

For the five-year period ending June 30, 2016, the ex-thermal coal and ex-fossil fuel indexes show better returns than the underlying benchmark, with the ex-fossil fuel outperforming by over 2.5 percentage points during this period which was marked by a dramatic drop in oil prices.

The table below identifies the number of VPIC managers that estimated under divestment that they would have generated trailing rates of return below the actual rate of return they generated for VPIC. For the trailing one-year period, both passive managers holding XOM estimate that the returns had they excluded XOM would have been below the actual rates of return for VPIC. Two of the three managers holding thermal coal, and four of the 10 equity managers that held fossil fuels, estimate their returns would have been reduced had they excluded the thermal coal companies they held during that period.

| Number of Managers with Trailing x-XOM, x-ThC or x-FF returns below actual |          |          |          |          |          |          |
|--|----------|----------|----------|----------|----------|----------|
|  | 1 Year   |          |          | 5-Year   |          |          |
|  | x-XOM    | x-ThC    | x-FF     | x-XOM    | x-ThC    | x-FF     |
| <b>Equities</b>  |          |          |          |          |          |          |
| Total Number of funds  | 10       | 10       | 10       | 10       | 10       | 10       |
| Number of funds holding some FF securities                                 | 2        | 6        | 10       | 2        | 6        | 10       |
| <b>Number of funds with x-FF below actual return</b>                       | <b>2</b> | <b>4</b> | <b>4</b> | <b>0</b> | <b>2</b> | <b>3</b> |
| <b>Fixed</b>   |          |          |          |          |          |          |
| Total Number of funds  | 9        | 9        | 9        | 5        | 5        | 5        |
| Number of funds holding some FF securities                                 | 0        | 3        | 5        | 0        | 1        | 2        |
| <b>Number of funds with x-FF below actual return</b>                       | <b>0</b> | <b>2</b> | <b>2</b> | <b>0</b> | <b>1</b> | <b>0</b> |
| <b>Absolute Return</b>   |          |          |          |          |          |          |
| Total Number of funds  | 4        | 4        | 4        | 4        | 4        | 4        |
| Number of funds holding some FF securities                                 | 0        | 1        | 1        | 0        | 1        | 1        |
| <b>Number of funds with x-FF below actual return</b>                       | <b>0</b> | <b>0</b> | <b>1</b> | <b>0</b> | <b>0</b> | <b>1</b> |

The trailing five-year estimates by VPIC managers show that during this trailing period, a minority of managers would have hypothetically generated returns under these divestment scenarios below their actual returns.

We note that the estimates of fixed income securities historic returns can be more challenging than that for equities because bonds have specific maturity dates and issue dates. We confirm that VPIC's passive core bond manager, SSGA, which held fossil fuel securities historically during the trailing five-year period, conducted the additional analysis to identify corporate bonds by the fossil fuel companies identified for this report that may have expired before June 30, 2016, but that were part of the VPIC portfolio during the trailing 1-year or 5-year period.

In PCA's opinion, the hypothetical return estimates based on historic divestment scenarios cannot be used to project future returns. Overall market dynamics can shift the performance of fossil fuel stocks compared to the broader economic index and would affect all managers, passive and active. Potential performance going forward of active managers, without fossil fuel restrictions, and with fossil fuel security restrictions by VPIC will also be affected by how their security selection without restrictions will compare to a restricted portfolio.

## Costs

### Management Fees from Portfolio Restructuring

Based on the structure of the VPIC portfolio, the largest measurable explicit costs of divestment for the VPIC portfolio are expected to be ongoing increased management fees. Management fees would increase under any of these divestment scenarios because VPIC commingled funds held the bulk of VPIC's fossil fuel. VPIC cannot divest from individual securities in commingled funds. VPIC's commingled funds would have to be closed, and the assets reallocated into materially higher-cost SMA funds. The



ongoing higher fees would be proportionally higher for divestment scenarios with the lowest amount of assets to be divested because the fee changes would be the same, whether VPIC restructured to divest just from ExxonMobil, or to divest from all fossil fuels.

VPIC held fossil fuel securities in a total of nine commingled funds that held public securities. The private equity portfolio also held fossil fuel assets. Among the nine commingled funds with publicly held securities, manager responses indicate that three of the funds would be cost prohibitive to move to an SMA structure, due to the relatively small AUM in each fund (Appendix 7). These commingled funds were the SSGA S&P Mid Cap, SSGA MSCI ACWI ex-US, and SSGA Barclays Aggregate. The managers of five other commingled funds indicate that fees would be meaningfully increased under a SMA structure. In addition to higher management fees, VPIC would have to pay its custodian to open and maintain custody of any securities held in an SMA that, in comingled funds, are part of the manager fees. Not all VPIC managers offered estimates of fee changes for this report.

As an example, VPIC's largest exposure to fossil fuels in a single account was \$27.4 million (20% of VPIC's total fossil fuel exposure) held in the SSGA S&P500 comingled passively managed account. In total, this account held \$453 million VPIC assets on June 30, 2016. SSGA's preliminary fee estimates indicate that, should VPIC restructure this comingled account into an SMA, the annual fee increase per annum would be approximately \$65,000, added to VPIC's current annual fee of \$137,500 per year. Over 30 years, divestment from VPIC's largest fossil fuel holding would result in \$1.95 million net additional fees that would be costs rather than invested.

VPIC's largest exposure to thermal coal in a single account was \$9.8 million (44% of total thermal coal exposure) was found in Aberdeen's Emerging Market Equity comingled fund. Aberdeen managed \$247 million VPIC assets in this account. Aberdeen's preliminary fee estimates indicate that, should VPIC restructure this comingled account into an SMA, the annual fee increase per annum would be approximately \$132,500, added to VPIC's current annual fee of \$1,867,000 per year. Over 30 years, divestment from VPIC's largest thermal coal holding would result in \$3.98 million net additional fees that would be costs rather than invested. These management fees do not include the additional ongoing cost to open and maintain a separate account at VPIC's custodian to house these emerging market securities. Emerging market custodial fees are meaningfully higher than those for large developed markets.

One commingled fund, (GAM fixed income unconstrained portfolio), suggested that the cost would be minimal to move VPIC to a different class without fossil fuels. GAM, which managed 3.5% of VPIC assets, held no XOM, and such a minimal exposure to thermal coal and fossil fuels that they responded that the exposure would be de minimis. VPIC's SMA managers reported that fees would remain largely unchanged.

VPIC's private equity manager, Harbourvest, indicated that fossil fuel divestment would require selling all holdings on the secondary market, likely at a significant discount to Net Asset Value (NAV). To reinvest those assets without fossil fuel exposure, Harbourvest suggested that VPIC would have to move their assets to a co-investment fund with opt-out provisions to opt out of any fossil fuel related securities.

### Transaction Costs

For this report, we identify transaction costs strictly as the costs to sell (divest) securities that were in the VPIC portfolio. This definition differs from the broader use of transaction costs in the VPIC staff divestment report. The VPIC report includes direct security transaction costs and the portfolio restructuring costs discussed above in transaction costs. Transaction costs as defined here are not relevant to VPIC's comingled fund managers, where the vast majority of VPIC's fossil fuel positions were held because they cannot divest individual securities.

VPIC could divest from its SMAs, so transaction costs for selling these securities are relevant to VPIC's SMAs. VPIC SMA managers estimated the transaction costs to divest. Combined together for all VPIC SMA managers, the transaction costs for SMA divestment were estimated at, \$185,422 for fossil fuels, \$35,914 for thermal coal, and \$68 for ExxonMobil divestment (Appendix 8). In our opinion, these small numbers are consistent with the small exposure to fossil fuels in VPIC SMAs and the market dynamics for the fossil fuel companies in the MSCI ACWI. These securities IMI trade in highly liquid markets.

We note that estimating transaction costs for corporate bonds is more difficult than estimating these costs for equities. Bonds trade based on the bid-ask spread at any given moment, thus, depending on when the manager assumes the divestment would occur, the estimate can vary. In total, we find that SMA manager estimates of transaction costs to divest from VPIC fossil fuels, thermal coal or Exxon would be de minimis.

In addition to restructuring and transaction costs, VPIC monitoring costs would increase under divestment scenarios to insure compliance throughout the portfolio of VPIC manager's compliance with VPIC-specific divestment lists. Opportunity costs are expected to vary depending on the manager's target market, and timing.

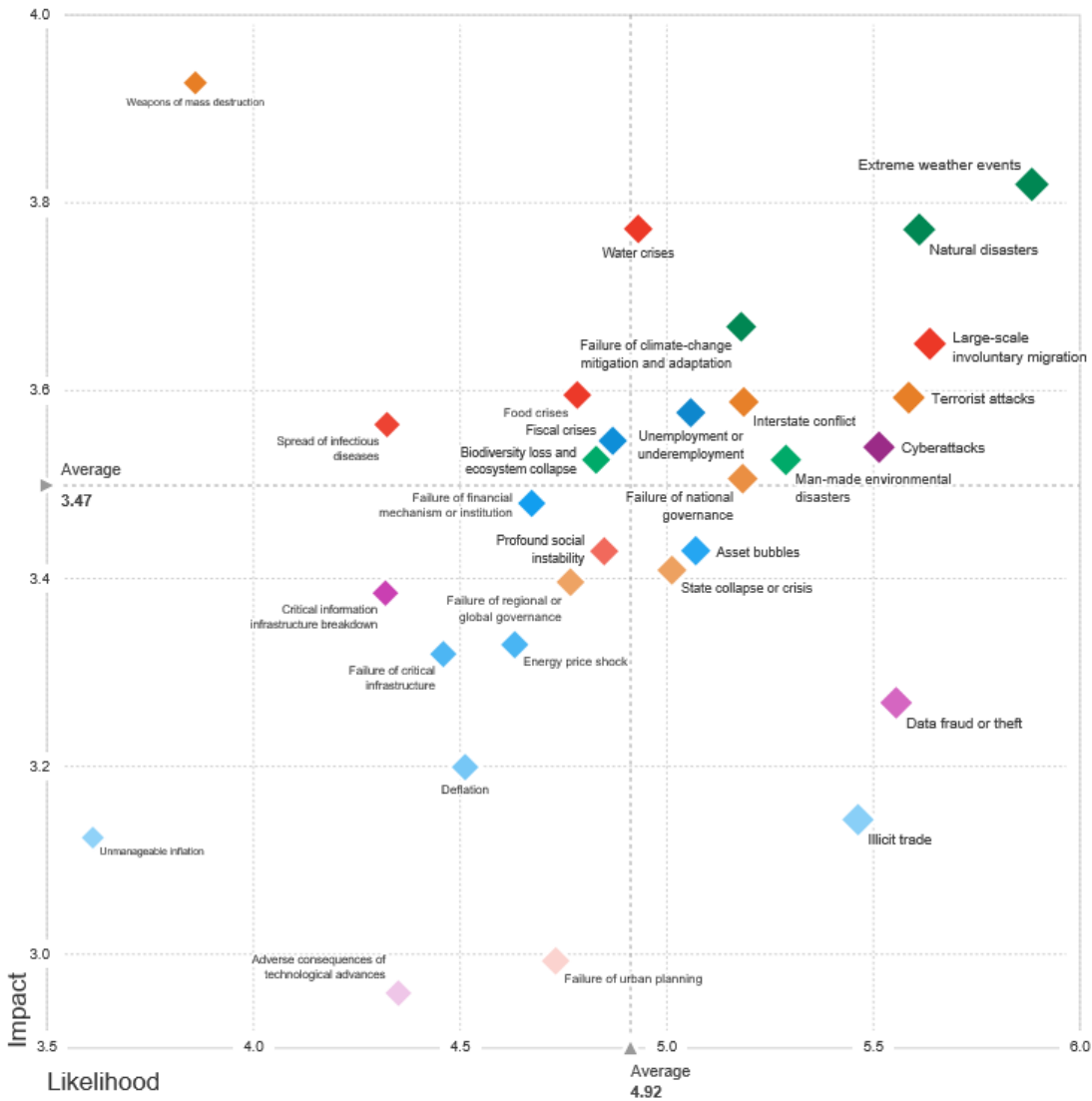
## **Climate Risks**

The above analysis focused on divestment impacts, including costs, returns and diversification risk. In this section, we provide background on the climate risks that motivate portfolio management efforts to assess, monitor and manage these risks, including fossil fuel divestment. We then consider the potential impact of divestment in managing these risks.

There is growing evidence that significant risks face the global economy and investors from climate change. As reported in "Assessing the Global Climate in 2016" by the NOAA National Centers for Environmental Information ("NCEI"): "the globally averaged temperature over land and ocean surfaces for 2016 was the highest since record keeping began in 1880,"..."surpassing the previous record set the previous year".

In January, 2017, ahead of its annual meeting of global political and business leaders in Davos, Switzerland, the World Economic Forum ("WEF") reported climate change is growing in prominence as "humanity's biggest threat". The WEF surveyed 750 experts on what the most likely and impactful risks facing humanity are in 2017. Extreme weather events ranked as the highest likelihood, second only to weapons of mass destruction in severity of impact. Three of the 2017 top five risks in terms of impact were environmental related: extreme weather events, water crises, and failure of climate-change mitigation and adaptation.

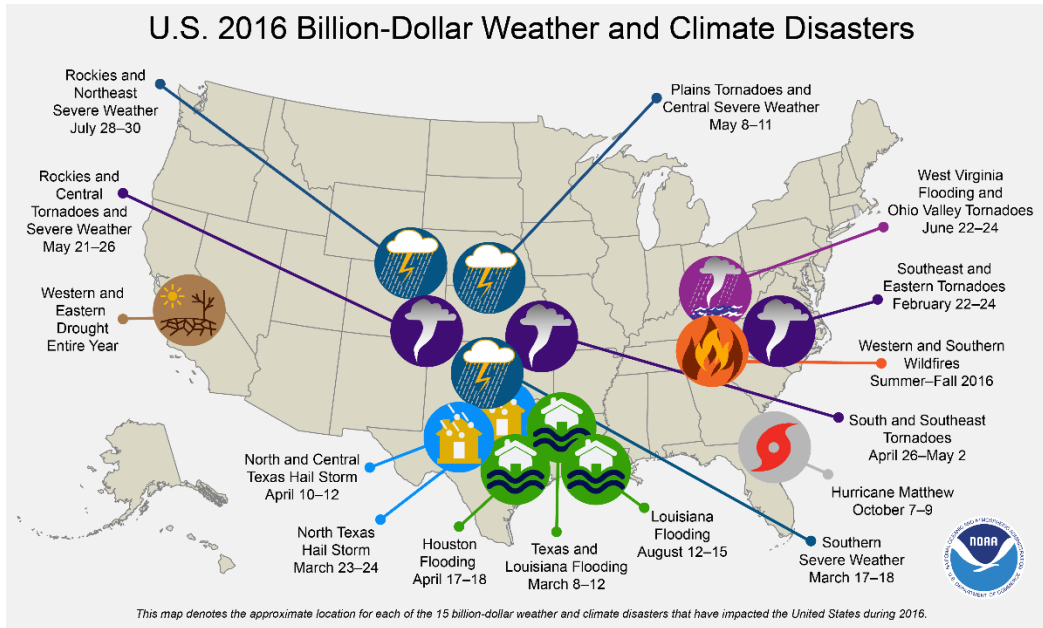
## World Economic Forum: 2017 Global Risks Landscape



Source: World Economic Forum

Data reported from the United States shows the recorded physical effects of weather and climate disasters are increasing. The NCEI reported in "Assessing the Global Climate in 2016":

"In 2016, there were 15 weather and climate disaster events with losses exceeding \$1 billion each across the United States. These events included a drought event, 4 flooding events, 8 severe storm events, a tropical cyclone event, and a wildfire event...The U.S. 4 billion-dollar inland flood events during 2016, doubled the previous record, as no more than 2 inland flood events have occurred in a year since 1980... Overall, these events resulted in the deaths of 138 people and had significant economic effects on the areas impacted. The 1980–2016 annual average is 5.5 events (CPI-adjusted); the annual average for the most recent five years (2012–2016) is 10.6 events (CPI-adjusted)."



Source: National Centers for Environmental Information

The information above illustrates that there appears to be a growing consensus, and increasing factual information indicating that global climate-related risks are increasing. In a paper published in *Nature* in 2015, Marshall Burke, Solomon Hsiang, and Edward Miguel, economists based at Stanford and the University of California Berkeley, presented a new analysis that found that:

business as usual emissions throughout the 21<sup>st</sup> century will decrease per capita GDP by 23% below what it would otherwise be, with the possibility of a much larger impact. Secondly, they conclude that countries with an average yearly temperature greater than 55°F will see decreased economic growth as temperatures rise. For cooler countries, warming will be an economic boon. This non-linear response creates a massive redistribution of future growth, away from hot regions and toward cool regions, with countries like those in Scandinavia likely experiencing substantial benefits, while those in hot regions through Asia, Africa, and the Americas, as well as island nations, facing potentially huge losses.

Research from different perspectives illustrates that climate change may impact many industries, but in different ways. For example, SASB's October, 2016 Climate Risk Technical Bulletin finds that climate risk is ubiquitous. SASB identified material financial impacts from climate change for companies in 72 out of 79 industries, representing \$27.5 trillion, or 93% of the U.S. equity market. In the forward to the SASB bulletin, Henry M. Paulson, 74<sup>th</sup> United States Secretary of the Treasury, Co-Chair, Risky Business Project, and Robert E. Rubin, 70<sup>th</sup> United States Secretary of the Treasury, Member, Risky Business Project highlight that: "As this new report from SASB makes clear, no matter what actions we take tomorrow, there are real, material climate risks that have already been "baked in" to the economy." Paulson and Rubin cite three examples out of the many areas SASB found to be vulnerable to climate risk.

Agricultural companies: Extreme weather events, heat, and humidity can materially affect the industry's production efficiency and supply chain.

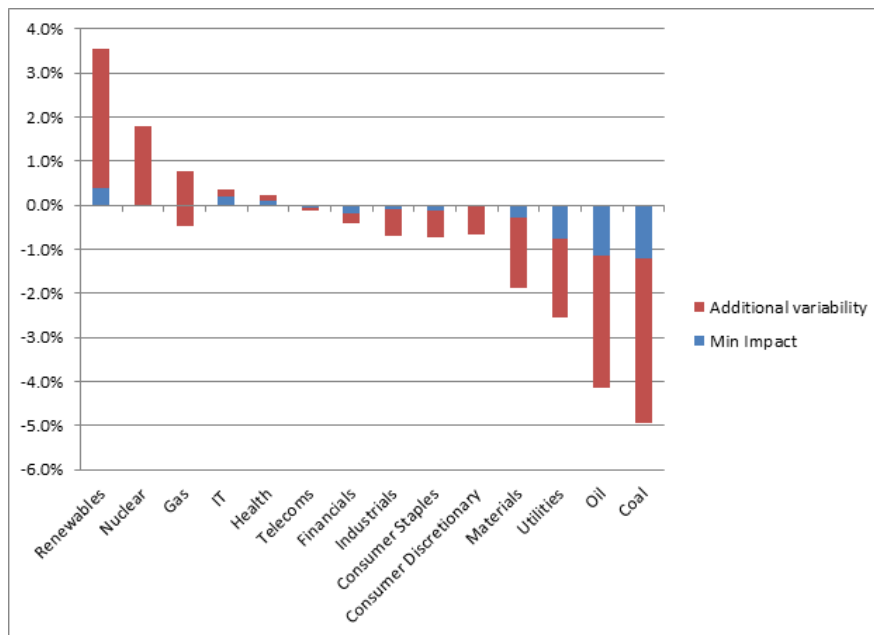
Commercial and residential real estate: Sea level rise and increased storms are expected to have significant consequences on coastal property and infrastructure.

