

Fossil Fuel Divestment: Risks and Opportunities

Daniel Kern, CFA
Jim Blachman, CFA
Gerard Cronin, CFA



ADVISOR PARTNERS

Advisor Partners, LLC
2175 N. California Blvd, Suite 400
Walnut Creek, CA 94596
www.advisorpartners.com

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Summary

Divestment from oil companies and other fossil fuel based companies is of interest to socially responsible investors who are concerned about climate change. Setting aside social considerations, our investment analysis suggests that removing these energy stocks from a well-diversified portfolio has little impact on investment risk; however, the evaluation of the impact on portfolio performance will depend on an investor's perspective.

Overview

Climate change is a significant challenge for society. One investment response to this is the divestment campaign started by writer and environmental advocate Bill McKibben. McKibben's organization, 350.org, claims activists on over 300 college and university campuses who have successfully convinced several schools to divest the top 200 oil, gas and coal companies from their endowments. In addition, cities such as San Francisco and Seattle have announced plans to divest fossil fuel stocks from their retirement portfolios.

This study provides a framework for analyzing the investment implications of two divestment policy alternatives so that institutional and individual investors can make an informed decision about divestment. Our analysis starts with a brief introduction to the policy debate, contrasting the arguments for the different approaches.

We then quantify the investment risks associated with divestment. We compare full divestment and partial divestment to an unconstrained policy of no divestment in order to determine the trade-offs among these approaches. Previous academic research, particularly prior research into the apartheid divestment campaign, informs our fossil fuel divestment research. We calculate forward-looking estimates of risk to forecast whether the divestment portfolios would present risks materially different from the unconstrained portfolio. We investigate the composition of the portfolios to anticipate sources of risk and return differences. We also simulate backward-looking returns to develop a hypothesis about how the divestment portfolios would have performed over prior years. We use financial modeling tools provided by FactSet Research Systems and Northfield Information Services to simulate the portfolios.

Policy Alternatives

Three policy alternatives guided the research project. Most major endowments currently oppose efforts to divest fossil fuels from their portfolios. The argument commonly offered by endowment leaders is that as fiduciaries they are obligated to maximize returns without regard to social costs. This *"no divestment"* policy alternative is represented in our study by the S&P 500 index.

Divestment proponents consider climate change to be an urgent crisis. The *"full divestment"* portfolio begins with the S&P 500 and then excludes U.S. oil, gas and coal companies that own carbon in the ground, as well as many chemical companies, utilities and miners, for a total of 72 excluded stocks. The full divestment portfolio differs somewhat from the 350.org divestment list, which is limited to the top 200 oil, gas, and coal companies and includes many non-U.S. companies which are not in the S&P 500.

The compromise alternative is a *"partial divestment"*, favored by proponents of a gradual approach. In partial divestment, the fossil fuel companies that receive positive environmental, social and governance ratings are included in the portfolio. Only the fossil fuel companies that receive the worst ratings are excluded. This provides a way to reward the better companies in the industry while punishing the worst-scoring companies. In this study, we excluded all S&P 500 benchmark constituents in the energy and utility sectors that fail according to our partner First Affirmative Financial Network's evaluation policy.

Risks in Absolute and Relative Terms

The study used standard deviation to measure projected risk in absolute terms, determining the projected variability of each portfolio, including the no divestment S&P 500. As shown in Table 1, the no divestment portfolio has the lowest standard deviation, 21.74%, while the partial divestment portfolio has the highest, 22.04%. Although the two divested portfolios each had higher standard deviation than the S&P 500 index, the difference between partial and full divestment was insignificant.

