NORTHERN TRUST

CLIMATE CHANGE IS HEATING UP

Exploring approaches to fossil fuel divestment.

A wide range of environmentally focused investment strategies now exist to enable investors to play their part in the transition to a lower carbon economy. We analyze the options and offer our insights.

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GROWING INTEREST IN DIVESTMENT

Interest in environmentally focused investment strategies is growing. For example, the Low Carbon Investment Registry launched in 2014 has shown that total investments have increased from $24bn in 2014 to $57bn through March 2017[i]. Amongst the plethora of strategies aimed at addressing climate change risk, divestment – electing not to invest in companies owning fossil fuel reserves – is a popular choice. University endowments and charity foundations were early adopters followed by some governments and state pension funds.

The total assets of investors who opted for fossil fuel divestment strategies almost doubled in the 18 months to December 2016, reaching $5 trillion[ii].

CURBING THE ENVIRONMENTAL IMPACT

The negative impact of fossil fuels has been reported widely. It includes higher concentration of CO_2 molecules in the air, which in turn leads to rising temperatures and sea levels, risk to biodiversity, concerns about people's security, living and working conditions.

The United Nations Framework Convention on Climate Change (UNFCCC) has been coordinating the process of curbing climate change and mitigating its drastic consequences. At the 16th Conference of Parties (COP) in Cancun in November 2010, participating governments agreed on a target to reduce carbon emissions to avoid a rise in global average temperature rise of more than 2°C above pre-industrial levels, with the possibility of revising this down to 1.5°C. At the COP21 in Paris in December 2015, 195 nations adopted a legally binding agreement, which confirmed these targets and set the scene for stronger international coordination and more stringent carbon regulation at national levels.

This momentum has encouraged investors to think about their role in the transition to a low carbon economy and to search for possible solutions in the area of responsible finance. To many of them, divestment from fossil fuel companies who continuously contribute to the climate change problem appears to be the first logical step in limiting further climate change.

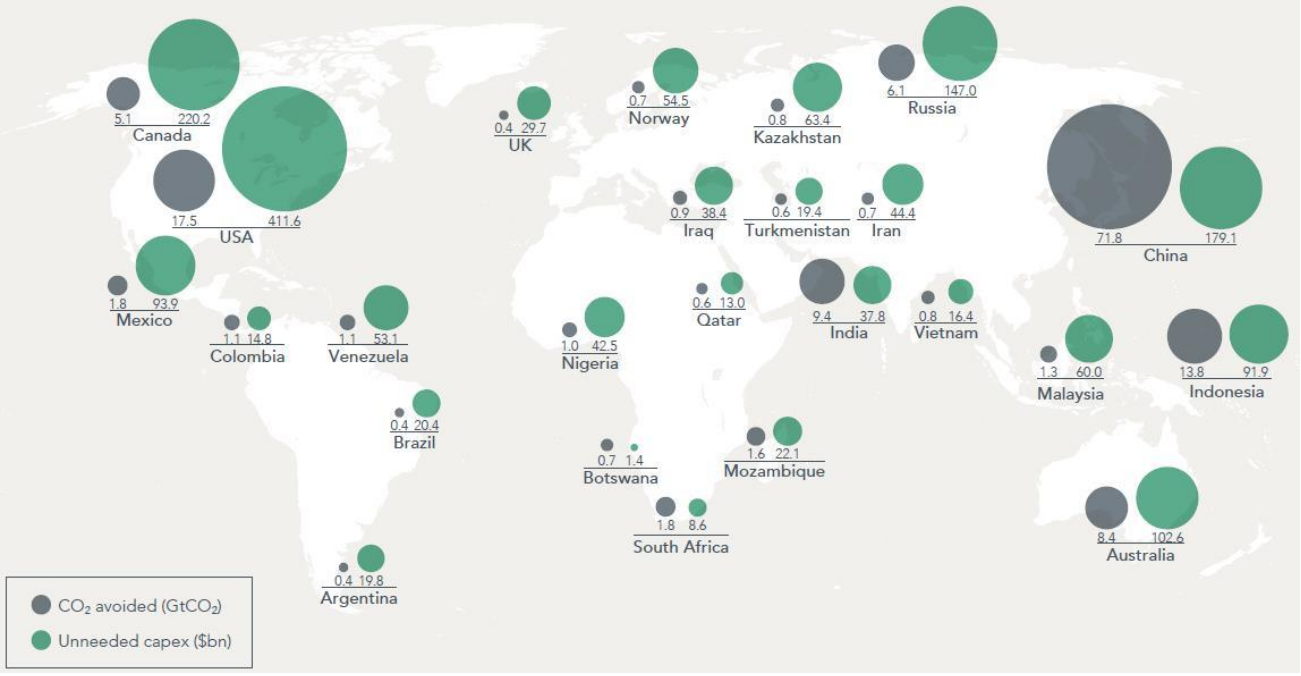
ECONOMIC JUSTIFICATION FOR LOW CARBON INVESTING

According to research[iii] a rise in global temperatures of five degrees Celsius between 2016 and 2100 would inflict $7 trillion of losses on investment portfolios discounted to present value. There is a high probability that a large proportion of the proven fossil fuel reserves may stay unexploited as a result of tightening carbon regulation and technology shifts. As a result their value will be reduced and they will effectively become stranded assets.

