Options for Reducing Fossil Fuel Exposure

Updated: January 2014

Note: This document was originally published in December, 2013. In January, 2014, we updated the analysis by extending the testing period through December 31, 2013. We also slightly modified the methodology for the Carbon Tilt option (Option #3) as described in the methodology section.

The debate around climate change shifted dramatically in tone this past year. No longer is the focus primarily on lobbying policy makers around the world to regulate carbon emissions. Rather, there appears to be a social movement in the making, and its targets are the investment committees of the world's major pension funds and endowments. Not since the apartheid era in South Africa have college campuses in the US and elsewhere teemed with the call for divestment. For this generation of students, the moral imperative today is to stop all fossil fuel extraction. Spurred by the nonprofit organization, 350.org, the movement is calling for divestment from approximately 200 companies that hold the vast majority of the world's carbon reserves.[1]

For most investors, outright divestment seems drastic to say the least. Yet, the main thesis of the divestment movement has raised some uncomfortable questions. While there is a range of opinions about the rise in global temperatures, the scientific consensus is that the atmospheric CO_2 level needs to be kept under 450 parts per million (ppm). The world's fossil fuel producers have carbon reserves up to five times higher than this limit would allow. 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.

Thus, there has been a lot of 'peeking under the hood' among the world's major pension funds: How much exposure does a portfolio have to potential 'stranded assets'? What kind of response is reasonable in the face of stakeholder pressure, in the face of an ethical quandary, or in the face of a potential 'carbon bubble'? What are the financial implications of reducing carbon exposure?

With over 75 asset owners as clients, we at MSCI ESG Research have seen an escalation in investor interest in measuring portfolio exposure and in formulating an appropriate policy. In 2014, we expect to see investors explore four major approaches to address this issue that range on a continuum from fully excluding carbon reserve holders to adding positive exposure to clean technology.

Using our data and analysis on carbon reserves, carbon emissions, and companies' climate strategies, MSCI ESG Research calculated the carbon intensity and effects on performance from applying three carbon-reduction approaches to the roughly 2,500 companies in the MSCI All Country World Index. These three approaches, as well as a fourth option of capturing opportunities beyond the broad-based index through thematic investments, are summarized in Table 1.

[1] For a brief summary of the divestment movement, please see Appendix 1: Excerpt from MSCI ESG Research's FAQ on Fossil Fuel-Free Portfolios.

Table 1: Brief Summary of Four Approaches

Approach #1	*Approach #2*	*Approach #3*	*Approach #4*
Fossil Fuel Divestment	**Low Carbon**	**Carbon Tilt**	**Thematic Opportunity**
Exclude from MSCI ACWI any company with identifiable fossil fuel reserves in the following GICS industries: Integrated Oil, Oil & Gas Exploration, and Coal & Consumable Fuels.	Exclude the biggest carbon reserve owners up to 50% of the reserves in the MSCI ACWI; additionally, exclude the largest carbon emitters, up to 25 percent of the carbon emissions in the index. This is similar to the methodology for a custom index recently designed by MSCI.[2]	Apply no exclusions to MSCI ACWI. Tilt the portfolio, with higher weights given to companies in each industry with stronger performance on their carbon strategy relative to peers, and lower weights given to companies in each industry with weaker performance on their carbon strategy relative to peers.	Focus on the upside using a thematic approach. Unlike the other approaches, this approach does not involve applying exclusions or tilts to MSCI ACWI. We use MSCI's Global Environment Index to demonstrate this approach.