Manufacturing industry: Dangerous levels of extreme heat and rising seas may cause large disruptions in supply chain operations and labor productivity--especially as many manufacturing plants are located in high-risk areas such as the Southeast.

The non-renewable energy sector can be materially affected by a global shift toward renewables. Government energy policies can exert a material influence on energy markets. Governments are adopting different energy policy approaches to potential climate risks. Some governments are actively moving to support a transition to a low carbon economy. For example, France passed a law mandating that investors and banks report on the carbon risks and climate friendliness of their portfolios, with disclosures separated between carbon risk and friendliness objectives. In December 2016, France inaugurated the world's first 'solar highway', a road paved with solar panels that are expected to provide enough energy to power the street lights of the small Normandy town of Tourouvre. According to Bloomberg, Colas SA, a subsidiary of France's construction firm, Bouygues Group, has plans to test the technology across four continents at 100 sites in 2017. Saudi Arabia, one of the world's biggest oil producers is seeking up to USD 50 billion of investment in solar and wind energy. U.S. policy may support fossil fuels longer than other countries. In that event, U.S. fossil fuel companies may fare better, and U.S. low carbon technologies may fare worse in the near to medium term than their respective non-U.S. counterparts from countries that provide a policy framework aimed at supporting a transition to a low carbon economy. Over the long term, if the global markets transition to low carbon energy, U.S. companies may be less competitive than counterparts from countries whose governments developed clear energy transition policies.

Mercer finds in its 2015 report "Investing in a Time of Climate Change", that:

climate risk impacts may vary considerably among industries...The figure below shows the potential climate impact on median annual returns for industry sectors over the next 35 years... The energy sector is broken into its sub-sectors, as one of the most negatively impacted industries in Mercer estimates.



Source: Mercer

Results such as Mercer's can be used as reinforcement of an argument for sector-wide fossil fuel divestment based on the potential for stranded fossil fuel assets. UBS's 2016 paper, "Stranded Assets:



What lies beneath" provides an analytical framework for thinking about the stranded assets debate, based on a study led by Dr. Dinah Koehler and Bruno Bertocci of the UBS Sustainable Investors team. Using scenario analysis, they isolate how publicly traded oil and gas companies may be affected by a steep drop in future consumption of oil and gas.

The author's key conclusions include:

"Any analysis of the investment implications of the stranded assets hypothesis must take market pricing and dynamics into account; Not all asset value associated with reserves are automatically lost. It depends on whether the price of oil justifies the effort to extract and produce a barrel of oil; at any moment in time a certain amount of known oil and gas reserves cannot be economically produced; even under the most extreme scenarios of reduced oil/gas consumption, many oil/gas companies in the MSCI World Index retain value in the next 10-20 years; There are some oil/gas companies that are not an attractive investment today, and continue to lag behind their peers at various future scenarios; If divestment is chosen as an investment strategy, it should be targeted at those oil/gas companies where the investment is unlikely to be recovered or exceeded in the next 10-20 years."

In our opinion, climate risks to investments, including potentially stranded assets, have become a potentially material investment issue. We believe divestment of fossil fuels, based on the definition employed here, could directly address the risk of potentially stranded assets, primarily in public equities. Divestment of thermal coal could directly address potential stranded asset risk within the sub-sector of fossil fuels that is perhaps at highest risk of becoming stranded. Thermal coal is viewed as a type of fossil fuel that is at highest risk of becoming stranded due to its relatively high carbon emissions. Divestment from Exxon would not significantly reduce VPIC's total exposure to stranded assets.

We believe divestment of all fossil fuels is a blunt tool to apply across a large industry that exhibits varied outlooks for each type of fossil fuel. As one VPIC manager stated "with regard to the stranded asset thesis, Mondrian does not believe the risk of stranded assets applies equally across the fuels as the world must consider the substitutability of each fuel, and the cost to implement substitution. Mondrian believes coal is most at risk, given its higher carbon intensity and the ease of substituting its use in generating electricity. Oil, while next in line in terms of carbon intensity, is primarily used in transportation, and despite multi-year investments in alternatives, the world still has not found an economically viable substitute. Finally, gas, with its lower carbon intensity, would appear to have the lowest risk of stranded reserves."

Divesting from a single fossil fuel company, in this case ExxonMobil, in our opinion, raises additional company-level investment questions. In our opinion, it is not already determined which energy companies will become obsolete, and which will manage to transition to a new energy economy over time. It is conceivable that a dominant fossil fuel company of the 20<sup>th</sup> century transitions to become a powerful force in a 21<sup>st</sup> century (or beyond) low carbon energy global economy.

For example, in January 2017, oil and gas majors, Royal Dutch Shell and Total SA announced, along with Toyota Motor Corp. and four of its biggest car-making peers, plans to invest a combined \$10.7 billion in hydrogen-related products within five years. In all, 13 energy transport and industrial companies are forming a hydrogen council to consult with policy makers and highlight its benefits to the public as the world seeks to switch from dirtier energy sources, according to a joint statement issued from Davos, Switzerland. The wager demonstrates that batteries aren't the only way to reduce pollution from cars, homes and utilities that are contributing to climate change.

On another front, Royal Dutch Shell, SABIC and Dow/DuPont have made strategic moves to change how petroleum is used, from mostly combustion, which generates carbon emissions, to mostly materials (polymers). Shell's chief oil and gas scientist, Joe Powell, told colleagues at Massachusetts Institute of

Technology that there is no reason the industry could not completely flip the ratio, with 80 percent of oil and gas going to material feedstocks. Such a move could, on the one hand, make use of a stranded resource (oil and gas), and on the other fill a resource vacuum (low carbon building materials). Buildings account for about 30 percent of emissions, about half of which comes from the "embodied" carbon emissions of the building itself -the energy it takes to make the building materials, transport them and build the building. Portland cement alone accounts for five percent of all carbon emissions worldwide. Steel and aluminum require intense industrial heat to manufacture. Lumber, in general, needs to stay in the ground as trees to sequester as much atmospheric carbon as possible. With the world in the midst of an unprecedented period of urbanization, and three billion people set to enter the global middle class in the coming decades, emissions from construction are at an all-time high.

In our opinion, divestment from a single fossil fuel company does little to reduce VPIC's stranded asset risk overall, and raises company selection risks in a period of enormous energy transition. In our opinion, because of the global dependence on fossil fuels, divestment of all fossil fuels could expose VPIC to technological shift risks if divestment is not phased in over a long, for example, 30-year period.

### **Phasing in Various Fossil Fuel Divestment Strategies**

A short-term divestment phase-in would likely incur essentially the same magnitude of costs as immediate divestment, and may be at a poor time in the energy market. In our opinion, divestment of fossil fuels over a business cycle time frame would not address the key long-term divestment risk of global dependence on fossil fuel energy. A long term, for example, 30-year divestment, geared toward implementation over a technological change cycle that was taken in incremental steps throughout the portfolio, with regular review and reassessment, could smooth out divestment impacts. The increases in management fees required to dismantle VPIC's inexpensive commingled funds and restructure those assets into more expensive SMA's would still be borne by VPIC, just spread out over time. However, a long-term strategy might increase VPIC's asset allocation analyses costs and staff and Board review time.

Financial analysts vary on near-term prospects for fossil fuel companies, as they do on other market investments and the market as a whole. For example, VPIC International Equity manager Mondrian responded to this survey with the overview perspective that "Our analysis indicates that fossil fuel companies, despite low long term growth, are undervalued. We believe the portfolio would lose exposure to the potential real returns offered by these companies, should they be divested". Macquarie Research (October 13, 2016) held a different opinion: "The [integrated oil] sector still looks expensive versus global markets, with forward PERS [price earnings ratios] at historical highs relative to normal levels despite the recent sharp fall (the integrations traditionally trade at 20-30% discounts to the key indices)."

Long term outlooks for the carbon energy market also range widely. The U.S. Energy Information Administration, International Energy Outlook 2016 estimates fossil fuels to have accounted for 84% of world energy consumption in 2012, nuclear 4%, and other, which includes renewables, at 12%. Overall world energy consumption is projected to grow at an annual average rate of 1.4% through 2040. By 2040, fossil fuels, combined (liquids, natural gas and coal) are projected to account for 78% of total world energy consumption.

| World Energy Consumption |             |             |  |
|--------------------------|-------------|-------------|--|
| Fuel                     | History     |             | Projections                                  |
|                          | 2012        | 2040        | Average Annual<br>Percent Change,<br>2012-40 |
| Liquids                  | 33%         | 30%         | 1.1  |
| Natural Gas              | 23%         | 26%         | 1.9  |
| Coal                     | 28%         | 22%         | 0.6  |
| Nuclear                  | 4%          | 6%          | 2.3  |
| Other (renew)            | 12%         | 16%         | 2.6  |
| <b>Total</b>             | <b>100%</b> | <b>100%</b> | <b>1.4</b>                                   |

Source: U.S. Energy Information Administration

Optimistic predictions, such as in the International Energy Association's ("IEA") 30-year forecasts expect continued strong global demand for oil and gas, based on increasing population, and expected inability of the global economy to meet those demands with renewables and energy efficiency.

Because PCA's mandate for this research involved discussion of potential divestment from a single company – ExxonMobil, for this report, we asked ExxonMobil and three competing integrated oil and gas majors (Chevron, Royal Dutch Shell and BP) to provide us with answers to specific questions regarding the potentially material risks regarding environmental concerns. Specifically, we asked each firm to provide data according to SASB's accounting standards and metrics for this industry sector. We received no response from Chevron, Shell or BP. Exxon's responses to our questionnaire for this report echo the long-term optimistic assumptions of the IEA (Appendix 9).

At the other extreme, as reported by Responsible Investor, Lou Allstadt, former Executive Vice President at Mobil Oil involved in the ExxonMobil merger in 1999, and current town trustee of Cooperstown, N.Y. which divested its de minimis exposure to fossil fuels, questions the survival of the oil majors "I don't think they are going to survive, I personally divested from ExxonMobil three years ago and reinvested in renewables. Allstadt also referred more broadly to the weak financial conditions that fossil fuels companies are facing. He stated they are being "squeezed from all sides", low prices which force them to increase borrowing, reduce share buybacks, dividends and investments in new projects, OPEC's ability to destroy their profitability by driving down oil prices through output fluctuation, or increasing government regulation and competition from cleaner sources of energy, among other factors.

Some observers feel that the reason the 2015 Paris Agreement succeeded was because the technological advances and potential competitiveness of renewables make them economically viable in a way they were not even five years prior. From this latter perspective, Carbon Tracker Executive Director Mark Campanale argues that from an engagement perspective, shareholders and regulators should put fossil fuel companies into an 'orderly wind down' while increasing investment in renewables.

More generally, the Risky Business November 2016 report, "From Risk to Return: Investing in a Clean Energy Economy" finds that "seriously addressing climate change requires reducing greenhouse gas emissions by at least 80 percent by 2050 in the U.S. and across all major economies". The report finds that this goal is "technically and economically achievable using commercial or near-commercial technology". The report is a product of the Risky Business Project, co-chaired by financial leaders involved in efforts to reduce climate change risks - Michael Bloomberg, Henry M. Paulson, Jr. and Thomas Steyer. The 2014 inaugural report "Risky Business: The Economic Risks of Climate Change in the United States" found that the economic risks from unmitigated climate change to American business and long-term investors are large and unacceptable. This second report turns to the question: how to respond to those risks. Risky Business modeled four different potential approaches, without endorsing

any approach, including: 1) Rely heavily on renewable energy, 2) Significantly expand reliance on nuclear energy, 3) Include a substantial amount of fossil fuel power plants with carbon capture and storage, and 4) generate electricity from a relatively even mix of these three zero- and low-carbon resources. "Given an appropriate policy framework, we expect these investments to be made largely by the private sector and consumers, and to yield significant returns." The report argues that "the large investment needs of a transition to a clean energy economy are manageable, especially when compared to the costs that would be imposed by unmitigated climate change and continued fossil fuel dependence, and comparable to other recent investments, such as in unconventional oil and gas production, and in computers and software. Those investments have transformed the American economy, yielding huge returns to those businesses that led in the development of new technologies and products."

In our opinion, a long-term divestment strategy would likely bear less market risk than an immediate fossil fuel divestment strategy that cannot incorporate longer-term changes in technology and global policy.

## **Divestment within the Context of VPIC Governance Structure**

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Divestment of fossil fuels, thermal coal, or ExxonMobil should be considered in relation to the VPIC's governance structure, including its relation to VPIC's asset allocation, its equity investment strategy, and VPIC's approach to proxy voting and engagement.

### **VPIC Asset Allocation**

As discussed above, divestment from fossil fuels, thermal coal, or ExxonMobil would require significant restructuring of the VPIC investment manager structure because of the dominant share of fossil fuel, thermal coal, and ExxonMobil exposure in commingled funds. To divest from fossil fuels, VPIC would likely have to conduct an asset allocation analysis that addressed how VPIC would restructure to accomplish divestment in its SSGA S&P Mid Cap 400 fund, its SSGA MSCI ACWI ex-U.S. fund, and its SSGA Barclays Aggregate Bond Index fund that each hold too few assets for VPIC to be able to transition to a SMA.

VPIC's overall investment strategy is designed to diversify among asset classes. As discussed above, we believe divestment of fossil fuels can be a tool primarily in public equities to remove exposure to potentially stranded fossil fuel assets. Divestment does not help VPIC manage other climate change material risks evident in other industries, or provide enhanced exposure to companies involved in energy efficiency and renewable energy. Divestment within VPIC's public equity asset class adds diversification risks if all fossil fuels are divested, and introduces technological shift risks if stocks are not divested over a long period. In our opinion, VPIC's limited exposure to thermal coal and to ExxonMobil would result in minimal diversification or technological changes risks from either of these divestment paths. Thermal coal and ExxonMobil divestment offer equally limited reduction in exposure to potentially stranded assets, compared to VPIC's overall investment portfolio.

In our opinion, divestment, with a proportional reallocation to non-fossil fuel companies increases investments in economic sectors:

- whose products and services generate demand for fossil fuel energy including utilities and transportation;
- that generate significant CO2 emissions, such as construction;
- that finance fossil fuel development; and

- face material physical risks of climate change including agriculture, real estate and consumer goods.

Divestment does not overweight VPIC's exposure to companies potentially stimulating and benefitting from low-carbon and renewable energy solutions.

Divesting from fossil fuel suppliers, in our opinion, has limited direct impact on fossil fuel corporate policies. PCA's 2014 review of the impacts of divestment found that studies suggest that the measurable financial impact on the companies targeted for divestment has been largely minimal. A comprehensive review (Oxford, 2013) found that divestment campaigns' successes have not been through the direct impact on the company's financials, but through a larger 'stigmatization' impact which resulted in successful lobbying of governments for restrictive legislation, which in turn could have meaningful effects on the business practices of targeted companies/industries. This study does not compare engagement strategies with divestment strategies.

Divestment from fossil fuels in the publicly listed bond market can be expected to have the same types of benefits and constraints as in equities. Because of VPIC's minor fixed income exposure to fossil fuel, thermal coal, or ExxonMobil, divestment impacts would be more muted than in equities. One difference between equities and bonds is that because new bonds are regularly issued, while divestment doesn't increase green bond exposure, investments in new green bonds can directly help provide financing for green initiatives.

Real Estate holds no fossil fuels as defined in this report. Divestment from fossil fuels does nothing in the real estate market to address the real physical risks that have become of increasing concern with climate change. Divestment and restrictions on future fossil fuel investments in private equity markets could protect VPIC from any stranded asset risk in its private equity portfolio. Divestment does not increase investments in green privately held companies. Unlike public equity, investment in green companies could directly provide financing to green initiatives.

VPIC's commodities asset class exposes VPIC to fossil fuel commodity markets through commodity futures investments. Divestment based on the definitions of used here for fossil fuels and thermal coal, is not relevant because the VPIC commodities asset class gains exposure through commodities futures, not holdings of any individual securities that own fossil fuel reserves. Any divestment from VPIC's commodities asset class would necessitate eliminating this asset class from VPIC's portfolio. Such an action would conflict with VPIC's current asset allocation strategy.

VPIC's absolute return asset class exposure to stranded assets, and to broader climate change risks, cannot be easily assessed. These assets are invested in some cases through fund of funds, and often through derivatives rather than direct holdings of securities of individual companies. In our opinion, the estimates that result from this study provide little insight into the potential risks to VPIC's absolute return managers in the event of any significant disruptive climate change risk.

In our opinion, addressing potential climate change risks and opportunities in the VPIC portfolio is best accomplished through a bottom up analysis within each asset class.

## **VPIC Equity Investment Strategy**

VPIC allocates its publicly held equity assets primarily through passive investments to gain overall market exposure. As of June 30, 2016, 53% of VPIC equities were passively managed (\$806.5 million). VPIC complements these investments with actively managed investments in discrete market segments where VPIC believes active management can increase its risk adjusted returns.



In our opinion, the risk of stranded assets is one of many potential long-term risks that VPIC must consider, including other climate risks in its passively managed equity funds, as discussed above. Today, VPIC's equities are managed against market-cap weighted indexes. These indexes do not explicitly account for potentially stranded asset risks. Market cap weighted indexes also include other biases. There exist a multitude of market wide benchmarks that seek to improve the overall risk adjusted return to investors over market-cap weighted indexes, including fundamental, equal-weighted, smart-beta, and a burgeoning plethora of ESG indexes. We believe other benchmarks may better balance potential stranded asset risk with other macro risks than can divestment.

Divestment constrains active managers in their mandate to find the best opportunities to invest. Thus divestment conflicts with the underlying reason VPIC pays active managers higher management fees than passive management. In the responses from VPIC equity managers, examples of this conflict with a divestment of fossil fuels were evident. For example, one manager, that held only a few fossil fuel stocks for limited periods during the trailing five-year period reports that, its 17-month overweight holding of one fossil fuel stock contributed 74 basis points to the VPIC portfolio, and its 22-month overweight holding of another fossil fuel stock contributed 46 basis points to the VPIC portfolio. In general, if VPIC active managers were prohibited from owning fossil fuels, rather than being allowed to selectively choose geographic, sector, and company weights, and buy/sell timing of each security, VPIC could not receive the full benefits of its active manager's selection expertise.

## **VPIC Monitoring, Proxy Voting and Engagement**

VPIC monitors its investment active managers for exposure to climate change risks. VPIC acts as an active shareholder, and has developed robust governance efforts focused on climate change as part of its overall approach to governance. This includes development of VPIC's custom proxy voting guidelines which bring a strong and coherent approach to voting its proxies, co-filing shareholder proxy proposals, and corporate and public policy and regulatory engagement actions. Appendix 2 lists VPIC engagements in 2015 and 2016. These included actions at XOM and other oil majors, coal companies, and efforts to effect regulatory change around climate change risks and disclosure. VPIC's most recent activity regarding Exxon was in November 2016 when it co-filed with NY State an Exxon Mobil Resolution 2 degree reporting for the 2017 annual meeting.