Table 1: Absolute and Relative Risk Measures: Similar Risks for Both Divestment Portfolios

	No Divestment	Partial Divestment	Full Divestment
Standard Deviation	21.74%	22.04%	21.96%
Predicted Tracking Error (relative to S&P 500)	0.00%	1.06%	1.57%
Number of holdings	500	465	428

Examining risk in relative terms, the study also examined predicted tracking error, which is a statistic that measures deviation from a target benchmark. The partial divestment portfolio has a predicted tracking error of 1.06% and the full divestment portfolio 1.57%. In statistical terms, a portfolio with predicted tracking error of 1.57% is expected to have annual returns within plus

or minus 1.57% of S&P 500 returns, two-thirds of the time. Placing these statistics in context, a typical index fund has tracking error of less than 0.50%. Consequently, it's reasonable to point out that the divestment portfolio options present higher risk than a typical index fund. However, the context is different when considering that an average actively managed portfolio has a tracking error around 4.00%.

Portfolio Characteristics

The study examined portfolio characteristics to assess underlying risks that may not be as evident when focusing on portfolio-level risk measures. Sector positioning is an important characteristic, as sector positioning can be an indicator of future sources of performance deviation relative to a benchmark. As shown in Table 2, both divestment portfolios were substantially underweight to energy and utilities companies. Energy companies alone represent 11% of the S&P 500. McKibben and some portfolio managers argue that energy stocks are systematically overvalued by the market because they will be unable to realize the value of their carbon reserves. Less controversial is the idea that the portfolios that are underweight to energy would deviate most in environments in which energy stocks were big winners or losers; we simulate past periods in the next section of the study.

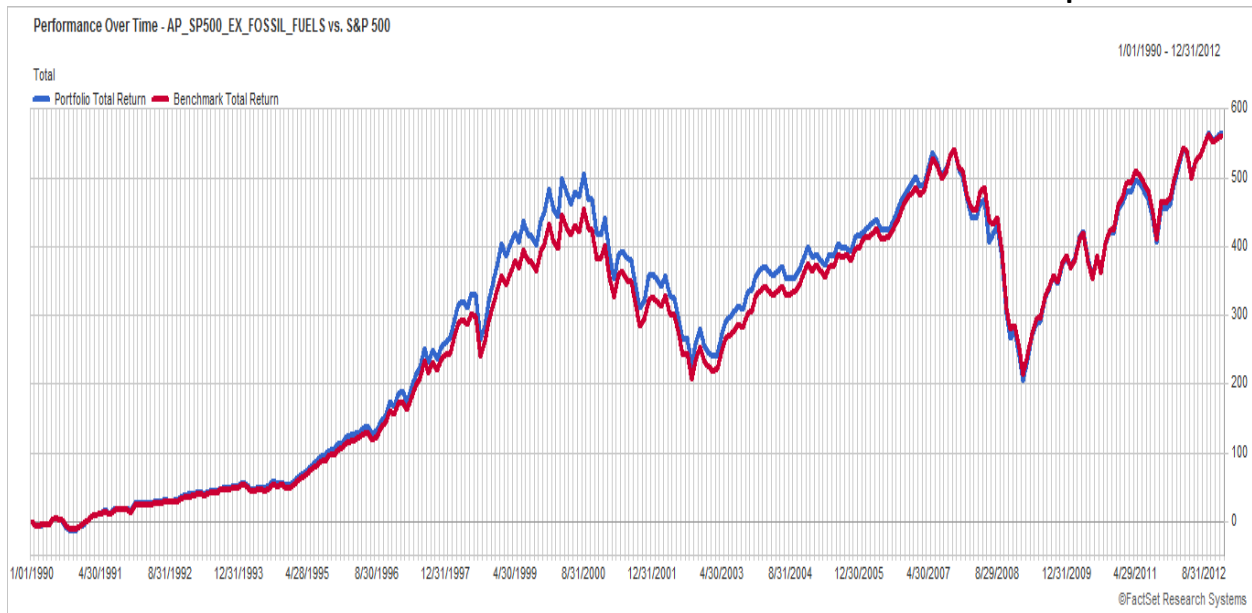
Table 2: Sector Weights: Very Different Weights in Energy and Utilities Sectors