For the period January 1, 2007 through December 31, 2013, we find that (See Figure 1):

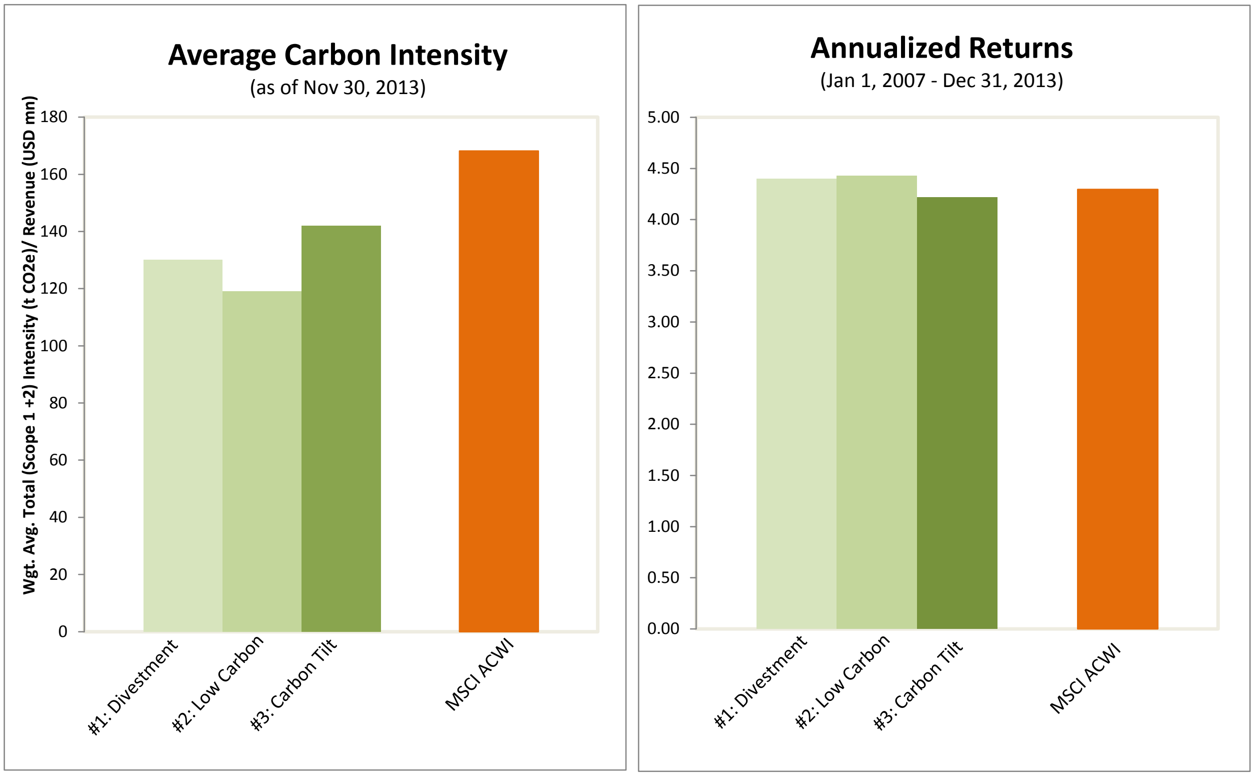
- The current snapshot of all three carbon-reduction approaches shows lower carbon intensity relative to MSCI ACWI. The Divestment approach and the Low Carbon approach have very similar overall carbon intensity, at 77% and 71% of the ACWI carbon intensity. This could be driven by the fact that the Divestment and the Low Carbon approaches exclude some of the largest fossil fuel companies in the index (respectively 8.6 and 4 percent of the ACWI market capitalization on average).
- The Carbon Tilt approach, which does not exclude any ACWI constituents, also shows a notable reduction in carbon intensity, at 84% of ACWI's carbon intensity.
- Over the test period, all three ACWI-based approaches (Approaches #1, 2, and 3) performed roughly in line with the MSCI ACWI, with annualized returns ranging from 4.22% to 4.40%., compared to 4.30% for MSCI ACWI. Tracking error ranged from .47 to 1.23.[i]
- Of the three ACWI-based approaches, the Low Carbon approach showed the lowest carbon intensity and the highest active returns.

For comparison, an example of a Thematic Opportunity approach may include companies with substantial exposure to technologies that are poised to benefit in a low carbon economy.