In our opinion, divestment from fossil fuels would materially undermine VPIC corporate governance strategies. VPIC's actions to promote regulatory and policy changes regarding climate change risks could remain intact. However, divestment would negate VPIC's shareholder governance voting efforts in fossil fuel companies. In our opinion, VPIC and the Vermont Treasurer, supported by the VPIC staff, stand out as a leader in climate change proxy voting and engagement. Through such actions, VPIC has exerted influence beyond its size, in our opinion.

## **Market Options for Institutional Investors to Manage Climate Change Risks**

Divestment as a strategy for exerting political influence to bring about social change has been influential in the modern economy back to the anti-apartheid campaigns that began in the 1970s. The anti-apartheid divestment campaigns, like today's fossil fuel divestment campaigns, began on university campuses, and influenced many endowments and foundations. U.S. public pensions plans today are subject to the same fiduciary obligations that they were during the anti-apartheid movement forty years ago. However, public pension plans have undergone major transformations, along with the U.S. economy. In the 1970s, Vermont pension plans, and most U.S. public pension plans were confined

to investing in high quality (not high yield) bonds, and were younger, growing plans. Today, Vermont and many U.S. public plans are mature plans that face many funding challenges. Like other plans, VPIC's asset allocation is now diversified to equities, globally, and across private investments, commodities, and absolute return strategies that didn't exist in the 1970s.

The institutional investment market and the organizations that exist to foster collaboration among like-minded institutional investors has evolved significantly since the well-known divestment movement surrounding South African Apartheid. In the 1970's, institutional investors, specifically U.S. public pension funds did not have the benefit of collaborative organizations to work together for common investment goals. Forty years ago, there was minimal coordinated effort by U.S. public pension funds on proxy voting or engagement with the companies in which they may have been invested. In our opinion, the organizational capacity of institutional investors has advanced materially since then. To mention a few examples, the U.S. Council of Institutional Investors was founded in 1985. In 2006, the Principles for Responsible Investment joined institutional investors globally. CERES was launched in 1989, with a mission to "mobilize investor and business leadership to build a thriving, sustainable global economy". Institutional investor organizations have grown surrounding accounting standards and reporting on ESG issues, including the Global Reporting Initiative. In the U.S., SASB incorporated in 2011 to develop and disseminate sustainability accounting standards.

Alongside these changes, financial markets developed multiple tools for institutional investors to address Environmental, Social and Governance ("ESG") concerns, including climate change risks and opportunities. Market forces continue to rapidly evolve the approaches available to address climate change risks. In our opinion, VPIC should consider divestment of fossil fuels, thermal coal, and Exxon within the context of the full set of options available. Each approach offers its own usefulness and limits, and each approach can reinforce other strategies to varying degrees. We consider the following approaches applied to climate change risks:

- divest
- monitor investment managers
- vote proxies
- engage with companies
- engage on regulatory issues
- invest in index funds or active managers

## **Peer Pension Plan Climate Change Survey Results**

PCA surveyed VPIC peer U.S. public pension funds on climate change related investing strategies. We received twenty-six responses, representing a combined \$887 billion AUM. The respondents range in size from \$1.2 billion AUM to \$195 billion AUM as of June 30, 2016, including nine plans under \$5 billion AUM, 14 plans with between \$5-\$100 billion AUM, and three plans over \$100 billion AUM. The plan's dedicated investment staff range from 0 to 150. Fourteen respondents were state public employee plans.

| Survey of VPIC Peers on Climate Change  |      |                |                |                 |                    |
|---|------|----------------|----------------|-----------------|--------------------|
|   | VPIC | Under \$5B AUM | \$5-\$100B AUM | Over \$100B AUM | All Peer Plans     |
| <b>Number of Plans</b>  | 1    | 9              | 14             | 3               | <b>26</b>          |
| <b>Assets Under Management (\$Billions)</b>   | \$4  | \$1.2B-\$4     | \$8-\$68       | \$179-\$195     | <b>\$1.2-\$195</b> |
| <b>Combined AUM (\$Billions)</b>  | \$4  | \$18           | \$315          | \$554           | <b>\$887</b>       |
| <b>Dedicated Investment Staff</b>   | 2    | 0-4            | Jan-52         | 59-150          | <b>0-150</b>       |
| <b>Number of Plans that responded 'Yes'</b>   |      |                |                |                 |                    |
| <b>Divested in relation to Climate Change Risk?</b>   | 0    | 0              | 0              | 1               | <b>1</b>           |
| Exxon   | 0    | 0              | 0              | 0               | 0                  |
| Thermal Coal  | 0    | 0              | 0              | 1               | 1                  |
| Fossil Fuel   | 0    | 0              | 0              | 0               | 0                  |
| Stranded Assets   | 0    | 0              | 0              | 0               | 0                  |
| CO2 Emissions   | 0    | 0              | 0              | 0               | 0                  |
| Climate Risk  | 0    | 0              | 0              | 0               | 0                  |
| <b>Measured Climate Change Risk and/or Opportunity of Total or Part of Portfolio?</b>                           | 0    | 1              | 0              | 2               | <b>3</b>           |
| <b>Monitor Managers on Climate Change Risk and/or Opportunity of Total or Part of Portfolio?</b>                | 1    | 1              | 1              | 2               | <b>4</b>           |
| <b>Voted Proxies to Mitigate Climate Change Risk and/or increase Opportunity of Total or Part of Portfolio?</b> | 1    | 1              | 1              | 3               | <b>5</b>           |
| <b>Engagement with individual companies on Climate Change Risk and/or Opportunities?</b>                        | 1    | 0              | 0              | 2               | <b>2</b>           |
| <b>Action to make recommendations to regulators on Climate Change Risk and/or Opportunities?</b>                | 1    | 1              | 0              | 2               | <b>3</b>           |
| <b>Member of Institutional Investor organization/s that include a focus on climate change?</b>                  | 1    | 2              | 3              | 2               | <b>7</b>           |
| <b>Adopted Climate Change Related Benchmark for Total or Part of Portfolio?</b>                                 | 0    | 0              | 0              | 1               | <b>1</b>           |
| <b>Invested in low carbon portfolio</b>   | 0    | 0              | 0              | 2               | <b>2</b>           |
| <b>Invested in Climate Change Opportunity</b>   | 0    | 1              | 2              | 2               | <b>5</b>           |

None of these pension plans have divested from Exxon individually, all fossil fuel companies, companies based on high stranded carbon reserve assets, high carbon emissions, or broader climate risk. One plan reported that under their Iran/Sudan policy they had a few fossil fuel related divestments. One plan with over \$100 billion in AUM reported divestment from U.S. thermal coal companies.

We found a greater number of plans pursue proxy voting and/or investments in green/climate change opportunities than divest from any definition of fossil fuels. Five plans report voting proxies to mitigate climate change risk (three plans larger than \$100 billion in AUM, one plan between \$5 billion and \$100

billion AUM, and one plan under \$5 billion AUM). Five plans reported investments in green/climate change opportunities within different asset classes that include public securities, private equity and infrastructure, while two plans over \$100 billion AUM have invested in a low carbon portfolio.

Seven of the 26 plans noted that they are members of institutional investor organizations that address climate risk related topics –including CERES/INCR, Council of Institutional Investors, Sustainable Accounting Standards Board (“SASB”), and UN Principles for Responsible Investing.

The September 2016 survey by the North Carolina Department of the State Treasurer entitled: “Long Term Stewardship: A pragmatic Approach for ESG Integration for Institutional Investment”, included responses from 61 U.S. public pension plans ranging in size from less than \$5 billion to greater than \$100 billion. The survey concentrated on institutional approaches to ESG. The results were similar to those of this VPIC peer survey. Among the 61 public pension plans in the North Carolina study, 15% were found to be active on ESG factors, 26% were categorized as work in progress, and 59% were inactive. An investor was categorized as being “active” if it had an established ESG policy, incorporated ESG factors into either its investment or risk management process or had a systematic approach to corporate governance issues such as shareholder activism. One of the key observations based on the responses of the U.S. public pension plans touched on divestment, and reported similar results as this VPIC peer survey:

“For most of the active plans, engagement with companies on ESG issues is viewed as being more impactful than divestment. This viewpoint is supported by empirical studies and the pensions’ direct experience. Impactful corporate engagement is both time and staff intensive. Consequently, smaller plans are interested in collaborating with larger ones on certain shareholder resolutions. Plans may also outsource this activity to external firms that provide corporate engagement services.” (Long Term Stewardship, page 9).

## Divestment

To supplement our survey on divestment of fossil fuels by U.S. public pension funds, we reviewed other sources of U.S. public pension fund divestments. The December 2016 Arabella Advisors report: “The Global Fossil Fuel Divestment and Clean Energy Movement” made headlines in December 2016 by stating that the value of assets represented by institutions and individuals committing to some sort of divestment from fossil fuel companies has reached \$5 trillion”. The report states that “pension funds and insurance companies now represent the largest sectors committing to divestment, reflecting increased financial and fiduciary risks of holding fossil fuels in a world committed to stay below 2 degrees Celsius warming”. PCA sought to identify which U.S. public pension plans were included in these numbers. We secured the list of U.S. pension plans from one of Arabella’s partners who is credited with helping gather and analyze the data for the Arabella report – the Divest/Invest Network. The Divest/Invest organization identified seven U.S. public pension plans that have divested from some version of fossil fuel securities. We checked the information on each of the seven plans and found that only four of those seven plans have divested from any version of fossil fuels. For example, CalPERS, the largest plan among the seven, and the largest U.S. public pension plan, was included as having divested. To date, CalPERS has not divested from any fossil fuels, and has the issue under review. The largest U.S. public pension plan in the Divest/Invest list that has made any fossil fuel divestments is CalSTRS – a respondent to our survey.

The total market value of the fossil fuel divestments made by the four plans identified by Divest/Invest that have in fact made a fossil fuel divestment has been approximately \$24 million, or 0.013% of their combined total plan assets of \$193 billion. The plans include:

- 1) CalSTRS divested approximately \$1.5 million in U.S. thermal coal, or 0.0008% of its \$186 billion portfolio. CalSTRS is now analyzing whether non-US thermal coal divestment makes sense,

including looking at whether in some areas of developing countries, the only alternative to coal is even worse polluting wood burning fuels).

- 2) The District of Columbia divested roughly \$21 million from the "Carbon Underground Top 200", or 0.03% of its \$6.4 billion portfolio.
- 3) Providence, Rhode Island divested about \$1.5 million in direct investments, or 0.6% of its \$282 million portfolio, from the "Filthy 15" (mostly companies that own coal-burning power plants or coal mining companies).
- 4) The Village of Cooperstown, N.Y. reallocated approximately \$8,386, or 0.9% of their total \$900,000 AUM, when they moved their \$140,000 investment in an S&P500 index fund to the SPYX ETF, which drops 29 fossil fuel stocks from the S&P500.

We conclude that divestment from fossil fuels is a sparsely used strategy among U.S. public pension plans, including by those plans, large and small, that are active on potential climate change risks to their investment portfolios.

In our opinion, divestment as a strategy is most closely aligned with traditional socially responsible investing (which often rests on 'negative' screening out of particular social outcomes) to impact investing. Negative screening seeks to achieve a social impact, and can seek both market or below or above market performance. While all investors typically prefer a competitive return, not all are legally bound to seek such returns. For example, individuals may decide they prefer investing in stocks that meet their social criteria, even with the expectation that their portfolio may generate below market investment returns. U.S. endowments and foundations are not bound by the same fiduciary framework as U.S. public pension funds.

As a strategy, in our opinion, divestment undermines institutional investor's ability to exercise their right to proxy votes and engagement with individual companies. For institutional investors actively voting proxies and/or engaging corporations, divestment's lack of consistency with such efforts can be meaningful. In cases where it is determined that proxy voting and engagement strategies are not useful, divestment may not pose a conflict with other institutional investor efforts. Such a determination can only be made, in our opinion, on a case by case basis, looking at the long-term potential for engagement. As with investment strategies, such a determination can and should be expected to differ among different institutional investors.

## **Invest in Low Carbon or Green Tilted Index Fund(s)**

Index providers and investment managers are developing new products to address climate change concerns of investors. Most major index providers now offer ex-fossil fuel indexes. The major index providers also created low carbon and green indexes, and broader ESG indexes that incorporate governance and social factor ratings alongside environmental ratings. Instead of removing specific stocks from an underlying benchmark, these indexes seek to reduce the tracking error of the climate change related index to its underlying benchmark by reweighting the stocks in the index to reduce, for example, carbon emissions exposure, or increase, for example, exposure to non-carbon and carbon reduction energy products, while maintaining a narrow tracking error to the underlying benchmark.

We use as an example below, MSCI's climate risk related indexes as compared to the MSCI ACWI, an equity reference benchmark for VPIC. As shown below, the MSCI ACWI Low Carbon Index maintained a 0.4 tracking error to the MSCI ACWI during the trailing five-year period ending June 30, 2016, while the MSCI ACWI ex-Fossil Fuel deviated from the underlying passive benchmark by 1%. During this five-year period, the MSCI ACWI ex-Fossil Fuels index outperformed both the MSCI ACWI and the MSCI ACWI Low Carbon indexes in returns, as oil prices plummeted. In periods of rising oil prices, such as began in 2016 and are anticipated to continue in 2017 and 2018, the removal of fossil fuels may well be a drag on the portfolio returns.

For passive investments seeking market wide exposure, a key advantage of low carbon indexes such as MSCI's is that deviations from the underlying benchmark are kept within a narrow range by design. MSCI's ESG Index ranks companies based on ESG scores and key ESG controversies, and also sets a range for deviation from the underlying benchmark. The tracking error for MSCI's ESG index is designed to be somewhat wider than that of its Low Carbon Target Index. The MSCI ACWI ESG outperformed the ACWI and ACWI Low Carbon Target during this period.

| Performance and Risk Data (periods ending June 30, 2016) |               |                 |                        |               |                      |
|--|---------------|-----------------|------------------------|---------------|----------------------|
| Name of Index  | ACWI          | ACWI ESG        | ACWI LOW CARBON TARGET | ACWI ex COAL  | ACWI ex FOSSIL FUELS |
| <b>Annualized Return Gross of License Fees)</b>          |               |                 |                        |               |                      |
| 5-year Return  | 5.95%         | 6.71%           | 6.28%                  | 6.28%         | 7.15%                |
| <b>Volatility (Standard Deviation)</b>                   |               |                 |                        |               |                      |
| 5-Year Risk  | 13.54%        | 13.07%          | 13.53%                 | 13.42%        | 13.19%               |
| 5-Year Tracking Error                                    | 0.00%         | 1.10%           | 0.41%                  | 0.26%         | 1.03%                |
| 5-Year Sharpe Ratio                                      | 47.85%        | 54.54%          | 50.15%                 | 50.50%        | 57.32%               |
| 5-Year Maximum Drawdown                                  | 17.33%        | 15.98%          | 17.19%                 | 17.06%        | 16.75%               |
| <b>No. of Constituents</b>                               | 2,481         | 1,221           | 1,786                  | 2,439         | 2,353                |
| <b>Average Mkt Cap</b>                                   | \$14,397      | \$14,667        | \$17,629               | \$14,525      | \$14,174             |
| <b>Comparative Carbon Exposure</b>                       |               |                 |                        |               |                      |
| Carbon Emissions (tons CO2e/\$M invested)                | 184           |                 | 45                     | 170           | 145                  |
| Carbon Reserves as Potential Emissions                   | 2094          |                 | 19                     | 1438          | 0                    |
| <b>ExxonMobil Share of Index</b>                         | 2nd<br>(1.1%) | Below<br>top 50 | 86th<br>(0.6%)         | 2nd<br>(0.1%) | Excluded             |

Source: MSCI

MSCI also publishes carbon metrics for its MSCI ACWI, MSCI ACWI Low Carbon Target Index, and its MSCI ACWI ex-Fossil Fuels Index. As shown, MSCI's ACWI Low Carbon Target Index reduces carbon emissions per million dollar invested by 76%, as compared to the ex-fossil fuel reduction of 5%. Measuring potential carbon emissions per million dollar invested, the MSCI ACWI Low Carbon Index reduces the MSCI ACWI exposure by 99%, as compared to the ex-Fossil Fuel Index reduction of 100%. When measuring fossil fuel reserves, the Low Carbon Index generated a 60% reduction from the MSCI ACWI, as compared to 78% for the ex-Fossil Fuels Index.

The reweighting of individual securities can be significant when comparing the MSCI low carbon and ESG indexes to the underlying MSCI ACWI. For example, for the period ending June 2016, ExxonMobil's was the second largest holding in the MSCI ACWI. This compares to ranking 86<sup>th</sup> in the MSCI ACWI Low Carbon Target Index, and below the top 50 largest holdings among MSCI's ACWI ESG Index.

Institutional investors, including U.S. public pension funds, have invested a portion of their passive equity allocations in funds benchmarked to such indexes. For example, in July, 2016, CalSTRS, the second largest pension fund in the US, committed up to \$2.5 billion to low-carbon strategies in U.S., non-U.S. developed and emerging equity markets based on MSCI's ACWI Low-Carbon Target Index. The passive index portfolio will be internally managed by the CalSTRS Global Equity investment staff and implementation will be phased in beginning with U.S. equity followed later by developed markets and then eventually emerging markets.



The \$185 billion New York State Common Retirement Fund (“NYSCRF”) is the third largest pension fund in the US. NYSCRF intends to double its exposure to \$4 billion in a low carbon index strategy that it launched with Goldman Sachs Asset Management (GSAM) just prior to the Paris COP21 conference in 2015, after what it said were positive environmental and financial results. The NYSCRF low carbon passive equity investment is based on index data from FTSE Russell. Peter Grannis, the First Deputy Comptroller in the Office of the New York State Comptroller, noted in December 2016 that performance so far had been encouraging: “It’s been in line with our expectations and with a tracking error of 0.25%. On the environmental side we’ve reduced the carbon emissions of this asset portion by 70%.

In June, 2016, FTSE released a new FTSE Green Revenue Index that seeks to increase the exposure to green product and services in all companies large and small, even should those products and services be sold by fossil fuel companies, while maintaining a close tracking error to the underlying benchmark. This index measures the green product exposures in companies in an underlying benchmark, and then reweights constituents based on their green weighting. As with the low carbon indexes, no securities are excluded. However, some companies can go to a ‘zero weight’, thus effectively being reduced to a zero weight as compared to the underlying benchmark.