Sector Weights	No Divestment	Partial Divestment	Full Divestment
Energy	11.0%	4.3%	0.8%
Utilities	3.4%	1.4%	0.3%
Consumer Discretionary	11.4%	12.5%	13.5%
Consumer Staples	10.6%	11.7%	12.5%
Financials	15.7%	17.3%	18.6%
Health Care	12.0%	13.2%	14.4%
Industrials	10.1%	11.1%	12.0%
Information Technology	19.0%	21.0%	21.6%
Materials	3.6%	4.0%	2.8%

Simulated Performance Results

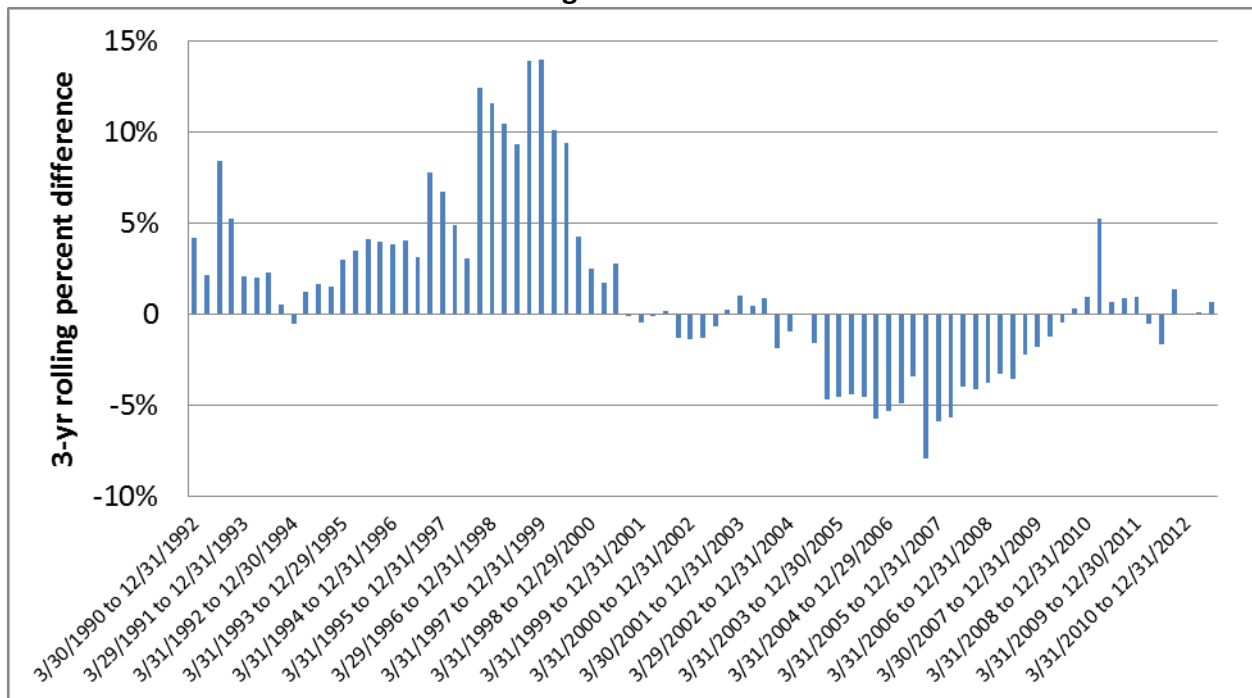
The study simulated historical performance by creating a full divestment portfolio as of the end of 1989. Simulated performance over the 22-year period provides support to both advocates and skeptics of fossil fuel divestment. Simulated performance of the full divestment portfolio was virtually indistinguishable from that of the S&P 500 index, as shown in Chart 1.