[2] MSCI Custom Emerging Markets Low Carbon Index, designed for Swedish pension fund AP4, was licensed for The Northern Trust Emerging Markets Custom Low Carbon Dioxide Equity Index Fund.

- MSCI's Global Environment Index[3], which includes approximately 155 companies that derive at least 50% of their revenues from clean technology, performed roughly comparable to the MSCI ACWI IMI, which is its parent index. Annualized gross returns since inception (November 2008) through December 2013 averaged 17.33%, versus 16.83% for the MSCI ACWI IMI.
- However, given greater risk, taking this approach would have returned lower risk-adjusted returns since inception, compared to the MSCI ACWI IMI.

Figure 1: Comparison of the Three Carbon-Reduction Approaches, on Carbon Intensity and Performance [i]



And then there is a fifth approach: engagement. In October 2013, a group of 70 investors with over USD 3 trillion in assets wrote to 45 of the world's largest oil & gas, coal, and electric power companies to demand a response on what each company is doing to address the carbon reserves risk.

As investors consider their range of options, we believe that valuation models will start to include more scenario planning around potential stranded assets. Some of those scenarios will include differential cost of extracting reserve types and geographic location[4]. But one of those scenarios could well be that if enough investors become concerned about a potential carbon bubble, there could be a self-fulfilling prophesy to how the financial community values current and future carbon reserves.

[3] MSCI's Global Environment Index is one of two Environmental Indexes, the second being the Global Climate Index, an equal weighted index consisting of 100 companies that are leaders in mitigating the causes or the impact of climate change.

[4] See for example Coal and Carbon Stranded Assets: Assessing the Risks, from HSBC Global Research. https://www.research.hsbc.com/midas/Res/RDV?p=pdf&key=dXwE9bC8qs&n=333473.PDF

Table 2: Performance Comparison of the Three Carbon-Reduction Approaches (Jan 1, 2007 – Dec 31, 2013) i

	Approach #1 Divestment	Approach #2 Low Carbon	Approach #3 Carbon Tilt	Benchmark MSCI All Country World Index (ACWI)
Carbon Intensity*	130.10	119.10	142.00	168.20
Carbon Intensity versus ACWI	77%	71%	84%	100%
Annualized Returns (1/2007-12/2013)	4.40	4.43	4.22	4.30
Volatility	19.08	19.08	19.00	18.95
Return/Risk	0.23	0.23	0.22	0.23
Active Return	0.10	0.13	-0.08	--
Tracking Error	1.23	0.60	0.47	--
Information Ratio	0.08	0.21	-0.16	--

**Wgt. Avg. Total (Scope 1 +2) Intensity (t CO2e/ Revenue (USD mn)) as of Nov 30, 2013*

Table 3: Performance of the Thematic Opportunity Approach versus its parent index, MSCI ACWI IMI (Nov 28, 2008 – Dec 31, 2013) i

	MSCI GEI	MSCI ACWI IMI
Carbon Intensity*	52.90	NA
Return	17.33	16.83
Volatility	21.63	17.70
Return/Risk	0.80	0.95

**Wgt. Avg. Total (Scope 1 +2) Intensity (t CO2e/ Revenue (USD mn)) as of Nov 30, 2013*

Comments on Results

It is important to note that for both the Divestment and the Low Carbon approaches which exclude some of the largest Oil & Gas and coal producers, all-time high oil prices in 2008 was a significant factor in the analysis given that the test period is from 2007 to 2013. Similar tests that we have performed over a longer term time frame did not necessarily reflect the same performance outcomes. For example, a test that excluded a different list of fossil energy stocks from the broader MSCI ACWI IMI from June 2003 to May 2013 showed slight underperformance relative to MSCI ACWI IMI (please see MSCI ESG Research's FAQ: Responding to the Call for Fossil-fuel Free Portfolios for details).

