**Fossil Fuel Divestment Literature Review**

**Table of Contents**

1. **The Financial Risk of Carbon Exposure**
2. The Carbon Underground - Fossil Free Indexes
3. Unburnable Carbon: Wasted Capital and Stranded Assets - Carbon Tracker Initiative
4. Stranded Assets and the Fossil Fuel Divestment Campaign: What does divestment mean for the valuation of fossil fuel assets? - The University of Oxford (2013)
5. Stranded Carbon Assets: Why and How Carbon Risks Should be Incorporated in Investment Analysis - Generation Foundation (2013)
6. Climate Change Scenarios: Implications for Strategic Asset Allocation – Mercer (2011)
Through the Looking Glass: How Investors are applying the results of the Climate Change Scenarios Study (2012) - Mercer
7. Oil and Carbon Revisited: Value at Risk from Unburnable Reserves - HSBC Global Research (2013)
8. **The Financial Integrity of Divestment**
9. Do the Investment Math: Building a Carbon Portfolio | Aperio Group LLC (2013)
10. Building a Carbon Free Equity Portfolio | Aperio Group LLC (2014)
11. Beyond Fossil Fuels: The Investment Case for Fossil Fuel Divestment | Impax Asset Management
12. Institutional Pathways to Fossil-Free Investing: Endowment Management in a Warming World | Tellus Institute (2013)
13. Responding to the Call for Fossil Free Portfolios - MSCI
14. 2014 ESG Trends to Watch | MSCI (2014)

**Introduction:**

There is a growing body of robust, credible investment-oriented research by financial firms and professionals that highlight the increasing risks of staying invested in the fossil fuel industry as well as the financial integrity of fossil fuel divestment. Divestment and reallocation of funds into climate solutions have shown that investors can maintain or increase returns, manage carbon exposure risks, uphold their fiduciary duty and mitigating climate change simultaneously. In the last several years there has been a boom of investment managers, financial advisers and planners that have created new fossil-free investment vehicles and fossil free strategies. Many large asset managers and institutional investors have already taken steps to decrease or virtually eliminate carbon risk exposure and the empirical results of those strategies have been competitive and compelling.

Going to add a paragraph about Blackrock and FTSE.

1. **The Financial Risk of Carbon Exposure**
2. **The Carbon Underground 200 | Fossil Free Indexes** (2014)

<http://fossilfreeindexes.com/the-carbon-underground-2014/>

The Carbon Underground 200 is the most recent list of the World’s top 100 public coal companies and the top 100 oil and gas public companies, ranked by the carbon content of their fossil fuel reserves as of November 2013. Despite the dwindling carbon emissions budget set forth by the International Panel on Climate Change to avoid excessive climate consequences, the top 200 fossil fuel companies C02 emissions have continued to grown (8.4% since the end of 2010). There is 546 gigatons of C02 emissions potential estimated to be embedded in the reported reserves of the 200 firms in the report which represents 400% of firms’ budget allocation based on their share of carbon emissions potential of global reserves. Three estimates confirm growing research that exposure to fossil fuel companies, especially investments in coal, have the potential to become stranded assets and experience other constraints. The report identifies changes in the top 200 companies since Carbon Tracker’s 2010 list, including 27 new companies. The research highlights the concentration of reserves and emissions potential in a small number of large firms.

1. **Unburnable Carbon 2013: Wasted Capital and Stranded Assets | Carbon Tracker Initiative** (2013)

<http://carbontracker.live.kiln.it/Unburnable-Carbon-2-Web-Version.pdf>

This report from Carbon Tracker and the Grantham Research Institute on Climate Change and the Environment, calls on regulators, government and investors to re-evaluate energy business models against carbon budgets, to avoid a 6 trillion carbon bubble in the next decade. It has been calculated 60-80% of reserves need to be kept in the ground to have an 80% chance of keeping global average temperatures below two degrees Celsius. There would still be significant constraints on reserves even with a less ambitious target of limiting warming to three degrees Celsius. The 200 largest listed fossil fuel companies had a market value of around $4 trillion at the end of 2012, but the models used to make those valuations do not account for how global actions to address climate change might significantly reduce the value of those companies.