Chart 1: Simulated Historical Cumulative Performance: Divestment Has Little Impact Overall



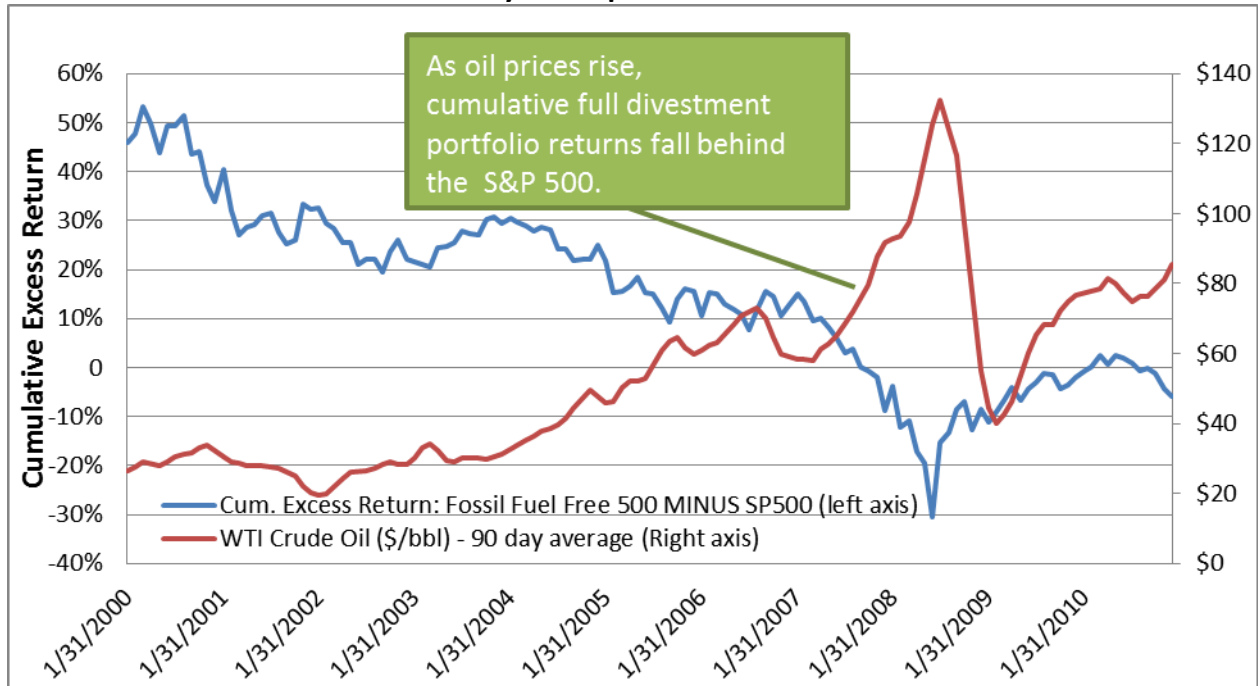
However, the study went beyond a point to point analysis to examine the pattern of returns over three-year rolling periods. Reviewing rolling return paints a somewhat different picture, as the full divestment portfolio has a significant performance advantage in the early years of the simulation, while the S&P 500 index has a significant performance advantage during several years in the second decade of analysis, as seen in Chart 2.

Chart 2: Simulated Historical 3-Year Rolling Excess Performance: Divestment Matters



Given the minimal exposure of the full divestment portfolio to energy stocks, the study compared performance of the full divestment portfolio to oil prices during the simulation. Chart 3 illustrates that the doubling of oil prices from 2002 to 2004 coincides with the performance deterioration of the full divestment portfolio relative to the S&P 500 index. The subsequent doubling of oil prices in 2007 had a similar impact to performance.

Chart 3: Full Divestment Portfolio May Underperform When Oil Prices Rise



Investment Implications

McKibben and other socially responsible investors think that fossil fuel companies will be forced to leave a significant portion of their fossil fuel reserves in the ground. Those investors argue that fossil fuel companies therefore have unrealistic valuations. If they are correct, then the risks associated with higher oil prices would not be of concern.