Although we have seen research using the S&P 500 that has shown similar results to our analysis[5], we note that the composition of the benchmark is a driving factor in the performance of any portfolio with fossil fuel exclusions. In the MSCI ACWI Index companies with identifiable carbon reserves comprise 9.5% of the index on average. Taking the same approaches in applying exclusions to indexes more heavily weighted toward Energy and Materials may yield different results in terms of the risk and return profile.

[5] "The Cost of Fossil Fuel Divestment", NorthStar Asset Management, 2013

Methodology for Constructing Each Sample Approach

Approach #1: Fossil Fuel Divestment

We excluded from MSCI ACWI all Integrated Oil and Oil & Gas Exploration companies, as defined by their GICS sub-industry, as well as 14 of the 15 companies represented in the Coal & Consumable Fuels sector. (The company not excluded was primarily engaged in uranium mining.) Oil & Gas Refining and Marketing sector companies remained in the portfolio because they are not primarily engaged in developing and owning fossil fuel reserves.

As of December 31, 2013, these exclusions reduced the analytical subset to 2,344 companies, versus 2,434 companies in the MSCI ACWI. The exclusions represent 8.6% of the market cap of the MSCI ACWI.

Back-testing of this data set was performed over a time series from January 1, 2007 through December 31, 2013.

Approach #2: Low Carbon

From MSCI ACWI, securities with the highest carbon footprint were excluded based on the following rules:

- Issuers with largest carbon reserves were excluded from the Index until 50% of the total carbon reserves of the Parent Index had been excluded.
- In addition, issuers with largest emissions were excluded from the Index until 25% of the total emissions of the Parent Index had been excluded.

The carbon exposure of a security is measured in terms of absolute greenhouse gas emissions and potential carbon emissions from fossil fuel reserves.

Carbon Emissions

- MSCI ESG Research collects annual company-specific direct (Scope 1) and indirect (Scope 2) greenhouse gas (GHG) emissions data from company public documents and/or the Carbon Disclosure Project. If a company does not report GHG emissions, then MSCI ESG Research uses a proprietary model to estimate Scope 1 and Scope 2 GHG emissions.
- For the purposes of constructing this portfolio, MSCI uses Scope 1 + Scope 2 emissions, whether reported or estimated.

Potential Carbon Emissions from Fossil Fuels

- MSCI ESG Research collects fossil fuel reserves data where relevant, typically in the Oil & Gas, Coal Mining and Electric Utilities industries. Sources for this data include company publications, other public records and third party data providers.[6]
- To convert reserves data to potential carbon emissions, MSCI ESG Research applies a formula from the Potsdam Institute for Climate Impact Research.[7]

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[6] Some of the raw data on which this research is based was supplied by GlobalData Publications Inc. (http://energy.globaldata.com)

[7] Malte Meinshausen, Nicolai Meinshausen, William Hare, Sarah C. B. Raper, Katja Frieler, Reto Knutti, David J. Frame & Myles R. Allen. *Greenhouse-gas emission targets for limiting global warming to 2 °C.* ***Nature*** 458, 1158-1162 (30 April 2009) | doi:10.1038/nature08017; Received 25 September 2008; Accepted 25 March 2009. Supplementary Information, p. 7.

As of December 31, 2013, these exclusions reduced the analytical subset to 2,415 companies, versus 2,434 companies in the MSCI ACWI. The exclusions represent 4% of the market cap of the MSCI ACWI.

Back-testing of this data set was performed over a time series from January 1, 2007 through December 31, 2013. Carbon emissions data was available for companies in ACWI from 2008 through December, 2013. Prior to 2008, we backfilled carbon emission data with data from 2008. Fossil fuel reserves data was available as a snapshot for 2013. For the purposes of making exclusions, we assumed that companies' carbon reserves remained relatively stable over this time period. i

<u>Approach #3: Carbon Tilt</u>

We applied no exclusions to MSCI ACWI. We applied an algorithm to overweight companies with stronger carbon strategy and underweight companies with weaker carbon strategy, relative to their industry peers at GICS industry level (GICS 4-digit level).