The risk of stranded assets is not new; researchers have been publishing reports on the issue since 2008. Carbon Tracker, an independent think tank providing analysis on the impact of climate change, has analyzed the investment plans of the largest fossil fuel companies. They suggest that the size of the investment at risk amounts to $2.2 trillion, where $1.9 trillion is associated with new projects – we can see the global distribution of these in Exhibit 1.

The majority, $1.3 trillion, is in new oil exploration and production projects, followed by projects in gas ($459 billion) and thermal coal ($177 billion).[iv] Should the world adopt a low carbon scenario these capital expenditures by fossil fuel companies are likely unnecessary.

EXHIBIT 1: MAP OF UNNEEDED CAPEX TO 2025 IN THE DANGER ZONE AND RELATED AVOIDED CO2 TO 2035 UNDER THE INTERNATIONAL ENERGY AGENCY (IEA) 450 SCENARIO (TOP 25 SUPPLY COUNTRIES)



SOURCE: Carbon Tracker & ETA analysis of Rystad UCube & Wood Mackenzie Ltd GEM

Technological shifts

Further reason for investors reducing exposure to fossil fuels is the growth of renewable energy. Over recent years the cost of renewable energy has been rapidly decreasing and in some regions has already reached cost parity with traditional electricity producers. Some forecasts suggest that solar energy will make up 23% of global power by 2040 and 29% by 2050[v].

The shift to electric cars that is planned in major emerging markets such as India and China, further threatens the consumer demand for fossil fuels. According to the same report, electric vehicles may account for approximately 35% of road transport by 2035; this growth is anticipated to result in the displacement of 2 million barrels of oil per day by 2025 and 25 million per day by 2050.

Climate Change Could Have Serious Economic Impact

$7 trillion

COULD BE LOST FROM INVESTMENT PORTFOLIOS BY 2100 IF GLOBAL TEMPERATURES RISE BY 5 DEGREES

CONSIDERING CLIMATE CHANGE IN YOUR PORTFOLIO

There are a wide range of tools and options available to investors who want to limit their investment exposure to fossil fuels

1) FULL FOSSIL FUEL DIVESTMENT

A simple option for investors is the use of fossil fuel free equity indices developed specially to reduce exposure to fossil fuels. (See Exhibit 5 in appendix for examples of off the shelf indices, which exclude companies by the criterion of their ownership of fossil fuel reserves.)

Investors can take divestment one step further and exclude not only the owners of fossil fuel reserves, but also companies who are highly dependent on fossil fuels in their value chain. These include equipment and service providers, refineries, oil, gas and coal transportation companies. This would represent a strong sector bet on the future economy, made at a stage when the transition to the two degrees trajectory has not been completely shaped. Despite the challenges facing the energy sector the extent of the impact is still unclear.

Drawbacks of wholesale exclusion

It is important to realize that wholesale exclusion of fossil fuels may have economic and even ethical drawbacks. From an economic perspective, energy stocks are highly cyclical, and divestment of fossil fuel producers may expose investors to the risk of short-term price movements. For example in the period between January 2016 and January 2017, oil price surged from $40p.b. to $54p.b., particularly following OPEC announcements of production cuts in September 2016. Consequently, the S&P 500 Energy Sector Index gained 45% in this period, while the S&P 500 gained 25%. Those

investment portfolios, which had earlier divested from oil and gas stocks, incurred short-term underperformance.

Intended impact of fossil fuel divestment considerations may not always sustain either. Although divestment by some environmentally-minded investors actually makes fossil fuel assets cheaper for someone else to buy, fossil fuel companies may not necessarily see any impact on their share price and cost of capital. Rather, they may end up with rather climate-indifferent and speculative investor base, leaving them less accountable for the external effects of their activities than they are now.

What is most important, divestment on its own does not contribute much to finding an effective solution of the climate change problem. Climate-concerned shareholders likely deliver greater impact by challenging strategies of the companies. As active stewards of capital, they can engage with these companies in order to elevate climate related risks and opportunities within organizations. One can see this as a unique and effective option to facilitate technological and structural shifts that could pave the way to green transition of the global economy.