 Despite that current reserves far exceed the carbon budget, the fossil fuel industry spent $674 billion in 2012 to find and develop new potential stranded assets. The report highlights serious questions about the ability of the financial industry to act on industry-wide long term risk, since the only currently measure of risk is performance against historical benchmarks.

Company valuation and other methodologies do not typically inform investors about their exposure to stranded assets. To avoid the systematic risk of climate change, investors need to demand to go beyond the traditional definition of risk as underperforming the benchmark. The rebalancing and redistribution of funds is required to protect shareholders and prevent wasted capital. Greater understanding of the risk and uncertainty associated with fossil can fuels can help redistribute investments to less risky alternatives.

1. **Stranded Assets and the Fossil Fuel Divestment Campaign: What Does Divestment Mean for the Valuation of Fossil Fuel Assets? | University of Oxford** (2013)

<http://www.smithschool.ox.ac.uk/research/stranded-assets/SAP-divestment-report-final.pdf>

This report sets out to find out if the Divestment campaign can affect fossil fuel assets, and if so how, to what extent and over which time horizons. The report finds that the direct financial impacts of divestment on fossil fuel companies is limited, however divestment campaigns may have lasting and meaningful indirect impacts on the fossil fuel industry through stigmatization that leads to restrictive legislation. The demand for carbon regulation is increasing around the world from a local to global level, divestment can be used as tool to push for a carbon tax or other forms of carbon regulation.

“One of the most important ways in which stigmatization could impact fossil fuel companies is through legislation. In almost every divestment campaign we reviewed from adult services to Darfur, from tobacco to South Africa, divestment campaigns were successful in lobbying for restrictive legislation affecting stigmatized firms.”

1. **Stranded Carbon Assets: Why and How Carbon Risks Should be Incorporated in Investment Analysis | Generation Foundation** (2013)

<http://genfound.org/media/pdf-generation-foundation-stranded-carbon-assets-v1.pdf>

This report highlights the importance of carbon-risk assessment when analyzing investment portfolios, due to the increasing risks associated fossil fuels and other carbon-intensive assets. The report emphasizes that the economic viability of fossil fuels is increasingly threatened by changes in legislation, regulation, environmental shocks, and disruptive technologies that aim to reduce greenhouse gas emissions. Fossil fuels run the risk of becoming stranded assets as the governments around are increasingly starting to impose limits on emissions in an attempt to keep global average temperatures below two degrees by not surpassing the carbon budget set forth by the 2013 IPCC report. Likely increases in regulation, a boom in more-cost effective alternatives and growing public stigmatization all threaten the viability of fossil fuel assets being profitable in the future. The report also identifies how to asses portfolio exposure to carbon risk.

There are three key risks that may result stranded carbon assets.

1. **Regulation –** Can be led by local or national authorities, and may take the form of direct regulation of carbon or indirect regulation in the form of increased pollution controls, water use restrictions, public health enforcement policies, or mandates to adoption of renewable energy or increase efficiency standards which can lead to the adoption of alternatives to carbon-intensive assets.
2. **Market Forces** – Renewables technologies are increasingly becoming economically competitive with fossil fuel-derived energy sources, without the cost of subsidies because costs have plummeted in recent years and continue to decline. Cost competitiveness in combination with the ability to secure stable long-term prices for power and electricity production is driving increased allocation of capital away from carbon-centric industries and into alternatives.
3. **Sociopolitical Forces** – In the absence of regulation, sociopolitical pressures could create an environment where carbon-intensive businesses could lose their license to operate. The growing momentum of public opposition to the environmental and social costs of fossil fuels poses a major threat to the industry. The nuclear industry has already been losing its license to operate in several countries as public opinion shifts. There are currently 400 campus campaigns and 150 city campaigns calling for divestment. Divestment has been adopted by 15 cities, 12 schools including Stanford, and many organizations and religious intuitions.
4. **Climate Change Scenarios – Implications for Strategic Asset Allocation | Mercer**