Other investors may be more concerned about reducing the risks associated with higher oil prices. For those investors, it may be desirable to identify investments that offset some of the risks associated with divestment.

Most simply, increasing exposure to sectors that are correlated with oil companies, namely the materials and utilities sectors, may be an option if that is compatible with an investor's divestment policy. Investors seeking to avoid those sectors may add emphasis to smaller industries that have exhibited high correlation to oil companies, particularly during periods of rising oil prices. For example, industry groups such as construction and engineering, aerospace and defense, and machinery have high historic correlations with oil companies.

Furthermore, investors with a global perspective may reduce risk by investing in the currencies or non-oil equities of countries that are major oil producers, such as Canada, Norway and Russia. The broader economy in these countries tends to do well when oil prices rise, so investing in them could be a way to benefit from rising oil prices without providing direct funding to fossil fuel companies. Beyond equities, inflation-linked bonds such as TIPs may also be a potential investment to hedge against the inflation risk associated with rising oil prices.

The debate about fossil fuel divestment has been centered on university endowments, which have a much different time horizon than individual investors. The perpetual nature of an endowment fund provides a much longer time horizon than that of an individual with a finite life expectancy and less predictable liquidity needs. Individual investors need to be aware of these differences and be prepared for the increased volatility that may arise in a full divestment portfolio.

Risk models and optimizers have inherent limitations; past performance and simulated results are no guarantee of future results. The study doesn't account for potential changes in company behavior resulting from engagement efforts, nor does it consider potential regulatory changes that could restrict the ability of companies to extract carbon.

Conclusion

Both sides of the debate offer compelling arguments, and the study offers empirical data that conceivably could be used to support each side. Advocates in favor of divestment point out the environmental damage already caused by fossil fuels and the climate changes that have been evident in recent years. Those advocates can point to the small differences in predicted tracking error and simulated performance as evidence that divestment may be less significant than presumed. Opponents of divestment can point to potential risk of falling behind during periods of rising oil prices.

About the Authors

Daniel Kern, CFA, President, Chief Investment Officer, Advisor Partners

Daniel is responsible for establishing and driving the overall company strategy for Advisor Partners, and oversees all aspects of company operations. As CIO, he establishes the investment philosophy and process for Advisor Partners. Prior to joining Advisor Partners, he was Managing Director and Portfolio Manager for Charles Schwab Investment Management. His leadership positions at Schwab prior to October 2008 included heading product development and serving as CFO of a fund company. Prior to Schwab, he was Managing Director and Principal for Montgomery Asset Management.

Daniel is a graduate of Brandeis University and earned his MBA in Finance from the University of California, Berkeley. He is a CFA Charterholder and a former President of the CFA Society of San Francisco.

Jim Blachman, CFA, Senior Portfolio Manager, Advisor Partners

Jim Blachman's career spans twenty-plus years in the industry, including quantitative research, consulting, product development and investment management. Prior to joining Advisor Partners, he spent eight years working in the institutional market where he consulted with plan sponsors and investment managers, and five years delivering retail investment management and advice. He has held positions with Bank of America, Wharton Econometric Forecasting Associates, Data Resources and SEI Investments.

Jim attended the University of California, Berkeley earning both a Master's and a Bachelor's degree (with distinction) in Economics emphasizing econometrics and industrial organization. He is a CFA Charterholder.

Gerard Cronin, CFA, Portfolio Manager, Advisor Partners

Gerard develops asset allocation models and assists in the ongoing oversight of portfolios, including construction, risk management, and cash management. Previously, he was a research analyst at Charles Schwab Investment Advisory, where he performed manager due diligence for separately managed accounts and mutual funds. Prior to his investment career, Gerard worked in the computer hardware and environmental services industries.

Gerard holds a BS in Civil Engineering from Carnegie Mellon University (CMU) and an MBA from CMU's Tepper School of Business. He is a CFA Charterholder and teaches ethics and private wealth management in the CFA Society of San Francisco's exam review program.