As shown below, the FTSE Russell 1000 Green Revenue Index closely tracked the underlying Russell 1000 benchmark on risk and return metrics, the number of constituents, and average market cap for the period ending December 31, 2016. The Green Revenue index shows 2.17% exposure to green revenue, up from 1.47% in the Russell 1000.

| FTSE Russell 1000 Green Revenue Index Compared to Underlying Benchmark<br>( Periods ending December 31, 2016) |               |              |
|---|---------------|--------------|
| Name of Index   | Russell 1000  |              |
|   | Green Revenue | Russell 1000 |
| Annualized Return Gross of License Fees   |               |              |
| 1-Year Return   | 2.95%         | 2.93%        |
| 5-year Return   | 11.74%        | 11.88%       |
| Volatility (Standard Deviation)   |               |              |
| 1-Year Risk   | 14.56%        | 14.62%       |
| 5-Year Risk   | 12.36%        | 12.33%       |
| 5-Year Tracking Error   | 0.16%         |              |
| 5-Year Sharpe Ratio   | 0.94          | 0.96         |
| 5-Year Maximum Drawdown   | -14.89%       | -14.68%      |
| No. of Constituents   | 1001          | 1001         |
| Average Mkt Cap   | \$20,318MM    | \$20,271MM   |
| Measure of Green Revenue Exposure   | 2.17          | 1.47         |
| Measure of ESG (0-5, highest)   | 2.79          | 2.79         |

Source: FTSE Russell

FTSE designed the Green Revenue Index to make modest changes based on green revenue exposure, so typically, an individual company’s share of the R1000 doesn’t change dramatically based on the reweighting for their Green Revenue Index.

The underlying concept – that green revenues are being generated by very large companies, that often have wide-ranging product lines in addition to green revenues, including publicly listed companies, and even oil and gas companies. For example, SASB states that industrial conglomerates General Electric (U.S.) and Siemens (Germany) each generated 7.3% of their revenues (\$9 billion and \$6.1 billion respectively) from the renewable energy segment as defined by SASB in 2016. Archer Daniel

Midland, U.S. agricultural product processing and trading company generated 9.3% of its revenue (\$6.3 billion) from 'bio-products' ethanol segment in 2016. Valero, an energy oil and gas refining company, generated 3.9% of its revenue (\$3.4 billion) from ethanol biofuel in 2015.

Climate related, and ESG benchmarks first emerged in equities. Barclay's December 2016 report shows that:

- ESG need not be an "equity-only" phenomenon and can be applied to credit markets without being detrimental to bondholders' returns.
- A positive ESG tilt resulted in a small but steady performance advantage.
- No evidence of a negative performance impact was found.
- ESG attributes did not significantly affect the price of corporate bonds. No evidence was found that the performance advantage was due to a change in relative valuation over the study period.
- When applying separate tilts to E, S and G scores, the positive effect was strongest for a positive tilt towards the Governance factor, and the weakest for social scores.
- Issuers with high Governance scores experienced lower incidence of downgrades by credit rating agencies.
- Broadly similar results were observed using ratings from the two ESG providers considered in this report (MSCI and Sustainalytics) despite the significant differences between their methodologies.

Barclay's research findings underscore the potential importance of systematic biases that can be introduced when developing any ESG benchmark compared to its underlying market wide benchmark, and the potential negative impacts of exclusion of entire industries. As reported:

"In research conducted in 2015, Barclays Research analyzed the historical returns of both its Socially Responsible ("SRI") corporate bond index that is based on negative screening, and Barclays Sustainability index that uses a 'best-in-class' approach based on ESG ratings to choose the best-rated subset of index bonds within each industry.

While both had underperformed in terms of nominal returns, some of that underperformance was traced to systematic biases unrelated to ESG criteria. Once they were corrected, we found that the return impact due specifically to the ESG tilt in security selection was positive for the Sustainability index, but negative for the SRI one. We concluded that the wholesale exclusion of entire industries from the investment universe, while it may be desirable based on ethical considerations, is not justified based on purely financial criteria."

Low carbon, green revenue and broader ESG Indexes are relatively new products that offer institutional investors alternatives to simple divestment and the related tracking error complications of divestment strategies that can be critical to passive investment strategies. In our opinion these strategies complement proxy voting and engagement efforts in that they do not reduce the shareowner's position in fossil fuel companies to zero. Thus shareholders maintain a vote on proxy proposals. We note that low carbon indexes will often reduce the shareowner position in fossil fuel companies, thus reducing the investor's weight in any given fossil fuel company proxy vote. Currently, passive investments vehicles that track an ESG index, including low carbon/green revenue indexes, have higher management fees than those of widely used standard benchmarks. The higher all in management fees will include slightly higher index licensing fees than the licensing fees for core benchmarks.

## **Invest in Active Manager(s) Emphasizing Climate Risks/Opportunities**

The active manager institutional investment market has evolved to include both managers explicitly targeting renewables, or low carbon markets, and managers who incorporate ESG metrics into their

stock selection, including climate change material risks. These efforts encompass both fundamental and quantitative management strategies. Most recently, active managers began more systematically incorporating ESG risk factors alongside traditional financial factors seeking to improve active management returns, labeled below as ESG Integration.

### ESG Active Investment Management Approaches

| Investment Approach to ESG Factors | Description  | Social Outcome          | Competitive Performance Outcome |
|------------------------------------|--|-------------------------|---------------------------------|
| <b>Negative Screening</b>          | Exclude companies based on non-financial concerns such as tobacco, firearms, more recently, fossil fuels.  | REQUIRED                | NOT ALWAYS REQUIRED             |
| <b>Impact Investing</b>            | Incorporate social outcome and seek to make a market return.   | REQUIRED                | VARIED                          |
| <b>Positive Screening</b>          | Select a portfolio of companies with desirable characteristics to form an investment universe.   | REQUIRED                | VARIED                          |
| <b>ESG Integration</b>             | Integrate ESG material risks into traditional financial analysis, independent of seeking any specific social/environmental outcome to improve portfolio performance. | NOT EXPLICITLY REQUIRED | REQUIRED                        |

The growth in ESG investment demand is fueling an expansion of the ESG investment manager universe. Historically ESG was primarily the purview of specialized ESG managers, and some managers that offered both traditional investment products and ESG products. Today, large global investment firms are developing ESG products, both through acquisition and increased hiring and reorganization. In some cases, a new ESG profile means emphasizing what a manager believes they have always done regarding these risks.

Similar to the passive investment market, active management around climate risk concerns grew first in equity markets. Today green bonds are being measured, rated, and targeted for specific investment strategies to boost their share in an overall bond portfolio.

In our opinion, active manager products that integrate climate risks or broader ESG risks into their security selection, bear the same active selection risks of the broader active manager market. Typically, the risk increases as the manager's universe of securities narrows. Such products are compatible with monitoring, proxy voting and engagement. To the degree that such a strategy replaces a strategy that doesn't account for climate risks, including stranded asset risk, the move to an ESG strategy incorporating these risks may reduce or remove the investor's proxy voting weight in such companies. ESG active manager fees are typically similar to fees charged by comparable non-ESG active managers.

## Monitoring

Monitoring of a portfolio for ESG, including climate change, risks can be undertaken portfolio wide and by monitoring of individual managers. The tools for such analysis are rapidly being developed and marketed in response to institutional investor demand. There is widespread evidence of a concerted push for disclosure, standardization, quantification and systematic risk analysis to integrate sustainability into risk/return analysis across the market.

The December 2016 release of the recommendations from the Task Force on Climate-related Financial Disclosures ("TCFD") marked a prominent step in seeking consistent disclosure, without which investors cannot appropriately assess and price the risks involved. The TCFD's, which was assembled by Mark Carney as Chairman of the Financial Stability Board, and chaired by Michael Bloomberg, aims to help integrate better understanding of the risks and opportunities presented by climate change into

investment and insurance underwriting decisions. There are four key features to the TCFD's recommendations:

- Adoptable by all organizations.
- Included in financial filings rather than other reports such as corporate social responsibility reports.
- Designed to solicit decision-useful, forward looking information on financial impacts.
- A Strong focus on risks and opportunities related to the transition to a lower-carbon economy.

Crucially, the report recommends that companies use different scenarios to report on governance, strategy, risk management, and metrics and targets, including a 2degree scenario.

Portfolio-wide monitoring might involve looking at a plan's overall carbon footprint, or assessing a plan's overall exposure, compared to its benchmark, to E, S and or G, or combined ESG ratings of companies in their portfolio. Carbon footprint analysis today contains many inconsistencies and holes due to lack of consistent data reported by companies, but is improving as reporting improves. Firms such as MSCI and Sustainalytics provide ESG company ratings. ESG ratings can provide meaningful insights into individual company risks. These ratings are not quantitative metrics, such as a standard deviation that can be aggregated and reported as an overall portfolio risk exposure metric. All ESG ratings involve the judgement of the researchers conducting the analysis. Ratings can and do differ meaningfully among providers. For example, Northern Trust observed in January 2017 that they found MSCI and Sustainalytics gave similar ESG ratings for approximately 60% of the companies that they both rated.

Broader, portfolio-wide climate risk frameworks are being developed. Mercer sought to measure climate risk by asset class, and identify differing industry impacts in its ongoing work. Towers Watson announced in January 2017 that it is rolling out a new sustainability framework that seeks to link sustainability analysis with investment returns. As reported by Responsible investor, a pillar of their analysis is:

"industry level research to determine how business profit pools are likely to change and how private and public capital will be allocated. When its complete, the framework will allow investors to seamlessly integrate the same financial, sustainability and ESG metrics into all aspects of portfolio management. i.e., from risk management, through portfolio construction, all the way down to security selection."

The prominence of concerns over environment-related risks is generating new quantitative metrics too, that did not exist a decade ago. For example, a decade ago, a typical institutional investor interested in the energy sector would not necessarily consider a firm's track record on environmental issues. Today, regulatory changes facing the energy sector make such non-financial issues potentially material. Investment consultants to institutional investors have increased their efforts to monitor managers on environmental, social, and governance ("ESG") issues, including climate change risks, incorporating such questions into regular monitoring activities, and into requests for proposals when new managers are being considered.

Recent research indicates that distinguishing between material and immaterial ESG issues can be meaningful in capital allocation. Khan, Serafeim and Yoon's 2015 analysis:

"Corporate Sustainability: First evidence on Materiality", finds that "firms with good ratings on material sustainability issues significantly outperform firms with poor ratings on these issues. In contrast, firms with good ratings on immaterial sustainability issues do not significantly outperform firms with poor ratings on the same issues. These results are confirmed when we analyze future

changes in accounting performance. The results have implications for asset managers who have committed to the integration of sustainability factors in their capital allocation decisions.”

Manager monitoring on ESG issues including climate risk can often be accomplished by a pension plan’s investment consultant, without adding costs to the plan’s overhead. Monitoring can signal managers that these issues concern their institutional clients and can complement proxy voting and regulatory activities. Monitoring in itself is often a first step in understanding the climate change issues facing the portfolio, without taking specific actions through voting, engagement, investment or divestment. As noted above, only a handful of U.S. public pension funds in the survey currently monitor their investment managers on climate change related risks. VPIC does monitor its managers on ESG issues. For example, VPIC reported the manager responses to staff’s survey of managers on ESG integration in the State of Vermont Treasury Staff Divestment Memo, July 28, 2015.

## Proxy Voting

As shown below, the number of shareholder proposals on environmental issues, and the average number of votes for shareholder proposals on environmental and environmental disclosure related issues, including climate change, trended upward for the Russell 3000, energy stocks, and for XOM since 2000. During the first 10 years of the 21<sup>st</sup> century (2000-2009), Russell 3000 stocks averaged 23 environmental-related shareholder proposals each year. During the most recent period (2010-16), this number more than doubled to an average of 57 environmentally related shareholder proposals each year. Similarly, during these periods, the average number of votes for environmentally related shareholder proposals among the Russell 3000 companies rose from 13% to 22%.

| Shareholder Proposals on Environmental issues, 2000-2016* |                   |        |     |             |     |               |        |     |
|---|-------------------|--------|-----|-------------|-----|---------------|--------|-----|
| Period  | Num. Went to Vote |        |     | Num. Passed |     | Avg Votes For |        |     |
|   | R3000             | Energy | XOM | R3000       | XOM | R3000         | Energy | XOM |
| 2000-2009   | 23                | 8      | 1.8 | 0.2         | 0   | 13%           | 16%    | 8%  |
| 2010-16   | 57                | 12     | 2.9 | 0.6         | 0   | 22%           | 22%    | 13% |

Sources: CalSTRS and CII information based on ISS data.

Institutional investors anticipate re-filing a high profile shareholder resolution for the 2017 proxy season at ExxonMobil, which was filed in 2016 to urge Exxon to publish an annual assessment of the long-term portfolio impacts of public climate change policies. In 2016, this shareowner proposal got the support of 38% of shareholders, as part of a campaign of similar high-scoring resolutions at oil majors around the world, many of which received majority support.

Recent research finds that the impact of shareholder proxy voting proposals on material environmental and social issues have affected corporate financial performance. Grewal, Serafeim and Yoon’s 2016 report “Shareholder Activism on Sustainability Issues” finds (based on SASB’s industry level definitions of materiality) that:

“42 percent of the shareholder proposals in their sample were filed on financially material issues. We document that filing shareholder proposals are related to subsequent improvements in the performance of the company on the focal environmental or social issue, even though such proposals nearly never received majority support. Improvements occur across both material and immaterial issues. Proposals on immaterial issues are associated with subsequent declines in firm valuation, while proposals on material issues are associated with subsequent increases in firm value. We show that managers increase performance on immaterial issues in companies

with agency problems, low awareness of the materiality of sustainability issues, and poor performance on material issues.”

Shareholder proxy proposals that are not explicitly related to carbon may exert influence at fossil fuel companies on carbon-related issues. A key example is the rising support for proxy access. At Exxon in 2016, a shareholder proposal passed that gives shareholders greater power to propose director candidates. Institutional investors anticipate using these steps to advocate for Exxon board members who are “climate competent”. As reported by Sidley Austin LLP, in “Sidley Corporate Governance Report” (January 3, 2017):

“In late December 2016, proxy access reached the tipping point in terms of adoption by large companies – just over 50% of S&P 500 companies have now adopted proxy access. Through the collective efforts of large institutional investors, including public and private pension funds, and other shareholder proponents, shareholders are increasingly gaining the power to nominate a portion of the board without undertaking the expense of a proxy solicitation. By obtaining proxy access (the ability to include shareholder nominees in the company’s own proxy materials), shareholders will have yet another tool to influence board decisions.”

Proxy voting can complement manager and portfolio monitoring, engaging with companies and regulators. In a targeted low carbon fund, proxy voting at fossil fuel companies can still be useful, but to a smaller degree because the exposure to fossil fuel companies is reduced compared to a market wide fund. Divestment would negate VPIC’s proxy efforts at fossil fuel companies because fossil fuel companies would be eliminated from the portfolio.

## **Summary of Market Options in Relation to Divestment**

The table on the following page seeks to summarize key parameters for institutional investors of various tools available to control the climate change risks and opportunities. As shown, straight divestment strategies, by excluding companies from any given fund or universe, make a strong public statement and rely on a transparent and simple methodology.

Divestment does not consider short-term financial risks or long-term diversification risks, which increase as the universe of divested stocks increases. Divestment from fossil fuels, suppliers of fossil fuel energy, will, if simply reweighting the rest of the portfolio, result in an increased exposure to companies on the demand side of fossil fuel energy, and in the companies financing fossil fuels. Transaction, restructuring and opportunity costs may vary according to the assets being divested, and the fund structure from which they are being divested. Divestment removes an institution’s ability to influence corporate behavior by voting proxies and engagement.



## Approaches to Addressing Climate Risk

### Key Parameters for Institutional Investors\*

| Approach   | Short-term Financial Risk*                         | Long-term Investment Thesis*  | Costs  | Shareholder Communication*   | Public Stance*   |
|--|--|---|--|--|--|
| <b>Divest</b>  | Not-considered                                     | Based on individual security selection; or long-term stranded assets thesis; diversification risks not considered | Transaction costs, portfolio restructuring, and opportunity costs vary with assets being divested and with fund structure.   | Transparent and simple methodology   | Makes strong public statement; but cannot directly influence corporate behavior; removes proxy and engagement access to influence companies. |
| <b>Monitor funds</b>   | None   | Alert managers  | Minimal  | Highlight concerns   | Shows concerns   |
| <b>Vote Proxies</b>  | None   | Improve underlying fundamentals of individual public equity investments   | Staff and board time; proxy service provider costs. Requires costly in-house or SMA passive management to control all votes. | Generally simple; specific proxies can be complex                                      | Voting proxies makes public statement; can directly influence corporate behavior   |
| <b>Engage with Companies</b>                                 | None   | Improve underlying fundamentals of individual public equity investments   | Requires minimal to high staff and board time depending on the number and complexity of issues.                              | General simple; specific efforts can be private process; communication can be detailed | Makes statement. Often private during engagement process; can directly influence corporations  |
| <b>Engage on Regulatory Issues</b>                           | None   | Improve regulatory fundamentals   | Requires minimal to high staff and board time.   | Generally simple. Specific issues can be complex.                                      | Makes statement and can influence regulatory environment   |
| <b>Invest in Low carbon or green tilted index funds</b>      | Optimizes to reduce tracking error to parent index | Optimize to reduce carbon increase green, and retain full opportunity set   | Typically, a few basis points more in fees than underlying benchmark.  | Sophisticated methodology, could be more difficult to explain                          | Makes statement for low carbon/high green economy. Allows voting proxies, engagement.  |
| <b>Invest in active focus on climate risks/opportunities</b> | Risk depends on fund strategy                      | Relies on active manager skills to outperform   | ESG active manager fees in line with non-ESG active manager counterparts   | Transparent and simple to explain  | Makes statement for low carbon/high green economy. Allows voting proxies; engagement;  |

\*PCA developed this chart of approaches to climate change risk from MSCI's March 2015 key parameters for institutional investors for assessing different public equity index options. PCA's adaptation including adding the cost parameter.

## Conclusion

In our opinion, divestment of fossil fuels, thermal coal, or Exxon is one possible approach for VPIC to mitigate a potentially significant climate risk – possible stranded assets of fossil fuel suppliers. Given the financial and governance costs that come with fossil fuel divestment, in PCA's opinion, divestment of fossil fuels, thermal coal, or Exxon has not been shown to be in the best interests of VPIC pension beneficiaries, and conflicts with VPIC governance structure. In our opinion, markets now offer meaningful tools to address climate risk other than divestment, from coordinated proxy voting and

corporate and public policy engagement, to passive and active low carbon alternatives that avoid the broad market exit risk inherent in near-term divestment approaches. We believe VPIC should continue its effort to address and manage climate and other ESG risks and opportunities. In our opinion, VPIC should continue to stay abreast of, and consider, the ongoing changes in assessments of climate risks, and approaches to managing these risks.