2) A DIVEST & REINVEST STRATEGY

In order to be constructive and consistent with their environmental and economic goals, investors could employ a divest and re-invest strategy, where divestment from fossil fuel companies is accompanied by increased exposure to companies providing climate solutions. Investing into renewable energy, energy storage, water, forestry or alternative fuels can help capturing upside opportunities in addition to minimizing downside risks. The Divest Invest movement which champions this approach currently includes 160 institutions and local governments, and over 500 individuals who have agreed to divest $50bn from fossil fuel investments within the next 3-5 years and reinvest in new energy sources[viii].

A number of off the shelf indices exist offering exposure to specific green or sustainable strategies such as clean energy, green technology, sustainable water, green buildings or pollution prevention (please see Exhibit 6 in appendix). The Sustainability Accounting Board Standards (SASB) has developed a new classification system to complement existing industry classifications and help investors achieve their desired exposure.

Specific clean energy stocks are typically volatile and single-theme investment strategies may expose investors to higher, unnecessary risks. A number of indices such as the FTSE Green Revenues Index offer a more diversified exposure by determining representation by the portion of revenue derived from the sale of green products. Other indices such as the MSCI ACWI Sustainable Impact Index select

The role of carbon emitters in driving change

Not every fossil fuel company has the necessary managerial resources and strategic vision to facilitate the transition to a low carbon economy; however investors' due diligence and stewardship, supported by their voting power, could play an important role. One impressive example of such a transition has been a Danish company DONG Energy, which re-invented itself from being an oil company into a renewable energy company over the last 10 years. Following the stewardship activities performed by Hermes EOS[vi], another global oil & gas company has joined a voluntary carbon reporting framework and has pledged that 20% of its portfolio will be low carbon in 20 years' time[vii].

constituent companies based on whether their core business addresses at least one of the social and environmental challenges defined by the United Nations Sustainable Development Goals.

3) GREEN INVESTING IN FIXED INCOME

The total value of outstanding green bonds is approximately $187 billion, almost half of which were issued in 2016. The level of outstanding issuance has more than quadrupled in the past two years, but when compared with the total bond universe of close to $100 trillion it is still very low.

Green bond indices certifications and assessments are now available to investors, they enable the identification of those bonds that are a "darker shade of green", where proceeds are used to finance highly impactful projects. Some of the existing green bond indices (see appendix) apply rigorous selection criteria looking at the use of proceeds disclosed by the bond issuers.

The key concern with green bonds is liquidity; most of these bonds remain insufficiently liquid for many investors thus also reducing the prospect of creating dedicated green bond investment products. There are however opportunities to include green bonds into conventional fixed income portfolios when their credit quality and liquidity characteristics meet the investors' criteria; this is the approach that the fixed income investment team of Northern Trust has been following.

4) NUANCED DIVESTMENT WITH SELECTIVE EXCLUSIONS

Investors can look at fossil fuel companies and their green transition potential in a more nuanced way, looking not at total divestment from all fossil fuel companies, rather making selective and targeted exclusions. A number of indices exist that can minimize exposure to carbon emissions by excluding only the companies with the highest carbon content, based on the revenue exposure or the size of future carbon emissions as converted from the current fossil fuel reserves.

In most cases, these indices aim to minimize exposure to the current operational carbon emissions as well. Companies who burn fossil fuels today are no less to blame for climate change than those who extract fossil fuels. Neither are they a less risky investment in the event that carbon regulation strengthens. The bulk of Scope 1 (direct) and Scope 2 (indirect) greenhouse gas emissions[ix] are, in fact, coming from a few sectors.

The bulk of greenhouse gases emanate from a handful of sectors.