The algorithm is as follows[8]:

1) calculate z-score of carbon scores by industry group
2) if the score is >0, multiply the original weight by (1+z), if <0, multiply by 1/(1-z); however, the multiplier has a cap of 1.5 and a floor of 0.5.
3) if no score data, leave the weight unchanged
4) finally normalize weights to sum to 1

Companies' Performance on Carbon Strategy

- On an annual basis, MSCI ESG Research assesses companies' performance on managing their exposure to risks associated with the carbon intensity of their business operations. Such risks include potential changes in regulatory limits, compliance costs, higher input prices due to carbon constraints. The analysis considers the strength of companies' strategies in mitigating these risks, including an assessment of governance of climate issues, policies and programs, targets on reducing carbon emissions and intensity, and performance against those targets and relative to peers in similar businesses. Taking a holistic view of these factors, we computed a 0-10 score for each company's overall carbon strategy performance. See MSCI ESG Research's IVA Methodology Document for more details on the specific metrics used and scoring methodology.
- The distribution of scores for companies in any given industry can vary. For the purposes of constructing this portfolio, we compare each company's carbon strategy score to those of its sector peers, as defined by the GICS classification scheme.

Back-testing of this data set was performed over a time series from January 2007 through December 2013. i

<u>Approach #4: Thematic Opportunity</u>

For exposure to potential upside opportunities in a future low carbon economy, we examined the performance of MSCI Global Environment Indexes (GEI), which are comprised of securities of companies

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[8] This approach is similar to the methodology used for other 'tilt' indexes, such as the MSCI Momentum Indexes (page 4) http://www.msci.com/eqb/methodology/meth_docs/MSCI_Momentum_Indices_Methodology.pdf

that derive at least 50% of their revenues from environmentally beneficial products and services. The indexes are based on key environmental themes: *Alternative Energy, Sustainable Water, Green Building, Pollution Prevention or Clean Technology*. The indexes aim to serve as benchmarks for investors seeking exposure to companies whose primary source of revenues increase the efficient use of scarce natural resources or mitigate the impact of environmental degradation.

Unlike the other three approaches, performance information for this data set was calculated since inception of the index in November, 2008. The benchmark for this index was the MSCI ACWI IMI.

Unlike the other three approaches, which are index-based and include a large number of constituents, this approach is thematic, focusing specifically on companies that generate revenue from environmentally-related activities. As such, the composition of this index is quite different from the broad market index that we are comparing it to, as can be seen in Table 4.

The GEI has only 155 constituents compared to about 8,500 for the ACWI IMI, and it is much more concentrated in the Industrials sector, where many companies involved in environmentally-related technologies are categorized.

Table 4: Comparison of Sector Composition of GEI versus ACWI IMI (as of Nov 29, 2013)

	Percent by weight		Number of Companies	
GICS Sector	**ACWI IMI**	**GEI**	**ACWI IMI**	**GEI**
Consumer Discretionary	12.6%	17.3%	1,376	14
Consumer Staples	9.2%	0.5%	541	2
Energy	9.0%	0.2%	480	3
Financials	21.7%	7.5%	1,677	11
Health Care	10.1%	N/A	634	N/A
Industrials	11.8%	56.8%	1,446	68
Information Technology	12.4%	6.8%	1,086	29
Materials	6.4%	6.9%	858	15
Telecommunication Services	3.7%	N/A	150	N/A
Utilities	3.1%	4.0%	265	13
Total	100.0%	100.0%	8,513	155

-Linda-Eling Lee, Zoltan Nagy, Manish Shakdwipee

Appendix 1: Excerpt from MSCI ESG Research's "FAQ: Responding to the Call for Fossil Fuel-Free Portfolios"[9]

What is 'fossil-free' investing?