<http://www.mercer.com/climatechange>

Scientists and economists have acknowledged that climate change is having and will continue to have significant impacts on economies and financial markets in the coming decades. This report analyzes the extent of projected climate impacts on 12 institutional investment portfolios through a series of four climate change scenarios and identifies pragmatic strategies for investors to assess climate-sensitive assets and adoption of a risk management process. Traditional Strategic Asset Allocation (SAA) is a key process of portfolio management, it is estimated that more than 90% of variations on portfolio returns overtime are attributable the SAA decisions. SAA relies heavily on historical quantitative analysis; however to assessing climate risk requires additional qualitative and forward looking inputs, thus historic precedent is not an effective indicator of future performance. The report uses scenario analyses to anticipate future trends and develops four alternative pathways that might result from climate change. The report models climate change risks using the "TIP Framework”, which assesses three variables for climate risk: technology, impacts and policy. Technology refers to the rate of development for investment opportunities in cost-effective low carbon technologies, impacts refer to how physical changes will affect investments and returns, and the policy aspect refers to how changes in global policies to reduce carbon and emissions levels will affect investments and returns.

The TIP framework suggests that climate policy could contribute to as much as 10% to overall portfolio risk. To manage climate change risks, Mercer suggests that institutional investors think about how to diversify sources of risk rather than across traditional asset classes. The report proposes that investors can manage climate risks by introducing climate risk assessments, increasing asset allocation to sustainability-themed passive portfolios to hedge climate sensitive assets. It also recommends investors to engage with companies to request improved disclosure on climate risks. The analysis suggests that under certain scenarios, investors could manage climate change risks and retain similar returns by increasing exposure to a range of assets that have a high sensitivity to “TIP” factors and can adapt to a low carbon environment, these assets could include infrastructure, real estate, private equity and agriculture. This strategy allows investors to increase investment in climate change mitigation and serve their beneficiaries financial interest simultaneously. It also advocates the need for investors to communicate with policymakers the need for a clear internationally coordinated policy response as well as to emphasize the potential economic and financial cost of delaying climate mitigation. The findings of this study suggest investment engagement with policymakers can play a vital role in overall portfolio risk management.

1. **Through the Looking Glass – How Investors are Applying the Results of the Climate Change Scenarios Study**

<http://www.mercer.com/climatechange>

After the Climate Change Scenarios report was published in early 2011, the 12 partner groups in the study (who are collectively worth over $2 trillion in assets) received individual reports providing a tailored analysis of their individual fund. Mercer followed up with participants to gain feedback and document the actions that the participants had already taken or may take in the future as a result of the recommendations. In this follow up report, out of the 12 investors, nearly all of them had updated or were in the process of updating their boards and investment committees on the findings of the study. More than half of project partners conducted or planned climate risk assessments and decided to include climate change consideration in future risk management or future SAA processes. Additionally over half of participants had already undertaken strategies or planned to make changes to their asset allocations. Over two thirds of the partners had already increased their engagement on climate change with companies and policy makers, or planned to and one third of the partners already began to or planned to allocate more climate sensitive assets.

The report provides additional information to highlights the Technology, Impacts, and Policy (TIP) Framework used to assess climate risk in the first report. According to the International Energy Agency’s 2009 World Energy Outlook Report the value of additional investments in efficiency improvements, renewable energy, and other alternative energy sources is expected to increase from $180 billion to $260 billion by 2030.  Grantham LSEVivid Economics 2002 model estimates that changes to the physical, environment, health and food security costs will cost $70 billion to 180 billion globally in terms of adaption and residual damage costs. Carbon and emissions prices also derived by Grantham LSE/Vivid Economics model, estimated that the cost of emissions from 2010 to 2030 will range from $130 billion to $400 billion, with delayed action as the most costly scenario due to the late and rushed unanticipated policy changes.

The report also highlights case studies, one of them being of Forsta AP Fonden (AP1) an asset management fund which oversees $32.5 billion in assets. After receiving the tailored findings, AP1 has implemented a significantly more structured and effective approach to reviewing climate change risks. The fund stated the following:

“Our participation in the project has not only given us a better insight into the potential effects of climate on different asset classes and the long-term performance of our portfolio, it has also provided us with better tools for our strategic asset allocation analysis, which is the core of our investment model. Going forward, the analytical approach that was applied in the study will be incorporated into the strategic reviews that AP1 uses to determine its long term investment orientation.”