## References

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- 2i Investing Initiative, United Nations Environment Programme Finance Initiative ("UNEP-FI") and World Resources Institute (2016) "Climate Strategies and Metrics: Exploring Options for Institutional Investors", World Resources Institute, UNEP-FI and 2 degrees Investing Initiative Portfolio Carbon Initiative.
- Amenc, Noel, Erik Christiansen, Felix Goltz, and Kumar Gautam (June, 2016). "Scientific Beta Low Carbon Multi-Beta Multi-Strategy Indices", Scientific Beta, An EDHEC-Risk Institute Venture.
- Ansar, Atif, Ben Caldecott and James Tilbury (2013). "Stranded assets and the fossil fuel divestment campaign: what does divestment mean for the valuation of fossil fuel assets?", *University of Oxford, Smith School of Enterprise and the Environment, Stranded Assets Programme*.
- Bernstein, Sarah (October, 2015). "ESG/Sustainability: Institutional Investor Market Developments", *Pension Consulting Alliance*.
- BlackRock Investment Institute (October 2015). "The Price of Climate Change: Global Warming's Impact on Portfolios", BlackRock.
- Burke, Marshall, Solomon Hsiang and Edward Miguel (12, November, 2015). "Global non-linear effect of temperature on economic production", *Nature*, 527, pages 235-239.
- Center for international Environmental Law (December 2016). "Trillion Dollar Transformation: Fiduciary duty, Divestment and Fossil Fuels in an Era of Climate Risk", Center for Environmental Law.
- Considine, Matt, CFA, Katie Green and Nick Foss (July 28, 2015). "Fossil Fuel Divestment Analysis), Staff Memo to VPIC, State of Vermont Office of the State Treasurer.
- Considine, Matt, CFA, Katie Green and Nick Foss (July 28, 2015). "Fossil Fuel Profile in VPIC", Staff Memo to VPIC, State of Vermont Office of the State Treasurer.
- Desclee, Albert, Lev Dynkin, Jay Hyman and Simon Polbennikov (2016) "Sustainable investing and bond returns: Research study into the impact of ESG on credit portfolio performance", "01 Impact Series, Research Department, Barclays.
- DivestmentFacts (2016). Divestment Compendium, DivestmentFacts.com and IPAA.
- Koehler, Dinah A., Dr. and Bruno Bertocci (October, 2016). "Stranded Assets: What lies beneath", UBS Mercer (2015). "Investing in a Time of Climate Change", Mercer.
- Moseley, Doug, Partner (February 22, 2013). "Preliminary Analysis of Potential Impact of Energy Sector Divestment", Consultant Memo to VPIC, NEPC.
- National Centers for Environmental Information ("NCEI"), National Oceanic and Atmospheric Administration ("NOAA") (December, 2016). "Global Analysis 2016", NOAA-NCEI.
- North Carolina Department of the State Treasurer (September, 2016). "Long Term Stewardship: A pragmatic Approach for ESG Integration for Institutional Investment – Draft", North Carolina Department of the State Treasurer.

Reid, Iain, Giacomo Romeo, CFA, David Farrell, CFA, and Kate Sloan (October, 2016). "Integrate Oil", Macquarie Research, Macquarie Capital (Europe) Limited.

Risky Business (2014). "Risky Business: The Economic Risks of Climate Change in the United States", The Risky Business Project.

Risky Business (2016). "From Risk to Return: Investing in a Clean Energy Economy", The Risky Business Project.

SASB (2014). "Oil & Gas Exploration & Production Sustainability Accounting Standard – Provisional Standard", SASB.

SASB (October 18, 2016). "Climate Risk Technical Bulletin", SASB.

Serafeim, George, Jody Grewal, and Aaron Yoon ((2015). "Corporate Sustainability: First Evidence on Materiality", Working Paper 15-073, Harvard Business School.

Serafeim, George, Mozaffar Khan, and Aaron Yoon ((2015). "Shareholder Activism on Sustainability Issues", Harvard Business School.

Sustainable Insight Capital Management (Week Ending January 13, 2017). "Insights for the Mainstream Investor", Sustainable Insight Capital Management.

Task Force on Climate-related Financial Disclosures ("TCFD"), (December, 2016). "Recommendations of the Task Force on Climate Related Financial Disclosures", TCFD.

U.S. Energy Information Administration (2016). "International Energy Outlook 2016", U.S. Energy Information Administration, Department of Energy.

Zindler, Ethan and Ken Locklin (27, January 2016). "Mapping the Gap: The Road from Paris", CERES and Bloomberg New Energy Finance.

## Appendix 1) List of Peer Pension Plans that Responded to Climate Risk Survey

We thank the pension plans listed below for participating in this survey. The plans are listed according to their total assets under management.

| 2016 Climate Change Survey of VPIC peer U.S. Public Pension Plans |                                       |
|---|---------------------------------------|
| Name of Pension Plan  | Assets Under Management (\$ Billions) |
| Total   | \$887                                 |
| East Bay Municipal Utility District Retirement System             | \$1                                   |
| San Luis Obispo County Pension Trust                              | \$1                                   |
| Louisiana Public Employees Retirement System                      | \$2                                   |
| Municipal Fire and Police Retirement System of Iowa               | \$2                                   |
| San Joaquin County Employees Retirement Association               | \$2                                   |
| Seattle City Employees Retirement System                          | \$2                                   |
| Sonoma County Employees Retirement Association                    | \$2                                   |
| Fresno City Employees' Retirement System                          | \$3                                   |
| Fresno County Employees' Retirement Association                   | \$4                                   |
| Employees' Retirement System of Rhode Island                      | \$8                                   |
| Arkansas Public Employees Retirement System                       | \$9                                   |
| Municipal Employees Retirement System of Michigan                 | \$9                                   |
| Oklahoma Public Employees Retirement System                       | \$9                                   |
| Los Angeles City Employees Retirement System                      | \$14                                  |
| Employees' Retirement System of Georgia                           | \$15                                  |
| Employees' Retirement System of the State of Hawaii               | \$15                                  |
| West Virginia Investment Management Board                         | \$17                                  |
| Kansas Public Employees' Retirement System                        | \$18                                  |
| Los Angeles Fire and Police Pension Fund                          | \$19                                  |
| South Carolina Retirement Systems                                 | \$29                                  |
| Public School & Education Employee Retirement Systems of Missouri | \$39                                  |
| Maryland State Retirement and Pension System                      | \$45                                  |
| Oregon Public Employees' Retirement System                        | \$68                                  |
| New York State Common Retirement Fund                             | \$179                                 |
| Florida State Board of Administration                             | \$180                                 |
| California State Teachers Retirement System                       | \$195                                 |

## Appendix 2) VPIC and Vermont Treasurer Climate Change Engagement Activities

| VPIC and Vermont Treasurer Engagement Activities on Climate Change (April 2015 - December 2016) |   |
|---|---|
| 4/16/2015   | BP resolution that VPIC co-filed on received 98.28% of the vote to get better disclosure and get an A from CDP  |
| 4/17/2015   | TRE & VPIC signed-on to letter to the SEC on better disclosure regarding climate change risks   |
| 4/21/2015   | TRE signed-on to letter to the SEC to strengthen disclosure of corporate political contributions.   |
| 5/5/2015  | Declare vote for the XOM resolution for GHG reduction targets   |
| 5/21/2015   | Signed on to Letter: The New York State Common Retirement Fund and Green Century Capital Management, together with over \$1.5 trillion AUM from signatories, are calling on the Roundtable on Sustainable Palm Oil (RSPO) to strengthen its standards to support deforestation-free and exploitation-free palm oil.   |
| 5/27/2015   | Treasurer attended XOM AGM. Beth introduced resolution and spoke in capacity as treasurer   |
| 7/6/2015  | Signed on to letter to SEC re: proxy access   |
| 7/10/2015   | Treasurer sent letter on behalf of VPIC & TRE to SEC re: proxy access proposal rulings 14a-8(i)(9) for proxy access (if mgmt brings similar resolution shareholder's is thrown out)   |
| 7/13/2015   | TRE signed on to SEC letter asking for stronger private equity fee disclosure to public pension LPs. RI Treasurer was lead on letter  |
| 7/21/2015   | TRE meets with ISS to discuss policy on Environmental resolutions and how we can get their support re: Exxon  |
| 7/22/2015   | TRE meets with INCR members to create a work plan for the 2016 proxy season   |
| 7/27/2015   | VMERS votes to reject divestment of fossil fuels  |
| 7/27/2015   | Vermont Retired Teachers Association votes to reject divestment of fossil fuels   |
| 7/28/2015   | VPIC votes unanimously to reject divestment of fossil fuels   |
| 7/29/2015   | Follow-up with Investment Managers re: their UN PRI grade on fulfilling the principles  |
| 7/29/2015   | Follow-up with Australia's SuperEnergy Fund re: PE disclosure laws, research, requests, etc   |
| 8/5/2015  | Call with Exxon to discuss questions regarding transparency   |
| 9/4/2015  | Treasurer hosted an informational session about Pensions and included an ESG session in the afternoon where Ceres presented to legislators  |
| 10/30/2015  | Treasurer signed on to a letter to the Indonesian President urging him to support private-sector forest conservation policies (part of the Palm Oil deforestation movement)   |
| 1/27/2016   | Treasurer Pearce is serving as a Convener of the 2016 Investor Summit on Climate Risk at the UN Headquarters in NYC   |
| 12/2/2015   | VPIC co-files with As You Sow and Calvert on resolution with FirstEnergy requesting they create a report quantifying the potential financial losses associated with stranding of its coal generation facilities under a range of climate change driven regulation scenarios mandated by the Clean Power Plan.   |
| 12/11/2015  | VPIC co-filed with Tri-State Coalition on a resolution at Chevron requesting they create GHG targets for the long-term.   |
| 12/14/2015  | VPIC co-filed with NY State Common Retirement Fund and the Endowment of the Church of England at Exxon on a CAR resolution  |
| 2/10/2016   | Treasurer Pearce, on behalf of VPIC, participated in a filer call with Exxon to discuss the resolution along with NYState, Church of England, Boston Trust, UC Davis and CDA  |
| 3/28/2016   | Director of Investments sends Dear Colleague letter on Beth's behalf to Investment Managers, Vendors (NEPC, JPM, ISS, etc), and public fund sponsors requesting they declare their support publicly for CAR resolutions.  |
| 3/30/2016   | ISS and Glass Lewis call with investors to discuss supporting the Chevron Resolution  |
| 4/5/2016  | Vermont State Treasurer and VPIC sign on to "Declaration of Support" for 2D resolutions   |
| 4/6/2016  | Staff attended webinar on EU Non-Financial reporting Directive (reporting on ESG factors requirement for companies)   |
| 4/21/2016   | OT sent on behalf of VPIC a memo to ISS & Glass Lewis in support of the Exxon Resolution Item No. 12  |
| 4/21/2016   | Dear Treasurer's Memo sent from Treasurer Pearce requesting their support for Exxon, Chevron & FirstEnergy proposals on the proxy vote.   |
| 6/13/2016   | Signed on to a letter through CII directed to Honorable Maxine Waters (Ranking Member) and Honorable Jeb Hensarling (Chairman) of the House Committee on Financial Services to voice our concern with HR 5311. TRE then sent a letter to VT Congressional delegation to tell them we are not happy with section g of this bill and that we have signed on to CII letter concerning HR 5311. |
| 7/8/2016  | CII sends letter to SEC for comment period "Business and Financial Disclosure Required by Regulation S-K".  |
| 7/20/2016   | State of VT Treasurer sends letter to SEC during their request for Comment period for "Business and Financial Disclosure Required by Regulation S-K".   |
| 9/1/2016  | TRE signed on to a Ceres letter sent to House and Senate party leadership and relevant Appropriations Committee leadership to help preserve the Climate Risk Disclosure text that is under attack due specifically to Amendment #44 to the House of Representatives' Financial Services and General Government (FSGG) Appropriations bill, which passed on July 7, 2016.                    |
| 9/2/2016  | TRE signed on to Trillium/CalSTRS/NYComptroller/Croatian Institute letter regarding the NC HR2 bill   |
| 11/10/2016  | VPIC co-files with Mercy Investment Services at Marathon Petroleum on resolution 2 degree reporting   |
| 11/21/2016  | VPIC co-files with NY State on Dominion Resources resolution 2 degree reporting   |
| 11/30/2016  | VPIC co-files with NY State on Exxon Mobil resolution 2 degree reporting  |
| 12/7/2016   | VPIC co-files with Wespeth Investment Management & Hermes EOS on Chevron resolution 2 degree reporting  |
| 12/7/2016   | VPIC co-files with As You Sow and Arjuna Capital on Chevron resolution low carbon transition  |
| 12/7/2016   | VPIC co-files with the Community of the Sisters of St. Dominic of Caldwell, NJ on Southern Company resolution 2 degree reporting  |



### **Appendix 3) SSGA preliminary estimates for possible commingled fund recommendations**

Please note that the information below is preliminary, and for general information, not to be considered an official response to a request for proposals.

#### Option 1 – Launch commingled fund with custom proxy voting policies

- Not an option at this time. We believe our policy is strong on ESG/Climate issues. Happy to discuss our policy and approach to engagement.

#### Option 2 – Launch commingled fund that utilizes a 3<sup>rd</sup> party's proxy voting policies

- We will not be able to launch a commingled fund that utilizes a 3<sup>rd</sup> party proxy voting policy.

#### Option 3 – Transfer \$500M from SP500 Commingled to SP500 Ex Fossil Fuel Separately Managed Account

- Fee Schedule – 5 bps Flat fee
- \$65k would be added to current relationship minimum
- Vermont provide screens for SSGA to implement and would also be responsible for sending updates to SSGA
- Proxy options at this fee level: (1) Vermont votes or (2) SSGA votes in accordance with the SSGA policy
- Additional fees: Any additional index licensing fees may also apply

#### Option 4 – \$500 mm MSCI ACWI Low Carbon Target Index or MSCI ACWI Low Carbon Target IMI Index Separately Managed Account

- Fee Schedule – 12 bps for ACWI based benchmark, 15 bps for an ACWI IMI benchmark
- Minimum annual fee of \$125,000 per account to be added to current relationship minimum
- Proxy options at this fee level: (1) Vermont votes or (2) SSGA votes in accordance with the SSGA policy
- Additional fees: Any additional index licensing fees may also apply

#### Option 5 – SSGA opens an MSCI ACWI Low Carbon Target Index or MSCI ACWI Low Carbon Target IMI Index Commingled Fund

- Seed Capital - ~\$200M for an ACWI benchmark and ~\$300 mm for an ACWI IMI benchmark
- Fee Schedule – 10 bps for ACWI, 13 for ACWI IMI (not inclusive of licensing fees)
- Minimum annual fees of \$25,000 per commingled fund
- Proxies would follow SSGA policies and SSGA would vote – no custom voting would be available

#### Option 6 – SSGA opens an S&P 500 using MSCI Low Carbon Target for Index Commingled Fund

- Seed Capital - ~\$500M for a S&P500 benchmark
- Fee Schedule – 4 bps (subject to potential additional licensing fees)
- Minimum annual fees of \$25,000 per commingled fund
- Proxies would follow SSGA policies and SSGA would vote – no custom voting would be available

## Appendix 4) Northern Trust and Rhumblin estimates for commingled fund recommendations

Please note that the information below is preliminary, and for general information, not to be considered as an official response to a request for proposals.

### Northern Trust

#### Comingled vehicle to vote proxies along ISS specialized (such as Public Fund, or ESG) guidelines.

Northern Trust provided a few options for a commingled fund structure that might offer better alignment with VPIC proxy voting guidelines than their current passive equity investments offer. For each option, Northern Trust would manage the assets; outsource the proxy voting to ISS according to one of ISS's specialized guidelines. The pricing presented below is for lending options. Northern Trust notes that the fees quoted are for asset management services, and any operating expenses such as administration, audit, and ISS fees will be born within the fund NAV.

**Option 1) Use NT's existing Russell 3000 Labor Select index fund.** The primary objective of the Northern Trust Labor Select Russell 3000 Index Fund is to approximate the risk and return characteristics of the Russell 3000 Index. This Index is commonly used to represent the broad U.S. equity market. Proxies for securities held in the fund shall be voted in accordance with the AFL-CIO proxy voting guidelines. The proxy voting for this fund is outsourced to ISS and follows ISS Taft Hartley guidelines. This fund currently manages approximately \$500 million. The fee schedule is 3.5 basis points per annum for \$25 million to \$100 million; 2 basis points per annum for a \$100 - \$500 million; or 1.5 basis points per annum for \$500 million or above investment.

**Option 2) Seed a commingled vehicle tracking the S&P500 and engage ISS to report proxies along their Public Fund (or other) guideline.** NT could launch a new vehicle with a minimum of \$250 million. The fee schedule would be 4 basis points per annum for \$25 million to \$100 million; 3 basis points per annum for a \$100 - \$500 million; or 2 basis points per annum for \$500 million or above investment.

**Option 3) Seed a commingled vehicle tracking the MSCI World-ex US Index (could use Low Carbon) and engage ISS to report proxies along their Public Fund policies.** NT could launch a new vehicle with a minimum of \$250 million. The reason Northern Trust suggests the World Ex-US here rather than World only is to give your clients more flexibility in weighting between US and non-US by combining these two funds. The fee schedule would be 8 basis points per annum for \$25 million to \$100 million; 6 basis points per annum for a \$100 - \$500 million; or 4 basis points per annum for \$500 million or above investment.

**Option 4) Seed a commingled vehicle to vote in line with a custom public fund proxy voting framework.** Northern Trust offered the following thoughts for VPIC to consider if they were to establish their own board/governance structure for voting proxies jointly with other public pension plans through a commingled fund.

**Custom Option a)** The client could launch their own vehicle in a LP format, hire a sub-advisor to manage the investment portfolio, retain service providers to administer and conduct the legal and audit work around pooling investor assets. They could then hire a proxy service provider such as ISS or Glass Lewis to implement a custom proxy voting policy that the client/board governing this pool would establish and monitor.

**Custom Option b)** A second, less expensive path, would be to gather a collection of public funds who, together, wish to develop and adopt a public fund custom proxy

voting framework; have them agree on a custom proxy voting policy; agree to request the same passive equity investment manager to invest their assets according to this custom public fund proxy voting policy; and direct an agreed upon proxy voting service provider to vote and report the proxies according to their custom public fund proxy voting framework.

Under this option, each public pension fund would invest directly in the new vehicle that a passive equity manager establishes for this custom public fund proxy voting framework, similar to the process undertaken to launch NT's R3000 Labor Select Index Fund. For Northern Trust, the minimum assets to launch such a fund would be \$250 million, with fee schedules in line with those stated above, where a U.S. domestic fund is less expensive to implement than a non-U.S. or world.

### **Rhumblin**

To open an additional passive comingled fund, it would take approximately 30-60 days for the legal work to be completed. The summary features and costs for launching a new fund with the objective of tracking the **MSCI ACWI Low Carbon Index** are as follows:

- Estimated Portfolio size - \$100 million.
- Estimated holdings – 1,500 companies across 46 countries.
- Number of trades per year – 500 to 1,000 depending on index turnover, corporate actions, liquidity needs, etc.
- Daily NAV and daily liquidity.
- Investment Management Fee – 10 basis points on the first \$100 million, 9 bps on next \$200 million, 7 bps on excess (inclusive of MSCI index licensing fee).
- \$25,000 minimum annual fee.
- Custody and Administration Fee (State Street) – 3 to 5 basis points depending on trading volume.