Students, faculty, parishioners and elected officials are asking college endowments, religious institutions and state and municipal pension funds to limit or divest their holdings in fossil fuel companies in response to rising concerns about global warming. As October 2013, divestment campaigns have been launched at more than 330 U.S. colleges and universities, 40 municipal and state pension funds, and 10 religious institutions, according to 350.org, an organizing movement for this campaign.[10]

What are 'carbon stranded' assets?

The atmospheric concentration of carbon dioxide, a greenhouse gas, has risen more than 40 percent since the start of the Industrial Revolution – eclipsing 400 parts per million in May 2013.[11] Products sold by fossil fuel producers are the largest source of this CO_2 emissions growth.[12] The United Nations 2009 Copenhagen Accord on climate change recognizes "the scientific view that the increase in global temperature should be below 2 degrees Celsius." This would require holding the atmospheric CO_2 level under 450 ppm. The world's fossil fuel producers have carbon reserves up to five times higher than this limit would allow. Such "unburnable" carbon could negatively impact these companies if stranded carbon assets are priced into their market valuations.[13]

What is Carbon Tracker?

The Carbon Tracker Initiative is a project of Investor Watch, a non-profit company seeking to improve the transparency of carbon risk embedded in equity markets. Carbon Tracker has published a list of the top 100 coal companies and the top 100 oil and gas companies, assessed on the potential carbon emissions from their reserves.[14] The advocacy group 350.org has called on institutional investors to divest holdings in companies appearing on the Carbon Tracker list.[15]

Can I adopt Carbon Tracker in a portfolio management system?

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[9] "FAQ: Responding the to Call for Fossil-Fuel Free Portfolios." MSCI ESG Research, November 2013. http://www.msci.com/resources/research_papers/faq_responding_to_the_call_for_fossil-fuel_free_portfolios.html

[10] http://350.org/mission

[11] Justin Gillis, "Heat-Trapping Gases Pass Milestone, Raising Fears," *The New York Times*, May 10, 2013

[12] International Energy Agency, "Key World Energy Statistics: 2012," Paris, http://www.iea.org/publications/freepublications/publication/kwes.pdf

[13] James Leaton, "Unburnable Carbon: Are the world's financial markets carrying a carbon bubble?", Carbon Tracker Initiative, Investor Watch, London, http://www.carbontracker.org/wp-content/uploads/downloads/2012/08/Unburnable-Carbon-Full1.pdf

[14] http://gofossilfree.org/companies/

[15] http://gofossilfree.org/

Carbon Tracker is intended to raise awareness about stranded carbon assets that present risk to markets and the scale of "*unburnable carbon*" listed on stock exchanges. It is *not* readily adaptable for use in a portfolio management system for the following reasons:

- Carbon Tracker is a static list. The carbon reserves data is based on reported information on proven fossil fuel reserves at the end of 2010. Verification of the stock listings of these companies and their market capitalization was completed in February 2011.
- Because of mergers and acquisitions and other corporate restructuring, at least eight of the 200 companies identified in Carbon Tracker are no longer publicly traded, according to an analysis by MSCI ESG Research in early 2013. Initial public offerings may also affect the composition of companies eligible to appear on the Carbon Tracker list.
- While Carbon Tracker associates companies with listed stock exchanges, it does not provide any company identifiers such as CUSIPs or SEDOLs.

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The company's flagship product offerings are: the MSCI indices with close to USD 7 trillion estimated to be benchmarked to them on a worldwide basis[1]; Barra multi-asset class factor models, portfolio risk and performance analytics; RiskMetrics multi-asset class market and credit risk analytics; IPD real estate information, indices and analytics; MSCI ESG (environmental, social and governance) Research screening, analysis and ratings; ISS governance research and outsourced proxy voting and reporting services; and FEA valuation models and risk management software for the energy and commodities markets. MSCI is headquartered in New York, with research and commercial offices around the world.

[1] *As of September 30, 2012, as published by eVestment, Lipper and Bloomberg on January 31, 2013* *Apr 2013*

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