1. **Oil and Carbon Revisited: Value at Risk from ‘Unburnable Reserves”| HSBC Global Research**

<http://gofossilfree.org/files/2013/02/HSBCOilJan13.pdf>

In this report HSBC analysts looked at the financial risks to the oil sector if carbon restrictive legislation would lead to price shifts and declining demand for oil and slower growth for demand of gas. It sites the International Energy Agency’s 2012 World Energy Outlook, report that stated that in order to have a 50% chance of keeping global average temperatures below two degrees, only a 1/3 of fossil fuels can be burned before 2050, thus two-thirds of fossil fuel reserves are at risk of being deemed unburnable over the next 40 years. In the International Energy Agency’s ‘450’ ppm scenario which aims to keep global average temperatures below two degrees, it assumes that between 2010 and 2035, coal consumption would fall by 30% and oil consumption by 12 %. Such demand effects may mean lower oil and gas prices, thus a greater value risk. In the case of gas and oil the value risk from unburnable reserves would be equivalent to 40-60% of the market capitalization of the affected companies.

1. **The Financial Integrity of Divestment and Reallocation**
2. **Do the Investment Math: Building a Carbon Free Portfolio | Aperio Group LLC** (2013)

<http://www.aperiogroup.com/system/files/documents/building_a_carbon_free_portfolio.pdf>

This study shows that divestment from the top 200 fossil fuel companies with the largest carbon reserves as listed by the Carbon Tracker Initiative, is unlikely to negatively impact portfolio returns. Aperio Group is an investment management firm that specializes in index tracking strategies. Using the peer-reviewed method called multi-factor model to estimate the effect of divestment on endowment risk. The model generates a forecast for tracking error of a U.S. carbon free portfolio. Tracking error is the statistical measurement of portfolio deviation from target benchmarks like the S&P 500 and Russell 3000. The study shows that the increased risk of divesting from the entire coal, oil and has industry to endowment portfolio is very negligible, the increased risk in standard deviation is a mere 0.0101% and the theoretical return penalty is .0034%. Using the multi-factor model Aperio Group also conducted a historical back-test which compared a portfolio free of coal, oil, and gas stocks against the Russel 3000 over 25 years from (1987 – 2012), the back test showed that the portfolio slightly outperformed the index in that time frame.

1. **Building a Carbon Free Equity Portfolio** | **Aperio Group LLC** (2014)

<https://www.aperiogroup.com/system/files/documents/aperio_group__building_a_carbon-free_equity_portfolio.pdf>

This report builds on its predecessor by analyzing data on carbon-free markets outside the U.S. The study focuses on hypothetical equity portfolios that exclude carbon industries from standard market indices in Australia, Canada, the U.S., as and a Global Index. The data does not support the view that screening carbon-centric companies negatively affects an index tracking portfolio return. The data also shows that the impact on risk may be far less significant than presumed. Carbon-free investments with low tracking error could be implemented by allocating investment funds from Oil, Gas and Consumable Fuel Industry to Utilities and Materials. The study conducts a historical back test over a 11-25 year period which compared hypothetical Carbon-Free Tracking Portfolios against their respective indices. The data showed that over the period analyzed, divestment presented a marginal risk and slightly better returns. Additionally the report states that government imposed carbon controls could lead to stranded assets, permanently eroding profits of carbon-centric companies.

1. **Beyond Fossil Fuels: The Investment Case for Fossil Fuel Divestment |Impax Asset Management** (2013)

<http://www.impaxam.com/media/178162/20130704_impax_white_paper_fossil_fuel_divestment_uk_final.pdf>

The returns over five years were analyzed and showed that removing the fossil fuels sector in its entirely and replacing it with ‘fossil free’ portfolios composed of energy efficiency, renewable energy and other alternative energy stacks that are either actively or passively managed would have improved annualized returns, increasing from 1.8% to 2.3% with a low tracking error of 1.6%. A major concern among investors is that if they exclude an entire industry such as the fossil fuel industry, and reallocate those funds amongst other industries, they’ll miss out on the sector’s future outperformance. To address this concern Impax modeled the performance of the MSCI World Index and replaced the fossil fuel sector with FTSE’s Environmental Opportunities Energy universe, which is comprised of 243 energy efficiency and renewable energy stocks. Over seven years, the analysis showed there was no impact on performance with a 1.6% tracking error and for the five-year period.