Appendix 5) VPIC Manager Exposure to XOM, Thermal Coal and Fossil Fuel Holdings (June 30, 2016)

| Asset Class/Investment Manager/Account Type                    |                   |         | Assets Under Mgt |                  | Exposure to  |               |              |               |              |                |            |     |     |
|--|-------------------|---------|------------------|------------------|--------------|---------------|--------------|---------------|--------------|----------------|------------|-----|-----|
|  |                   |         |                  |                  | XOM          |               | ThC          |               | FF           |                | # of Firms |     |     |
|  |                   |         | (%)              | (\$Millions)     | % of Total   | \$millions    | % of Total   | \$millions    | % of Total   | \$Millions     | XOM        | ThC | FF  |
| <b>Total Plan</b>  |                   |         | <b>100.0%</b>    | <b>\$3,743.2</b> | <b>0.27%</b> | <b>\$10.0</b> | <b>0.59%</b> | <b>\$22.2</b> | <b>3.12%</b> | <b>\$117.0</b> |            |     |     |
| <b>Equities</b>  | <b>Total</b>      |         | <b>40.0%</b>     | <b>\$1,507.7</b> | <b>0.27%</b> | <b>\$10.0</b> | <b>0.58%</b> | <b>\$21.9</b> | <b>2.83%</b> | <b>\$106.1</b> |            |     |     |
| <b>Equities</b>  | <b>Commingled</b> |         | <b>23.5%</b>     | <b>\$877.9</b>   | <b>0.26%</b> | <b>\$9.7</b>  | <b>0.45%</b> | <b>\$17.0</b> | <b>1.79%</b> | <b>\$66.9</b>  |            |     |     |
| SSGA S&P 500 Cap Weighted                                      | Commingled        | Passive | 12.1%            | \$453.4          | 0.26%        | \$9.7         | 0.07%        | \$2.6         | 0.73%        | \$27.4         | 1          | 4   | 27  |
| Aberdeen Emerging Mkt Equi                                     | Commingled        | Active  | 6.6%             | \$247.1          | 0.00%        | \$0.0         | 0.26%        | \$9.8         | 0.65%        | \$24.3         | 0          | 3   | 6   |
| Mondrian Intl Equity   | Separate          | Active  | 4.0%             | \$149.6          | 0.00%        | \$0.0         | 0.07%        | \$2.5         | 0.42%        | \$15.8         | 0          | 1   | 4   |
| SSGA MSCI ACWI ex-US   | Commingled        | Passive | 4.2%             | \$156.4          | 0.00%        | \$0.0         | 0.12%        | \$4.5         | 0.39%        | \$14.7         | 0          | 56  | 147 |
| Acadian Intl Equity  | Separate          | Active  | 4.0%             | \$149.1          | 0.00%        | \$0.0         | 0.04%        | \$1.6         | 0.34%        | \$12.8         | 0          | 4   | 12  |
| SSGA S&P500 Eq. Wtd Ex Tobac                                   | Separate          | Passive | 4.2%             | \$158.7          | 0.01%        | \$0.3         | 0.02%        | \$0.8         | 0.23%        | \$8.8          | 1          | 3   | 27  |
| Wellington Smal Cap Value                                      | Separate          | Active  | 2.0%             | \$73.9           | 0.00%        | \$0.0         | 0.00%        | \$0.0         | 0.03%        | \$1.1          | 0          | 0   | 1   |
| SSGA S&P Mid Cap 400   | Commingled        | Passive | 0.6%             | \$21.0           | 0.00%        | \$0.0         | 0.00%        | \$0.2         | 0.02%        | \$0.6          | 0          | 3   | 12  |
| Champlain Mid Cap  | Separate          | Active  | 2.2%             | \$81.5           | 0.00%        | \$0.0         | 0.00%        | \$0.0         | 0.01%        | \$0.5          | 0          | 0   | 1   |
| SSGA Russell 2000 ex-Tobacco                                   | Separate          | Passive | 0.5%             | \$17.0           | 0.00%        | \$0.0         | 0.00%        | \$0.0         | 0.00%        | \$0.1          | 0          | 0   | 7   |
| <b>Fixed Income</b>  | <b>Total</b>      |         | <b>32.0%</b>     | <b>\$1,194.4</b> | <b>0.00%</b> | <b>\$0.0</b>  | <b>0.01%</b> | <b>\$0.3</b>  | <b>0.06%</b> | <b>\$2.3</b>   |            |     |     |
| <b>Fixed Income</b>  | <b>Commingled</b> |         | <b>18.5%</b>     | <b>\$694</b>     | <b>0.00%</b> | <b>\$0.0</b>  | <b>0.00%</b> | <b>\$0.0</b>  | <b>0.05%</b> | <b>\$1.7</b>   |            |     |     |
| <b>SSGA Barclays Aggregate Inde</b>                            | Commingled        | Passive | 3.1%             | \$117.7          | 0.00%        | \$0.0         | 0.00%        | \$0.0         | 0.00%        | \$0.0          |            |     |     |
| Guggenheim High Yield  | Separate          | Active  | 4.0%             | \$147.9          | 0.00%        | \$0.0         | 0.03%        | \$1.2         | 0.12%        | \$4.4          | 0          | 2   | 8   |
| Wellington EMD   | Commingled        | Active  | 5.1%             | \$192.7          | 0.00%        | \$0.0         | 0.00%        | \$0.0         | 0.05%        | \$1.7          | 0          | 0   | 1   |
| PIMCO Core Plus  | Separate          | Active  | 5.8%             | \$216.3          | 0.00%        | \$0.0         | 0.00%        | \$0.0         | 0.03%        | \$1.2          | 0          | 0   | 2   |
| PIMCO Unconstrained Bond                                       | Separate          | Active  | 2.5%             | \$92.9           | 0.00%        | \$0.0         | 0.00%        | \$0.0         | 0.01%        | \$0.3          | 0          | 0   | 1   |
| KDP High Yield   | Separate          | Active  | 1.1%             | \$39.7           | 0.00%        | \$0.0         | 0.01%        | \$0.3         | 0.02%        | \$0.8          | 0          | 1   | 3   |
| Wellington DAS Plus Beta 10y                                   | Commingled        | Active  | 2.9%             | \$108.9          | DU           | DU            | DU           | DU            |              | DU             | DU         | DU  | DU  |
| GAM Unconstrained Bond   | Commingled        | Active  | 3.5%             | \$130.8          | 0.0%         | \$0.0         | de mini      | de minimus    |              | de minimus     | DU         | DU  | DU  |
| BlackRock TIPS   | Commingled        | Passive | 3.8%             | \$144.0          | NA           | NA            | NA           | NA            | NA           | NA             | NA         | NA  | NA  |
| <b>Absolute Return</b>   | <b>Commingled</b> |         | <b>17.0%</b>     | <b>\$647.8</b>   | <b>0.0%</b>  | <b>\$0.0</b>  | <b>0.0%</b>  | <b>\$0.0</b>  | <b>0.21%</b> | <b>\$7.8</b>   |            |     |     |
| AQR Gbl Risk Prem Fd Moder                                     | Commingled        | Active  | 8.3%             | \$309.0          | NA           | NA            | NA           | NA            | NA           | NA             | NA         | NA  | NA  |
| Grosvenor GIPMS HFOF   | Commingled        | Active  | 5.2%             | \$193.0          | DU           | DU            | DU           | DU            | 0.19%        | \$7.0          | DU         | DU  | DU  |
| Allianz Structured Alpha                                       | Commingled        | Active  | 1.9%             | \$70.0           | NA           | NA            | NA           | NA            | NA           | NA             |            |     |     |
| Mellon Global Expanded Alpr                                    | Commingled        | Active  | 2.0%             | \$75.3           | 0.0%         | \$0.0         | 0.0%         | \$0.0         | 0.02%        | \$0.8          | 0          | 0   | 3   |
| <b>Alternatives (Real Estate, Commodities, Private Equity)</b> |                   |         | <b>11.0%</b>     | <b>\$393.2</b>   | <b>0.0%</b>  | <b>\$0.0</b>  | <b>0.0%</b>  | <b>\$0.0</b>  | <b>0.02%</b> | <b>\$0.7</b>   |            |     |     |
| Total Private Equity- Habourv                                  | Commingled        | Active  | 1.3%             | \$48.9           | 0.0%         | \$0.0         | 0.0%         | \$0.0         | 0.02%        | \$0.7          | 0          | 0   | 89  |

## Appendix 6) VPIC Manager Trailing Return Estimated Impacts of Divestment

| Asset Class/Investment Manager                                 | Account Type | Assets Under Mgt |                  | Trailing Returns |        |            |        |          |                             |        |       |       |      |
|--|--------------|------------------|------------------|------------------|--------|------------|--------|----------|-----------------------------|--------|-------|-------|------|
|  |              | (%)              | (Millions)       | 1-Year           |        |            |        |          | 5-Year                      |        |       |       |      |
|  |              |                  |                  | Bnmk             | Actual | x-XOM      | x-ThC  | x-FF     | Bnmk                        | Actual | x-XOM | x-ThC | x-FF |
| <b>Total Plan</b>  |              | <b>100.0%</b>    | <b>\$3,743.2</b> |                  |        |            |        |          |                             |        |       |       |      |
| <b>Equities</b>  |              | <b>40.0%</b>     | <b>\$1,507.7</b> |                  |        |            |        |          |                             |        |       |       |      |
| SSGA S&P500 Eq. Wtd Ex Tobacco                                 | Separate     | 4.2%             | \$158.7          | 2.5              | 2.5    | 2.4        | 2.4    | 2.9      | 11.9                        | 11.9   | 11.9  | 11.9  | 12.6 |
| SSGA S&P 500 Cap Weighted                                      | Commingled   | 12.1%            | \$453.4          | 4.0              | 4.1    | 3.7        | 3.9    | 4.1      | 12.1                        | 12.1   | 12.5  | 12.4  | 13.3 |
| Champlain Mid Cap  | Separate     | 2.2%             | \$81.5           | 0.6              | 4.7    | -          | -      | 5.3      | 10.9                        | 12.6   | -     | -     | 13.7 |
| SSGA S&P Mid Cap 400   | Commingled   | 0.6%             | \$21.0           | 1.3              | 1.4    | -          | 1.0    | 1.3      | 10.5                        | 10.6   | -     | 9.9   | 10.3 |
| SSGA Russell 2000 ex-Tobacco                                   | Separate     | 0.5%             | \$17.0           | -70.8            | -10.8  | -          | -      | -10.9    | 8.5                         | 8.5    | -     | -     | 8.6  |
| Wellington Smal Cap Value                                      | Separate     | 2.0%             | \$73.9           | -2.6             | -0.8   | -          | -      | -1.4     | 8.1                         | 11.2   | -     | -     | 10.9 |
| Acadian Intl Equity  | Separate     | 4.0%             | \$149.1          | -9.3             | -5.4   | -          | -4.9   | -4.6     | 2.1                         | 4.2    | -     | 4.3   | 4.6  |
| Mondrian Intl Equity   | Separate     | 4.0%             | \$149.6          | 6.5              | 8.1    | -          | 7.5    | 6.6      | 7.4                         | 7.3    | -     | 7.7   | 8.1  |
| SSGA MSCI ACWI ex-US   | Commingled   | 4.2%             | \$156.4          | -10.2            | -10.0  | -          | -9.7   | -9.6     | 0.5                         | 1.7    | -     | -2.3  | -2.1 |
| Aberdeen Emerging Mkt Equity                                   | Commingled   | 6.6%             | \$247.1          | -3.7             | -2.9   | -          | -      | -1.9     | -0.4                        | 0.3    | -     | -     | 2.7  |
| <b>Fixed</b>   |              | <b>32.0%</b>     | <b>\$1,194.4</b> |                  |        |            |        |          |                             |        |       |       |      |
| PIMCO Core Plus  | Separate     | 5.8%             | \$216.3          | 6.0              | 5.4    | -          | -      | 5.3      | 3.8                         | 4.1    | -     | -     | 4.1  |
| PIMCO Unconstrained Bond                                       | Separate     | 2.5%             | \$92.9           | -0.4             | -0.4   | -          | -      | -0.5     | No VPIC 5-Year Track Record |        |       |       |      |
| GAM Unconstrained Bond   | Commingled   | 3.5%             | \$130.8          | 0.5              | 1.0    | de minimus |        |          | No VPIC 5-Year Track Record |        |       |       |      |
| <b>SSGA Barclays Aggregate Index</b>                           | Commingled   | 3.1%             | \$117.7          |                  |        |            |        |          |                             |        |       |       |      |
| Guggenheim High Yield  | Separate     | 4.0%             | \$147.9          | 1.7              | 0.8    | -          | 0.8    | 0.9      | No VPIC 5-Year Track Record |        |       |       |      |
| KDP High Yield   | Separate     | 1.1%             | \$39.7           | 1.6              | 0.6    | -          | 0.4    | 2.4      | 5.8                         | 5.2    | -     | 5.1   | 5.3  |
| Wellington EMD   | Commingled   | 5.1%             | \$192.7          | 10.3             | 10.0   | -          | de min | mixed+/- | No VPIC 5-Year Track Record |        |       |       |      |
| <b>Absolute Return</b>   |              | <b>17.0%</b>     | <b>\$647.8</b>   |                  |        |            |        |          |                             |        |       |       |      |
| Mellon Global Expanded Alpha I                                 | Commingled   | 2.0%             | \$75.3           | 0.8              | -0.9   | -          | -0.9   | -1.3     | 4.3                         | 6.1    | -     | 6.1   | 5.7  |
| <b>Alternatives (Real Estate, Commodities, Private Equity)</b> |              | <b>11.0%</b>     | <b>\$393.2</b>   |                  |        |            |        |          |                             |        |       |       |      |
| Total Private Equity- Habourvest                               |              | 1.3%             | \$48.9           | DU               | DU     | DU         | DU     | DU       | DU                          | DU     | DU    | DU    | DU   |

## Appendix 7) Divestment Impacts on Transaction Costs

| Asset Class/Investment Manager       | Account Type | Assets Under Mgt |                  | Transaction Costs to Divest |                |               |                 |                |  |     | # of firms |     |  |
|--------------------------------------|--------------|------------------|------------------|-----------------------------|----------------|---------------|-----------------|----------------|--|-----|------------|-----|--|
|                                      |              | (% )             | (\$Millions)     | XOM                         |                | ThC           |                 | FF             |  | XOM | ThC        | FF  |  |
|                                      |              |                  |                  | XOM (\$M)                   | Trnsct (\$)    | AUM (\$M)     | Trnsct (\$)     | AUM (\$M)      | Trnsct \$s (\$)  |     |            |     |  |
| <b>Total Plan</b>                    |              | <b>100.0%</b>    | <b>\$3,743.2</b> | <b>\$10.0</b>               | <b>\$68</b>    | <b>\$22.2</b> | <b>\$51,191</b> | <b>\$117.0</b> | <b>\$185,422</b>   |     |            |     |  |
| <b>Equities Total</b>                |              | <b>40.0%</b>     | <b>\$1,507.7</b> | <b>\$10.0</b>               | <b>\$68</b>    | <b>\$21.9</b> | <b>\$8,683</b>  | <b>\$106.1</b> | <b>\$132,593</b>   |     |            |     |  |
| <b>Equities Commingled</b>           |              | <b>23.5%</b>     | <b>\$877.9</b>   | <b>\$9.7</b>                | <b>CannotD</b> | <b>\$17.0</b> | <b>CannotD</b>  | <b>\$66.9</b>  | <b>CannotD</b>   |     |            |     |  |
| <b>Equities Separately Managed</b>   |              | <b>16.8%</b>     | <b>\$629.8</b>   | <b>\$0.3</b>                | <b>\$68</b>    | <b>\$4.9</b>  | <b>\$20,638</b> | <b>\$39.1</b>  | <b>\$132,593</b>   |     |            |     |  |
| SSGA S&P 500 Cap Weighted            | Commingled   | 12.1%            | \$453.4          | \$9.7                       | CannotD        | \$2.6         | CannotD         | \$27.4         | CannotD  | 1   | 4          | 26  |  |
| Aberdeen Emerging Mkt Equity         | Commingled   | 6.6%             | \$247.1          | \$0.0                       | NA             | \$9.8         | CannotD         | \$24.3         | CannotD  | 0   | 3          | 6   |  |
| Mondrian Intl Equity                 | Separate     | 4.0%             | \$149.6          | \$0.0                       | \$0            | \$2.5         | \$16,141        | \$15.8         | \$103,481  | 0   | 1          | 4   |  |
| SSGA MSCI ACWI ex-US                 | Commingled   | 4.2%             | \$156.4          | \$0.0                       | NA             | \$4.5         | CannotD         | \$14.7         | CannotD  | 0   | 56         | 136 |  |
| Acadian Intl Equity                  | Separate     | 4.0%             | \$149.1          | \$0.0                       | NA             | \$1.6         | \$4,187         | \$12.8         | \$27,204   | 0   | 4          | 12  |  |
| SSGA S&P500 Eq. Wtd Ex Tobacco       | Separate     | 4.2%             | \$158.7          | \$0.3                       | \$68           | \$0.8         | \$310           | \$8.8          | \$432  | 1   | 3          | 27  |  |
| Wellington Smal Cap Value            | Separate     | 2.0%             | \$73.9           | \$0.0                       | NA             | \$0.0         | NA              | \$1.1          | -  | 0   | 0          | 1   |  |
| SSGA S&P Mid Cap 400                 | Commingled   | 0.6%             | \$21.0           | \$0.0                       | NA             | \$0.2         | NA              | \$0.6          | CannotD  | 0   | 0          | 12  |  |
| Champlain Mid Cap                    | Separate     | 2.2%             | \$81.5           | \$0.0                       | NA             | \$0.0         | NA              | \$0.5          | \$1,312  | 0   | 0          | 1   |  |
| SSGA Russell 2000 ex-Tobacco         | Separate     | 0.5%             | \$17.0           | \$0.0                       | NA             | \$0.0         | NA              | \$0.1          | \$164  | 0   | 0          | 7   |  |
| <b>Fixed Income - Total</b>          |              | <b>32.0%</b>     | <b>\$1,194.4</b> | <b>\$0.0</b>                | <b>NA</b>      | <b>\$0.3</b>  | <b>\$15,277</b> | <b>\$2.3</b>   | <b>\$52,829</b>  |     |            |     |  |
| <b>Fixed Income -commingled w/FF</b> |              | <b>11.8%</b>     | <b>\$441.2</b>   | <b>\$0.0</b>                | <b>CannotD</b> | <b>\$0.0</b>  | <b>CannotD</b>  | <b>\$1.7</b>   | <b>CannotD</b>   |     |            |     |  |
| <b>Fixed Income - SMA - w/FF</b>     |              | <b>10.9%</b>     | <b>\$ 403.9</b>  | <b>\$0.0</b>                | <b>NA</b>      | <b>\$1.5</b>  | <b>\$15,277</b> | <b>\$6.3</b>   | <b>\$52,829</b>  |     |            |     |  |
| SSGA Barclays Aggregate Index        | Commingled   | 3.1%             | \$117.7          |                             |                |               |                 |                |  |     |            |     |  |
| Guggenheim High Yield                | Separate     | 4.0%             | \$147.9          | \$0.0                       | NA             | \$1.2         | \$12,000        | \$4.4          | \$44,000   | 0   | 2          | 8   |  |
| Wellington Emerging Market Debt      | Commingled   | 5.1%             | \$192.7          | \$0.0                       | NA             | \$0.0         | NA              | \$1.7          | CannotD  | 0   | 0          | 1   |  |
| PIMCO Core Plus                      | Separate     | 5.8%             | \$216.3          | \$0.0                       | NA             | \$0.0         | NA              | \$1.2          | \$600  | 0   | 0          | 2   |  |
| GAM Unconstrained Bond               | Commingled   | 3.5%             | \$130.8          | \$0.0                       | NA             | \$0.0         | CannotD         | \$0.3          | CannotD  | 0   | de min     |     |  |
| KDP High Yield                       | Separate     | 1.1%             | \$39.7           | \$0.0                       | NA             | \$0.3         | \$3,277         | \$0.8          | \$8,229  | 0   | 1          | 3   |  |
| <b>Absolute Return</b>               |              | <b>17.0%</b>     | <b>\$647.8</b>   | <b>\$0.0</b>                |                | <b>\$0.0</b>  |                 | <b>\$7.8</b>   | <b>DU</b>  |     |            |     |  |
| Grosvenor GIPMS HFOF                 | Commingled   | 5.2%             | \$193.0          | DU                          | DU             | DU            | DU              | \$7.0          | DU   | DU  | DU         | DU  |  |
| Mellon EB DV Dynamic Growth Fund     | Commingled   | 2.0%             | \$75.3           | \$0.0                       | NA             | \$0.0         | NA              | \$0.8          | CannotD  | 0   | 0          | 3   |  |
| <b>Alternatives</b>                  |              | <b>11.0%</b>     | <b>\$393.2</b>   | <b>\$0.0</b>                |                | <b>\$0.0</b>  |                 | <b>\$0.7</b>   |  |     |            |     |  |
| Total Harbourvest Partners           | Commingled   | 1.3%             | \$48.9           | \$0.0                       | 0              | \$0.0         | \$0             | \$0.7          | Sell entire portfolios on secondary market, likely at steep discount to NAV, to eliminate about 1% AUM | 0   | 0          | 89  |  |