The report mirrors to recent research by MSCI, where the MSCI World Index was used to assess the risk and return for four fossil-free portfolio options. MSCI analyzed the impact of removing 247 companies owning fossil fuel reserves from its All-Country World Index Investable Market Index over a period of 5 years (2008-2013). In a back testing exercise from 2008 – 2013 the MSCI ACWI index minus the fossil fuel sector outperformed by 1.2 % with a tracking error of 1.9%.

1. **The Fossil Free Portfolio** - The MSCI World Index without the fossil fuel energy sector
2. **Fossil Free Plus Alternative Energy (Passive) Portfolio.** Replacing the fossil fuel stocks of the MSCI World Index with a passive allocation to renewable energy and energy efficiency stocks
3. **Fossil Free Plus Alternative Energy (Active) Portfolio -** Replacing the fossil fuel stocks of the MSCI World Index with an actively managed portfolio of renewable energy and energy efficiency stocks
4. **The Fossil Free Plus Environmental Opportunities (Active) Portfolio -** Replacing Fossil fuels of the MSCI World Index with an actively managed allocation of stocks from a wider range resource optimization and environmental investment opportunities.

The primary concern amongst investors about divestment is that, excluding components of an index will increase volatility and tracking error and could potentially lead to underperformance. It is important to look at how investment portfolios have actually performed in recent years without exposure to fossil fuel extraction and production sector. Analysis of the historical data over the last seven years shows that eliminating fossil fuels from a global benchmark index had a positive return. Impax recommends investors to consider reallocating their fossil fuel stocks towards energy efficiency, renewable energy and low carbon energy investments, thereby retaining exposure to the energy sector while mitigating financial risks posed by the fossil fuel sector

1. **Institutional Pathways to Fossil-Free Investing: Endowment Management in a Warming World | Joshua Humphreys PH.D| Tellus Institute** (2013)

<http://gofossilfree.org/files/2013/06/institutional-pathways-final-061813.pdf>

This paper outlines three pathways for investors to develop fossil free portfolios based on strategies used by leading asset managers that have successfully invested in fossil free portfolios. Each pathway can be executed individually but are designed to build on one another, making them adaptable to the investors needs throughout different stages of the divestment process. The options are based on practical and profitable strategies for divestment and reinvestment. Meta-Data studies by the Deutsche Bank and Mercer have shown that a vast majority of academic studies of which analyzed Environmental Social Governance (ESG) investment performance result in neutral or positive relationships between financial performance and the incorporation of ESG factors into portfolio management. It also refers to the Aperio “Do the Investment Math” study, which showed that fossil fuel divestment has shown minimal additional portfolio risk by excluding coal, oil and gas companies from passive index strategies. Many asset managers, index firms and other financial institutions are increasingly creating fossil-free investment vehicles and strategies to keep up with the growing investor demand for fossil free investment options.

1. **Fossil Fuel Divestment:** The first pathway is to freeze new investments in the top 200 fossil fuel companies, holding the largest proven carbon reserves, in addition to selling off stocks and bonds, and instructing commingled fund managers to unwind their commingled holdings.
2. **FF Divestment with 5% Sustainable Reinvestment -** The second pathway builds upon the first by reinvesting a at least 5% of the portfolio that into investment that focus on climate change mitigation .
3. **Total Portfolio Activation for Sustainability and Climate Responsible Investment –** The final pathway involves divestment and strategic reallocation across all asset classes, geared towards mitigating climate change. These would include re-allocation of assets into areas such as revolving green funds, green bonds, energy efficiency, green building and community development funds.

The paper also highlights case studies of asset management firms, who have already implemented these pathways to divestment from fossil fuels. The empirical results have been competitive and compelling with the added benefit of decreasing exposure to the projected carbon bubble. The examples presented throughout the paper range from small to mid-size foundations who have embraced divestment as well as multi-billion dollar endowments such as Caltech and Yale who have allocated portions of the portfolios to green revolving funds and sustainable alternative investments. The report emphasized that divestment is merely the first most immediate steps in a much long process of re-designing portfolio to manage climate risk, seize climate-related opportunities and optimizing entire portfolios around themes of sustainability across all asset classes.

1. **Responding to the call for Fossil-Free Portfolios | MSCI ESG Research** (2013)

<http://www.msci.com/resources/factsheets/MSCI_ESG_Research_FAQ_on_Fossil-Free_Investing.pdf>

This fact sheet explains the results of several backtests done on the Carbon Tracker 200, a list of the top 200 companies with the largest holdings of coal and fossil fuel reserves, as well as The MSCI All Country World Index Investible Market Index (MSCI ACWI IMI) Select Energy Producers. The MSCI ACWI IMI tracks companies in the following sectors of industry classifications: Coal and Consumable Fuels, Integrated Oil & Gas, Oil & Gas Exploration. MSCI conducted Backtesting of the MSCI ACWI Select Energy Producers Index from January 2008 through March 2013 showed that that the Select Energy Producers Index slightly outperformed the MSCI ACWI IMI at the beginning of the time series, as crude oil prices reached an all time high of $147 per barrel in 2008, but began to underperform in early 2012 as oil prices dropped back below $100 per barrel. MSCI also conducted a backtest done on a list of carbon-reserve (Provided by CalSTRS) owning companies that mirrors the Carbon Tracker list from June 2003 through May 2013. It showed that the MSCI ACWI IMI slightly underperformed the carbon-excluding list.

The research also highlights that the Energy Sector has consistently been among the most risky sectors in the global economy since 2005, thus fossil fuel divestment has the potential to reduce overall portfolio risk because of volatility of the Energy Sector. The report also provides low-carbon alternatives to full divestment such as selective divestment, carbon tilts, low-carbon momentum and thematic investments.

1. **2014 ESG Trends to Watch | MSCI ESG Research** (2014)

<http://www.msci.com/resources/factsheets/MSCI_ESG_Research_2014_ESG_Trends_to_Watch.pdf>

MSCI is an international investment research firm that provides indices, portfolio risk and performance analytics and governance tools to institutional investors and hedge funds. The company created the first global stock market indices for markets outside the U.S. and is often used as a common benchmark for global stock funds. The company remains a one of the world's leader in investment expertise. This report explains some of the most pressing trends and questions from their clients.

MSCI has seen escalating investor interest in measuring portfolio exposure to the carbon bubble. The firm expects to see four major approaches to address this issue. Using data analysis on carbon reserves, emissions and climate strategies MSCI tested three carbon-reduction strategies to roughly 2,500 companies in the MSCI All Country World Index (ASWI).

**Approach 1: Fossil Fuel Divestment** - Exclude any companies in the ACWI with identifiable fossil fuel reserves

**Approach 2: Low Carbon** - Exclude the biggest carbon reserve owners and additionally, exclude the largest carbon emitters.

**Approach 3: Carbon Tilt** - Apply no exclusions but tilt the portfolio with higher weights given to companies in each industry with higher weights given to companies in each industry with stronger performance on their carbon strategy.

The analysis compared the three approaches to the to the MSCI ASWI from January 1st, 2007 to December 31st 2013. Over the time frame, the annualized returns of the three approaches outperformed the unscreened MSCI ACWI. The annualized returns of the screened approaches ranged from 3.78% to 4.55% compared to a 2.99% return on the MSCI ACWI annualized return of the unscreened MSCI ASWI index. Risk-adjusted returns were also higher, as was the volatility.

The report also examines the growth impact investing - investments intended to generate a social benefit while producing financial return and in particular the recent boom of 'green bonds.’ Due varying definitions of what ‘green bonds’ are, the market ranges from $13 billion to $346 billion. MSCI analyzed the Barclays Global Aggregate Bond Index and found that $81.2 billion to $517.6 billion were bonds issued by companies considered ‘clean tech leaders’. This pool of ‘green bonds’ are issued by supranationals, renewable energy project-linked bonds issued by legal entities and corporate and municipal users that derive over 50% of their revenues from clean technologies such as including solar, wind, green building and pollution prevention.

The report also emphasizes the overwhelming scientific consensus has deemed 450 parts per million to be the maximum safe limit of carbon dioxide in the atmosphere and that the world's fossil fuel producers have enough carbon in their reserves to raise carbon levels 5 times past that limit.

"Purely from a financial perspective, even the outside chance that some reserves could become 'stranded assets' if a red line is breached should prompt a hard look at the assumptions underlying the valuation of fossil fuel producers."