## Appendix 8) Divestment Restructuring Fee Implications

| Asset Class/Investment Manager       | Account Type | Assets Under Mgt |                  | Divest Restructuring               |  |
|--------------------------------------|--------------|------------------|------------------|------------------------------------|--|
|                                      |              | (%)              | (\$Millions)     | Possible to divest in current fund | Fee Change to divest                                 |
| <b>Total Plan</b>                    |              | <b>100.0%</b>    | <b>\$3,743.2</b> |                                    |  |
| <b>Equities</b>                      |              | <b>40.0%</b>     | <b>\$1,507.7</b> |                                    |  |
| SSGA S&P 500 Cap Weighted            | Commingled   | 12.1%            | \$453.4          | NO                                 | Increased fees to move to SMA                        |
| Aberdeen Emerging Mkt Equity         | Commingled   | 6.6%             | \$247.1          | NO                                 | SMA operating costs meaningfully higher              |
| SSGA S&P Mid Cap 400                 | Commingled   | 0.6%             | \$21.0           | NO                                 | Prohibitively costly to move to SMA- too small \$AUM |
| SSGA MSCI ACWI ex-US                 | Commingled   | 4.2%             | \$156.4          | NO                                 | Prohibitively costly to move to SMA- too small \$AUM |
| Wellington Smal Cap Value            | Separate     | 2.0%             | \$73.9           | YES                                | Requires discussion of fees, benchmark, guidelines.  |
| SSGA S&P500 Eq. Wtd Ex Tobacco       | Separate     | 4.2%             | \$158.7          | YES                                | Fees unchanged                                       |
| Champlain Mid Cap                    | Separate     | 2.2%             | \$81.5           | YES                                | Fees unchanged                                       |
| SSGA Russell 2000 ex-Tobacco         | Separate     | 0.5%             | \$17.0           | YES                                | Fees unchanged                                       |
| Acadian Intl Equity                  | Separate     | 4.0%             | \$149.1          | YES                                | Fees unchanged                                       |
| Mondrian Intl Equity                 | Separate     | 4.0%             | \$149.6          | YES                                | Fees unchanged                                       |
| <b>Fixed</b>                         |              | <b>32.0%</b>     | <b>\$1,194.4</b> |                                    |  |
| Wellington DAS Plus Beta 10yr        | Commingled   | 2.9%             | \$108.9          | NO                                 | Cost to move out of this pool; create new fund of 1. |
| Wellington Emerging Market Debt      | Commingled   | 5.1%             | \$192.7          | NO                                 | Work with VPIC on most appropriate SMA               |
| <b>SSGA Barclays Aggregate Index</b> | Commingled   | 3.1%             | \$117.7          | NO                                 | Prohibitively costly to move to SMA- too small \$AUM |
| GAM Unconstrained Bond               | Commingled   | 3.5%             | \$130.8          | NO                                 | Minimal costs to move to different class without FF. |
| PIMCO Core Plus                      | Separate     | 5.8%             | \$216.3          | YES                                | Fees unchanged                                       |
| PIMCO Unconstrained Bond             | Separate     | 2.5%             | \$92.9           | YES                                | Fees unchanged                                       |
| Guggenheim High Yield                | Separate     | 4.0%             | \$147.9          | YES                                | Fees Unchanged                                       |
| KDP High Yield                       | Separate     | 1.1%             | \$39.7           | YES                                | Fees Unchanged                                       |
| <b>Absolute Return</b>               |              | <b>17.0%</b>     | <b>\$647.8</b>   |                                    |  |
| Mellon EB DV Dynamic Growth Fun      | Commingled   | 2.0%             | \$75.3           | NO                                 | Requires SMA-meaningfully higher fees                |
| <b>Alternatives</b>                  |              | <b>11.0%</b>     | <b>\$393.2</b>   |                                    |  |
| Total Harbourvest Partners           | Commingled   | 1.3%             | \$48.9           | NO                                 | Co-invest fund with opt-out; seek non-Harbourvest.   |

**Appendix 9) Exxon-Mobil Response to Vermont Pension Investment Committee Questionnaire**  
(November 2016)

Question-1: Gross global Scope 1 emissions, percentage covered under a regulatory program, percentage by hydrocarbon resource

*A combined response to Questions 1 and 2 is below*

Question-2: Amount of gross global Scope 1 emissions from: (1) combustion, (2) flared hydrocarbons, (3) process emissions, (4) directly vented releases, and (5) fugitive emissions/leaks

*In 2015, ExxonMobil's net equity greenhouse gas emissions were 122 million CO<sub>2</sub>-equivalent metric tons. Relative to our 2014 performance, our 2015 emissions decreased by approximately 1 million CO<sub>2</sub>-equivalent metric tons. This decrease was primarily driven by energy efficiency improvement and asset divestment. The net equity greenhouse gas metric includes direct and imported greenhouse gas emissions and excludes emissions from exports (including ExxonMobil's interest in Hong Kong power through mid-2014, when it was sold). ExxonMobil reports greenhouse gas emissions on a net equity basis for all our business operations, reflecting our percent ownership in an asset.*

**Energy efficiency**

*In 2015, energy used in our operations totaled 1.7 billion gigajoules. Energy consumed in our operations generates more than 80 percent of our direct greenhouse gas emissions and is one of our largest operating costs. As such, we have focused on energy efficiency for several decades. Since 2000, we have used our Global Energy Management System in the Downstream and Chemical businesses, and our Production Operations Energy Management System in our Upstream businesses to identify and act on energy savings opportunities.*

*Through our commitment to energy efficiency, application of structured processes and continued use of a bottom-up approach, we continue to yield industry-leading results. For example, in 2010, 2012 and 2014 refining industry surveys, ExxonMobil's global refining operations achieved first quartile energy efficiency performance.*

**Flaring**

*ExxonMobil has invested more than \$3.8 billion at our Upstream facilities around the world on emission reduction efforts, including flare mitigation since 2000. As a result, hydrocarbon flaring volumes from our combined operations in 2015 were 35 percent lower than 2006 levels.*

*In 2015, flaring volume from our combined Upstream, Downstream and Chemical operations totaled 5.3 million metric tons. This represents an increase of 0.8 million metric tons compared with our 2014 performance.*

*The increase in flaring was primarily due to operations in Angola, where a third-party-operated liquefied natural gas (LNG) plant was not operating. The increase was partially offset by flaring reductions resulting from the completion of commissioning work at our Papua New Guinea LNG plant and operational improvements at the Usan production field in Nigeria.*

*ExxonMobil is a charter member of the Global Gas Flaring Reduction Partnership. In addition, we put in place our own parameters, the Upstream Flaring and Venting Reduction Environmental Standard for Projects, in 2005. Our goal is to responsibly avoid routine flaring in new Upstream projects and reduce "legacy" flaring in our existing operations.*

For example, our joint venture operations in Qatar have recently begun using a jetty boil-off gas recovery facility to recover natural gas that was previously flared during LNG vessel loading at the marine berths located at the Ras Laffan Port. Approximately 1 percent of the LNG loaded onto the ships evaporates due to the difference in temperature between the LNG and the ship tank. The recovery facility collects the boil-off gas and returns it to the LNG plants to be used as fuel or converted back into LNG. During one year of operation, the facility has recovered more than 500,000 metric tons of gas and reduced LNG vessel loading-related flaring by around 90 percent.

### **Venting and fugitive emissions**

Our venting and fugitive emissions in 2015 totaled 6 million CO<sub>2</sub>-equivalent metric tons, which is essentially the same as our 2014 performance. While venting and fugitive emissions, most of which are methane, represent approximately 5 percent of our direct greenhouse gas emissions, we recognize the importance of reducing these emissions. We continue to look for ways to reduce methane and other hydrocarbon emissions in our operations, such as replacing high-bleed pneumatic devices with lower-emission technology and conducting green well completions in targeted Upstream operations.

### **Cogeneration**

ExxonMobil has invested more than \$2 billion since 2001 in support of Upstream and Downstream cogeneration facilities to more efficiently produce electricity and reduce greenhouse gas emissions.

Cogeneration technology captures heat generated from the production of electricity for use in production, refining and chemical processing operations. Due to its inherent energy efficiency, the use of cogeneration leads to reduced greenhouse gas emissions. ExxonMobil's cogeneration facilities enable the avoidance of approximately 6 million metric tons per year of greenhouse gas emissions.

We have interests in approximately 5,500 megawatts of cogeneration capacity in more than 100 installations at more than 30 locations around the world. This capacity is equivalent to the annual energy needed to power 2.5 million U.S. homes. Over the past decade, we have added more than 1,000 megawatts of cogeneration capacity and continue to develop additional investment opportunities.

For example, ExxonMobil began the construction of a new 84-megawatt cogeneration facility at our Singapore refinery's Jurong site. When this facility is completed in 2017, ExxonMobil will have more than 440 megawatts of cogeneration capacity in Singapore, enabling our integrated refining and petrochemical complex to meet all its power needs.

ExxonMobil provides detailed reporting on our greenhouse gas emissions each year in our Corporate Citizenship Report. The following table is from the 2015 report:

| Performance data table*  | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | Page # |
|--|------|------|------|------|------|------|------|------|------|------|--------|
| <b>Managing climate change risks</b>   |      |      |      |      |      |      |      |      |      |      |        |
| <sup>5</sup> Greenhouse gas emissions, absolute (net equity, CO <sub>2</sub> -equivalent emissions), millions of metric tons | 139  | 135  | 126  | 123  | 126  | 128  | 126  | 127  | 123  | 122  | 35     |
| <sup>6</sup> Direct (excluding emissions from exported power and heat)   | 129  | 125  | 117  | 114  | 117  | 119  | 118  | 119  | 115  | 114  | N/A    |
| <sup>7</sup> Emissions associated with imported power  | 10   | 10   | 9    | 9    | 9    | 9    | 8    | 8    | 8    | 8    | N/A    |
| Greenhouse gas emission constituents (excludes emissions from exported power and heat), millions of metric tons              |      |      |      |      |      |      |      |      |      |      |        |
| CO <sub>2</sub> (excluding emissions from exported power and heat)   | 134  | 131  | 122  | 119  | 122  | 124  | 120  | 119  | 116  | 115  | N/A    |
| Methane (CO <sub>2</sub> -equivalent)  | 4    | 3    | 3    | 3    | 3    | 3    | 5    | 7    | 6    | 6    | N/A    |
| Other gases (CO <sub>2</sub> -equivalent)  | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | 1    | N/A    |
| Emissions from exported power and heat   | 14   | 14   | 13   | 14   | 13   | 15   | 15   | 16   | 7    | 4    | N/A    |
| By-region greenhouse gas emissions (net equity, CO <sub>2</sub> -equivalent emissions), millions of metric tons              |      |      |      |      |      |      |      |      |      |      |        |
| Africa/Europe/Middle East  | 50   | 50   | 45   | 43   | 45   | 45   | 44   | 44   | 43   | 44   | N/A    |
| Americas   | 69   | 65   | 62   | 62   | 64   | 66   | 68   | 70   | 66   | 65   | N/A    |
| Asia Pacific   | 20   | 20   | 19   | 18   | 17   | 17   | 14   | 13   | 14   | 13   | N/A    |

| By-division greenhouse gas emissions (net equity, CO <sub>2</sub> -equivalent emissions), millions of metric tons                                     |      |      |      |      |      |      |      |      |      |      |     |
|---|------|------|------|------|------|------|------|------|------|------|-----|
| Upstream  | 57   | 53   | 49   | 47   | 50   | 54   | 56   | 58   | 56   | 56   | N/A |
| Downstream  | 60   | 59   | 57   | 56   | 55   | 54   | 51   | 49   | 47   | 45   | N/A |
| Chemical  | 22   | 23   | 20   | 20   | 21   | 20   | 19   | 20   | 20   | 21   | N/A |
| Carbon dioxide — captured for sequestration, millions of metric tons  | N/A  | N/A  | N/A  | N/A  | N/A  | 5.0  | 4.8  | 5.9  | 6.9  | 6.9  | 34  |
| Greenhouse gas emissions, normalized (net equity, CO <sub>2</sub> -equivalent emissions), metric tons per 100 metric tons of throughput or production |      |      |      |      |      |      |      |      |      |      |     |
| Upstream  | 22.6 | 21.7 | 21.0 | 20.1 | 20.5 | 20.7 | 22.3 | 22.8 | 23.4 | 23.4 | 35  |
| Downstream  | 21.8 | 21.5 | 21.0 | 21.0 | 20.8 | 20.0 | 19.6 | 19.7 | 19.2 | 18.9 | 35  |
| Chemical  | 60.9 | 62.1 | 59.8 | 60.7 | 57.9 | 57.2 | 56.3 | 57.0 | 53.4 | 52.3 | 35  |
| Energy use (billion gigajoules)   | 1.6  | 1.6  | 1.5  | 1.5  | 1.5  | 1.5  | 1.5  | 1.5  | 1.6  | 1.7  | 36  |
| Energy intensity, normalized versus Global Energy Management System (GEMS) base year (2002) — refining  | 94.8 | 94.2 | 93.7 | 92.8 | 91.8 | 90.9 | 90.0 | 90.5 | 90.3 | 91.2 | N/A |
| Energy intensity, normalized versus GEMS base year (2002) — chemical steam cracking   | 90.4 | 89.6 | 90.4 | 88.6 | 87.6 | 87.3 | 88.2 | 88.8 | 86.4 | 86.6 | N/A |
| Hydrocarbon flaring (worldwide activities), millions of metric tons   | 8.2  | 8.0  | 5.7  | 4.4  | 3.6  | 4.1  | 3.6  | 3.7  | 4.5  | 5.3  | 36  |
| Cogeneration capacity in which we have interest, gigawatts  | 4.3  | 4.5  | 4.6  | 4.9  | 4.9  | 5.0  | 5.2  | 5.3  | 5.5  | 5.5  | 37  |

<sup>†</sup>The net equity greenhouse gas emissions metric was introduced in 2011 as a replacement for the direct equity greenhouse gas metric. Information has been restated back to 2005 according to the new metric. The net equity greenhouse gas metric includes direct and imported greenhouse gas emissions and excludes emissions from exports (including Hong Kong Power through mid-2014). ExxonMobil reports greenhouse gas emissions on a net equity basis for all our business operations, reflecting our percent ownership in an asset.

<sup>‡</sup>The addition of direct emissions and emissions associated with exported power and heat is equivalent to World Resources Institute (WRI) Scope 1.

<sup>§</sup>These emissions are equivalent to WRI Scope 2.

**Question-3: Description of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets**

*As we seek to increase production of oil and natural gas to meet growing global energy demand, we are committed to continuing to take actions to mitigate greenhouse gas emissions within our operations.*

*ExxonMobil has strong processes designed to improve efficiency, reduce emissions and contribute to effective long-term solutions to manage climate change risks. These processes include, where appropriate, setting tailored objectives at the business, site and equipment levels, and then stewarding progress toward meeting those objectives. Based on decades of experience, ExxonMobil believes this rigorous bottom-up approach is a more effective and meaningful way to drive efficiency improvement and greenhouse gas emissions reduction than through high-level corporate targets. We believe that continuing to use this approach will yield further improvements in all sectors of our business.*

*In the near term, we are working to increase energy efficiency while reducing flaring, venting and fugitive emissions in our operations. In the medium term, we are deploying proven technologies such as cogeneration and carbon capture and sequestration where technically and economically feasible. Longer term, we are conducting and supporting research to develop breakthrough, game-changing technologies.*

*Since 2000, ExxonMobil has spent approximately \$7 billion on technologies to reduce emissions and in the development of lower-emission energy solutions.*

**Question-4: Sensitivity of hydrocarbon reserve levels to future price projection scenarios that account for a price on carbon emissions**

*A combined response to Questions 4 and 6 can be found under Question 6 below*

**Question-5: Estimated carbon dioxide emissions embedded in proved hydrocarbon reserves**

*ExxonMobil does not estimate the potential quantity of carbon dioxide that may be created when our proved reserves are produced, converted to finished products and used by consumers. According to the International Energy Agency, approximately 90 percent of petroleum-related greenhouse gas emissions attributable to operations such as ours are generated when customers use our products (indirect emissions) and the remaining 10 percent are generated by industry operations (direct emissions).*

**Question-6: Discussion of how price and demand for hydrocarbons and/or climate regulation influence the capital expenditure strategy for exploration, acquisition, and development of assets**

By 2040, the world's population is projected to reach 9 billion — up from about 7.2 billion today — and global GDP will have more than doubled. As a result, we see global energy demand rising by about 25 percent from 2014 to 2040. In order to meet this demand, we believe all economic energy sources, including our existing hydrocarbon reserves, will be needed. We also believe that the transition of the global energy system to lower-emissions sources will take many decades due to the system's enormous scale, capital intensity and complexity. As such, we believe that none of our proven hydrocarbon reserves are, or will become, stranded.

ExxonMobil's long-range annual forecast, *The Outlook for Energy*, examines energy supply and demand trends for approximately 100 countries, 15 demand sectors and 20 different energy types. The Outlook forms the foundation for the company's business strategies and helps guide our investment decisions. In response to projected increases in global fuel and electricity demand, our 2016 Outlook estimates that global energy-related CO<sub>2</sub> emissions will peak around 2030 and then begin to decline. A host of trends contribute to this downturn — including slowing population growth, maturing economies and a shift to cleaner fuels like natural gas and renewables — some voluntary and some the result of policy.

ExxonMobil believes the long-term objective of effective policy is to reduce the risks posed by climate change at minimum societal cost, in balance with other societal priorities such as poverty eradication, education, health, security and affordable energy.

We fundamentally believe that free markets, innovation and technology are essential to addressing the risks of climate change. Success in developing and deploying impactful technologies will highly depend on governments creating a policy landscape that enables innovation and competition. Policies need to be clear and guard against duplicative, overlapping and conflicting regulations, which send mixed signals to the market and impose unnecessary costs on consumers. We believe that effective policies are those that:

- Promote global participation;
- Let market prices drive the selection of solutions;
- Ensure a uniform and predictable cost of greenhouse gas emissions across the economy;
- Minimize complexity and administrative costs;
- Maximize transparency; and
- Provide flexibility for future adjustments to react to developments in climate science and the economic impacts of climate policies.

Policies based on these principles minimize overall costs to society and allow markets to help determine the most effective and commercially viable solutions.

Given the wide range of societal priorities and limited global resources, all policies, including climate change policy, must be as economically efficient as possible. ExxonMobil believes that market-based systems that impose a uniform, economy-wide cost on greenhouse gas emissions are more economically efficient policy options than mandates or standards. This is because market-based policies more effectively drive consumer behavior and technology innovation, while mandates and standards eliminate consumer choice and can perpetuate ineffective technologies.

Since 2009, ExxonMobil has advocated the view that a properly designed, revenue-neutral carbon tax is a more effective market-based option than a cap-and-trade approach. A carbon tax is more transparent, can be implemented in existing tax infrastructure, avoids the complexity of creating and regulating carbon markets where none exist and reduces greenhouse gas emissions price volatility, thus delivering a clearer, more consistent long-term market price signal.

Only through a sound global policy framework will the power of markets and innovation enable society to find cost-effective solutions to address the risks of climate change, while at the same time continuing to address the many other challenges the world faces.

ExxonMobil addresses the potential for future climate change policy, including the potential for restrictions on emissions, by estimating a proxy cost of carbon. This cost, which in some geographies may approach \$80 per ton by 2040, has been included in our Outlook for several years. This approach seeks to reflect potential policies governments may employ related to the exploration, development, production, transportation or use of carbon-based fuels. We believe our view on the potential for future policy action is realistic and by no means represents a "business-as-usual" case. We require all of our business lines to include, where appropriate, an estimate of greenhouse gas-related emissions costs in their economics when seeking funding for capital investments.

We evaluate potential investments and projects using a wide range of economic conditions and commodity prices. We apply prudent and substantial margins in our planning assumptions to help ensure competitive returns over a wide range of market conditions. We also financially stress test our investment opportunities, which provides an added margin against uncertainties, such as those related to technology development, costs, geopolitics, availability of required materials, services and labor. Stress testing further enables us to consider a wide range of market environments in our planning and investment process.

Question-7: Revenues from renewable and alternative energy, average annual during trailing three years ending June 30, 2016

Recognizing the limitations associated with most existing low greenhouse gas emissions energy technologies, particularly in delivering the necessary economy and scale, we are conducting fundamental research to develop low greenhouse gas emission energy solutions that have the potential to be economically feasible without subsidies, standards or mandates. As society transitions to lower greenhouse gas emission energy solutions, technological advancements that change the way we produce and use energy will be instrumental in providing the global economy with the energy it needs while reducing greenhouse gas emissions. ExxonMobil is pioneering scientific research to discover innovative approaches to enhance existing and develop next-generation energy sources.

Question-8: R&D spending on renewable, alternative and low-carbon energy and technologies (including natural gas, carbon capture technologies, and energy efficiency improvements, average annual during trailing three years ending June 30, 2016.

Since our merger with XTO Energy in 2010, ExxonMobil has been one of the largest natural gas producers in the world. Coupled with our leadership in the development and production of liquefied natural gas (LNG), ExxonMobil is well-positioned to meet growing demand for this clean energy source. We spend approximately a quarter of a billion dollars per year on research and development on technologies to enable the safe development of natural gas. In addition, since 2000, ExxonMobil has spent nearly \$7 billion on technology to reduce greenhouse gas emissions, including on energy efficiency, cogeneration, flare reduction, carbon capture and sequestration, and to research lower-emission energy solutions.

Question-9: R&D spending on renewable energy technologies, Average Annual during trailing three years ending June 30, 2016

ExxonMobil's Emerging Technologies program brings together executives, scientists and engineers from across ExxonMobil's businesses to identify and evaluate technology research opportunities with a long-term strategic focus. The Emerging Technologies team seeks to understand a wide range of technology options and how they may impact the global energy system in the near term and as far as 50 years into



the future. Our evaluation extends well beyond our base business and near-term focus. If a technology could have a material effect on the future of energy, we insist on knowing about it and understanding the related science. Understanding the fundamental science serves as a basis for our broader research efforts and may lead to further technology development aimed at practical application, such as our work on biofuels. Additionally, this awareness informs our internal analysis of the global energy landscape as reflected and encapsulated in our annual Outlook for Energy.

At the center of our research is ExxonMobil's Corporate Strategic Research laboratory, a fundamental research institution with approximately 150 Ph.D. scientists and engineers focused on addressing the company's long-range science needs. The laboratory's scientists are internationally recognized experts in their field. Our research portfolio includes a broad array of programs, including biofuels, carbon capture and sequestration, alternative energy and climate science.

In addition to in-house research, the Corporate Strategic Research laboratory conducts strategic research with approximately 80 universities around the world on next-generation technology. For example, in 2014, ExxonMobil signed an agreement to join the Massachusetts Institute of Technology Energy Initiative, a collaboration aimed at working to advance and explore the future of energy. ExxonMobil was also a founding member in 2002 of the Global Climate and Energy Project at Stanford University, which included a \$100 million commitment to develop fundamental, game-changing scientific breakthroughs that could lead to lower greenhouse gas emissions and a less carbon-intensive global energy system. Other university collaborations cover a wide range of scientific topics, from understanding the impacts of black carbon and aerosols at the University of California, Riverside to photovoltaics at Princeton University.

### **Advanced biofuels**

ExxonMobil funds a broad portfolio of biofuels research programs including ongoing efforts to develop algae-based biofuels, as well as programs for converting non-food based feedstocks, such as whole cellulosic biomass, algae-based feedstocks and cellulose-derived sugars, into advanced biofuels. We believe that additional fundamental technology improvements and scientific breakthroughs are still necessary in both biomass optimization and the processing of biomass into fuels. Specifically, scientific breakthroughs are needed to ensure that advanced biofuels can be scaled up economically and produced with the desired environmental benefit of lower life cycle greenhouse gas emissions.

Our advanced biofuels research includes joint research collaborations with Synthetic Genomics Inc. (SGI), Renewable Energy Group, the Colorado School of Mines, Michigan State University, Northwestern University and the University of Wisconsin.

There are numerous benefits of using algae for biofuels production. Algae can be cultivated on land unsuitable for other purposes with water that cannot be used for food production. In addition to using non-arable land and not requiring the use of fresh water, algae could also potentially yield greater volumes of biofuels per acre than other sources. We also know that algae can be used to manufacture biofuels similar in composition to today's transportation fuels.

In addition, growing algae can provide an environmental benefit. Algae consume CO<sub>2</sub> and have the potential to provide greenhouse gas mitigation benefits versus conventional fuels. In 2012, researchers from MIT, ExxonMobil and SGI published an assessment of algal biofuels in the peer-reviewed journal *Environmental Science and Technology*, which concluded that if key research hurdles are overcome, algal biofuels will have about 50% lower life cycle greenhouse gas emissions than petroleum-derived fuel.

In contrast, there is a robust debate in the academic research community regarding the carbon footprint of first generation biofuels, which the EPA defines as those generated from edible crops (such

as corn). Many peer-reviewed papers in the scientific literature suggest that the direct life cycle greenhouse gas emissions are lower than fossil fuels, but that indirect consequences of first generation biofuel development, including changes in forest and agricultural land use change, may result in higher total greenhouse gas emissions than petroleum-derived fuels.

For these reasons, ExxonMobil is pursuing research into second generation biofuels to determine how they may best fit into our energy future. Second generation biofuels are defined as those produced from non-edible crops, crop residues, or biologically generated gas and therefore do not take away from the total food supply. Examples include algae, corn stover, switchgrass or methane emitted from microbial activity in landfills.

ExxonMobil and SGI are carrying out a basic research program to develop advanced biofuels from algae. Our objective is to develop advanced algae biofuels options and identify the best pathways to make these groundbreaking technologies available to consumers. We have been working with SGI since 2009.

We face some significant technical hurdles before biofuels production from algae will be possible at a significant commercial scale. To overcome these challenges, we are working to answer some basic questions such as:

- Why do algae utilize a relatively small amount of available light energy?
- What tools can be used to improve light utilization efficiency of algae and to improve production characteristics?
- How do you develop an organism that will produce significantly more bio oil?

The central challenge is that algae naturally harvest significantly more light than they can effectively convert to biofuels. Only a fixed amount of light hits the surface of a pond, and our goal is for the algae to use this light as efficiently as possible. The amount of wasted sunlight varies greatly depending on the algae species and growth conditions, but can be as high as 80 percent or more. ExxonMobil and SGI are conducting fundamental research to decrease the amount of wasted sunlight and increase biomass productivity by improving the photosynthetic efficiency of individual algae cells. To achieve this objective, the SGI team is working to engineer algae cells that will absorb only the amount of light that they can effectively use.

### **Carbon capture and sequestration**

Carbon capture and sequestration (CCS) is the process by which CO<sub>2</sub> gas that would otherwise be released into the atmosphere is captured, compressed and injected into underground geologic formations for permanent storage. With a working interest in approximately one-third of the world's total CCS capacity, ExxonMobil is a leader in one of the most important next-generation low-carbon technologies. In 2015, we captured 6.9 million metric tons of CO<sub>2</sub> for sequestration.

Over the past 15 years, ExxonMobil has invested nearly \$400 million in researching, developing and applying carbon capture and storage technology in association with our projects, with significant additional investment expected at our Gorgon project in coming years.

ExxonMobil believes the greatest opportunity for future large-scale deployment of CCS will be in the natural gas-fired power generation sector. While CCS technology can be applied to coal-fired power generation, the cost to capture CO<sub>2</sub> from that source is about twice that of natural gas power generation. In addition, because coal-fired power generation creates about twice as much CO<sub>2</sub> per unit of electricity generated, the geological storage space required to sequester the CO<sub>2</sub> produced from coal-fired generation is about twice that associated with gas-fired generation.

ExxonMobil is conducting proprietary, fundamental research to develop breakthrough carbon capture technologies that have the potential to be economically feasible without government subsidies, standards or mandates.

As an example, ExxonMobil's scientists have been pursuing new technology that could reduce the costs associated with current CCS processes by increasing the amount of electricity a power plant produces while simultaneously delivering significant reductions in carbon dioxide emissions. At the center of ExxonMobil's technology application is a carbonate fuel cell.

Laboratory tests have demonstrated that the unique integration of carbonate fuel cells and natural gas power generation captures carbon dioxide more efficiently than current, conventional capture technology. During the conventional capture process, a chemical reacts with the carbon dioxide, extracting it from power plant exhaust. Steam is then used to release the carbon dioxide from the chemical – steam that would otherwise be used to move a turbine, thus decreasing the amount of power the turbine can generate.

Using fuel cells to capture carbon dioxide from power plants results in a more efficient separation of carbon dioxide from power plant exhaust and an increased output of electricity. Power plant exhaust is directed to the fuel cell, replacing air that is normally used in combination with natural gas during the fuel cell power generation process. As the fuel cell generates power, the carbon dioxide becomes more concentrated, allowing it to be more easily and affordably captured from the cell's exhaust and stored. ExxonMobil's research indicates that a typical 500 megawatt (MW) power plant using a carbonate fuel cell may be able to generate up to an additional 120 MW of power while current CCS technology consumes about 50 MW of power.

ExxonMobil's research indicates that by applying this technology, more than 90 percent of a natural gas power plant's carbon dioxide emissions could be captured. Natural gas is already the least carbon-intensive of the major hydrocarbon-based energy sources.

In addition, carbonate fuel cell technology has the potential to generate significant volumes of hydrogen. Simulations suggest that the new technology can produce up to 150 million cubic feet per day of hydrogen while capturing carbon dioxide from a 500 MW power plant. To put that in perspective, a world-scale steam methane reforming hydrogen plant produces around 125 million cubic feet per day. In addition, synthesis gas, or syngas, composed of hydrogen and carbon monoxide, can be produced that can be upgraded to other useful products such as methanol, olefins, or higher molecular weight hydrocarbons for transportation fuels or lubricants.

In May 2016, ExxonMobil and FuelCell Energy, Inc., announced an agreement to pursue this novel technology in power plant carbon dioxide capture through a new application of carbonate fuel cells, and in October of the same year, we jointly announced the selection of a location to test it at the James M. Barry Electric Generating Station in Alabama. This fuel cell carbon capture solution could substantially reduce costs and lead to a more economical pathway toward large-scale carbon capture and sequestration globally.

### **University Collaborations**

ExxonMobil is working with approximately 80 universities around the world to explore next-generation energy technologies. Since 2002, we have supported long-term collaborative scientific research related to greenhouse gas emissions at Stanford University, and more recently, we have begun collaborations with Princeton University, Massachusetts Institute of Technology (MIT), the University of Texas at Austin, and Georgia Institute of Technology as part of our commitment to finding meaningful and scalable solutions to meet global energy demand.

### **Stanford University**

In 2002, ExxonMobil made a \$100 million commitment to Stanford's Global Climate and Energy Project (GCEP), which is focused on identifying breakthrough energy technologies. GCEP's strategy is to take a long view by supporting game-changing research with a 10- to 50-year time horizon; its goal is to keep the innovation pipeline filled with new ideas and new approaches that will ultimately make efficient, environmentally sustainable, low-cost energy available worldwide. Since its launch, GCEP has built a diverse research portfolio of innovative technologies in areas such as solar power, biomass energy, advanced combustion, carbon capture and sequestration, transportation and the electrical grid. GCEP-supported research has led to significant advances in cutting-edge energy technologies ranging from improved light management techniques and nanoscale designs for increasing the efficiency of photovoltaic systems, to novel microbial bioreactors that use renewable energy to produce methane and other fuels. Overall, GCEP has supported 80 scientific programs led by 165 faculty members and 39 research institutions across the globe. GCEP researchers have also published more than 500 papers in leading journals and given more than 700 presentations at conferences.

### **Massachusetts Institute of Technology**

In October 2014, ExxonMobil became a founding member of the MIT Energy Initiative and will contribute \$25 million over five years to support research and establish 10 graduate energy fellowship appointments each year. The MIT Energy Initiative is a unique collaboration aimed at working together to advance and explore the future of energy focused on new energy sources and more efficient use of conventional energy resources. Since launching the collaboration with MIT, the joint research program has made inroads into several areas, including bio-inspired catalysts for the petrochemical industry and computational modeling to better understand the properties of iron and iron-based alloys used in pipelines. The program has also enabled ExxonMobil to expand research efforts to emerging areas like photovoltaic and nuclear power, as well as enhance our understanding of energy options and the interactions between them.

ExxonMobil has also joined the MIT Energy Initiative's Carbon Capture, Utilization, and Storage (CCUS) Center, one of eight Low-Carbon Energy Centers first called for in MIT's Plan for Action on Climate Change in October 2015. It was established to advance research on specific, key technologies to address climate change such as electric power systems, energy bioscience, energy storage, materials for energy and extreme environments, advanced nuclear energy systems, nuclear fusion and solar energy, in addition to CCUS.

### **Princeton University**

In September 2016, ExxonMobil and Princeton University announced the selection of five research projects associated with their partnership focused on energy technologies. The projects will center on solar and battery technologies, plasma physics, Arctic sea-ice modeling, and the impact of carbon dioxide absorption on the world's oceans. This announcement followed ExxonMobil's June 2015 commitment to contribute \$5 million to Princeton E-affiliates Partnership, a program administered by Princeton University's Andlinger Center for Energy and the Environment that fosters research in sustainable energy and environmental solutions. E-affiliates promotes collaboration between industry and academia to search for energy and environmental breakthroughs. ExxonMobil scientists collaborated with Princeton professors to identify areas with the most scientific potential, particularly ones that build on the university's existing strengths and interests in emerging energy.

### **The University of Texas at Austin**

In July 2016, ExxonMobil announced a \$15 million investment as a leading member of the University of Texas at Austin Energy Institute to pursue technologies to help meet growing energy demand while reducing environmental impacts and the risk of climate change. The joint research initiative will study transformational energy innovations including integrating renewable energy sources into the current supply mix and advancing traditional energy sources in ways that improve efficiency and reduce impacts on water, air and climate. Research projects are expected to cover a range of emerging

technologies, and will take advantage of the university's capabilities in renewable energy, battery technologies, carbon capture and power grid modeling. Core strengths in advanced computing, environmental management and additive manufacturing may be applied to improve traditional energy sources.

### **Georgia Institute of Technology**

Scientists from ExxonMobil and the Georgia Institute of Technology (GT) have developed a potentially revolutionary new technology that could significantly reduce the amount of energy and emissions associated with manufacturing plastics. Results of the research were published in the August 19, 2016, edition of the professional journal Science.

The new process uses a form of reverse osmosis to separate similarly sized organic molecules. It effectively relies on a molecular-level filter that separates chemical building blocks for plastics from complex hydrocarbons at low temperatures and pressures. Working with Dr. Ryan Lively, assistant professor in GT's School of Chemical & Biomolecular Engineering, and a GT post-doctoral researcher, the team successfully demonstrated that chemical compounds known as aromatics can be separated by pressing them through a synthetic membrane they developed that acts as a high-tech sieve.

The new process may enable chemical producers to separate aromatics without heating the chemical mixture, greatly reducing the amount of energy consumed and emissions generated during the current commercial manufacturing process. ExxonMobil believes the new membrane has potential for commercialization and integration into industrial chemical separation processes since it is made from common materials, known as polymer building blocks. The technology still faces a number of challenges before it can be considered for commercialization and use at an industrial scale. The membranes used in the process will need to be tested under more challenging conditions, as industrial mixtures normally contain multiple organic compounds and may include materials that can foul membrane systems. The researchers must also learn to make the material consistently and demonstrate that it can withstand long-term industrial use.

This breakthrough could reduce annual carbon dioxide emissions by 45 million tons, which is equivalent to the annual energy-related carbon dioxide emissions of about five million U.S. homes. It could also reduce global energy costs used to make plastics by up to \$2 billion a year. As our research into this specific chemical process advances, we hope to learn more about how this technology could be used in other applications to achieve the same type of efficiency and emissions-reductions results, and potentially reduce our manufacturing footprint even further.

### **For additional information, please see the following:**

- Corporate Citizenship Report – Managing Climate Risks:  
<http://corporate.exxonmobil.com/en/community/corporate-citizenship-report/managing-climate-change-risks>
- ExxonMobil's perspectives on climate change:  
<http://corporate.exxonmobil.com/en/current-issues/climate-policy/climate-perspectives>
- ExxonMobil Outlook for Energy: A View to 2040  
<http://corporate.exxonmobil.com/en/energy/energy-outlook>
- Credit natural gas for falling emissions, rising economy – ExxonMobil blog:  
<https://energyfactor.exxonmobil.com/perspectives/natural-gas-falling-emissions/>
- ExxonMobil's Collegiate Collaboration – ExxonMobil blog:  
<https://energyfactor.exxonmobil.com/perspectives/exxonmobil-collegiate-collaboration/>



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