>40%

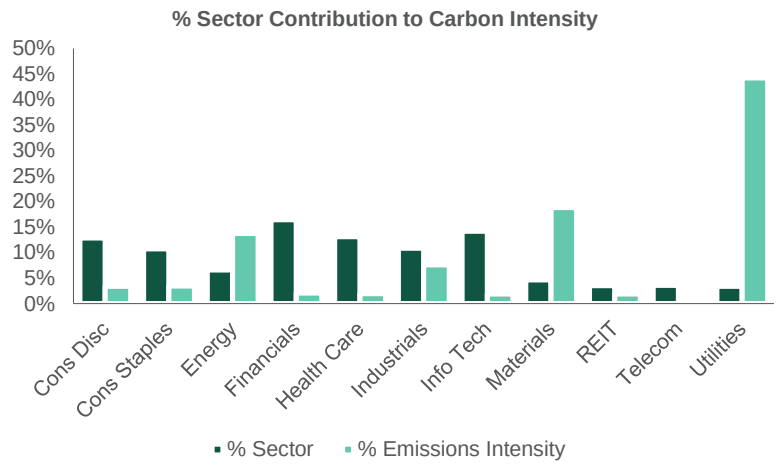
OF CARBON INTENSITY DERIVED FROM THE UTILITIES SECTOR

70%

OF TOTAL POTENTIAL CARBON EMISSIONS FROM ENERGY SECTOR

EXHIBIT 2: HIGH CARBON SECTORS

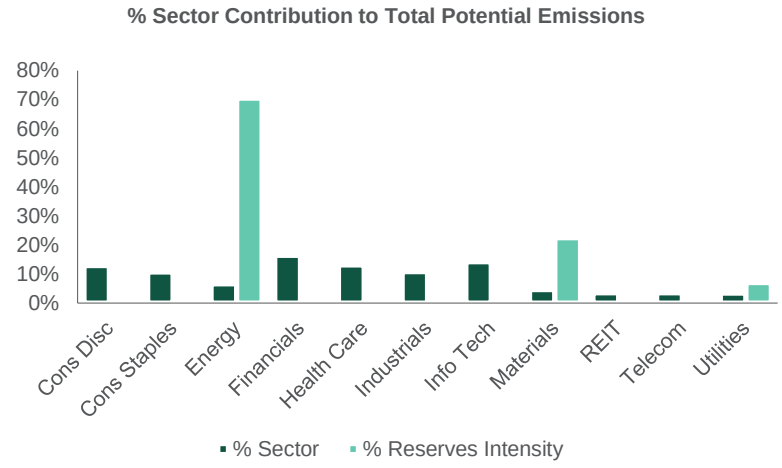
Percentage Sector Contribution to Carbon Intensity



SOURCE: MSCI, Northern Trust. As of 31 May 2016

EXHIBIT 3: HIGH CARBON SECTORS

Percentage Sector Contribution to Total Potential Emissions



SOURCE: MSCI, Northern Trust. As of 31 May 2016

Avoiding the highest emitting companies in these sectors by their current carbon dioxide emissions can be done in parallel with minimizing exposure to the most carbon-intensive fossil fuel companies. To help investors manage their financial performance better and neutralize the unintended effects of such active bets, these indices often incorporate controls over tracking error from their benchmarks.

A strategy designed to avoid the highest emitters appears more comprehensive and more consistent with the idea of maximizing portfolio decarbonization than one of pure divestment. A pioneering state-owned Swedish low carbon investor chose this approach in 2013 when it partnered with Northern Trust and MSCI to create the Low Carbon Index on the Emerging Markets universe, with many other investors following in their footsteps. In September 2014 AP4, the Carbon Disclosure Project, Amundi and UN Environment Programme established the Portfolio Decarbonization Coalition in order to share knowledge and best practices. Today, its 27 members have around 2% or $600 million of their $3.2 trillion assets under management in decarbonization strategies.

Performance of Optimized Decarbonized Indices

Because the tracking error of optimized decarbonized indices versus conventional benchmarks can be very low, we can see them as a "free option" to reducing carbon[x]. It means that if and when wider regulatory actions are taken on the way to curb climate change, the markets will re-price climate risks and such low-carbon strategies should start outperforming conventional benchmarks. At the status quo, these strategies are expected to perform in line with their benchmarks. In many cases, however, low carbon indices have outperformed their benchmarks. Exhibit 4 shows examples of such indices, including the MSCI Emerging Markets Low Carbon Leaders ex REITs 10/50, to which Northern Trust manages a UCITS fund. Analysis finds that such outperformance is often attributed to stock selection rather than sector allocation. It is our understanding that such effect does not necessarily mean that climate risks are already priced in, rather that companies who have invested into low carbon technologies happen to be more innovative and more efficient.

Methodologies of measuring carbon exposures and impacts are continuing to evolve. New advanced approaches today allow including wider scope of the current carbon emissions, i.e., Scope 3 emissions[xi], which are not universally reported by companies, but can be estimated with a sufficient degree of precision. It is also possible to factor in companies' carbon policies, investment strategies and the expected impact of those investments which have already been announced or disbursed[xii].

The Northern Trust World Quality Low-Carbon strategy

This fund is an example of combining low carbon with equity factors. It is designed with the acknowledgement that carbon reduction is unlikely to be the sole objective of investors.

- Carbon budget set at approximately 20% of the carbon footprint of the parent index.
- The carbon budget is wisely spent on companies that bring other benefits to the portfolio, primarily high quality.
- Seeks to control other risks – such as sector, country and style factor exposures – in order to provide this portfolio at a modest tracking error to the parent index.

As a result, The Northern Trust Quality Low Carbon strategy achieves an 80% reduction of the current operational carbon footprint and an 83% reduction of potential carbon emissions with a 1.0% tracking error to the MSCI World Index.

Moreover, while optimization is applied to low carbon indices for achieving the market beta, they can also be used as part of factor investing, or “alternative beta” strategies, such as quality, low volatility or dividend, Northern Trust offers such strategies (see sidebar above).

EXHIBIT 4: PERFORMANCE METRICS OF MSCI LOW CARBON INDICES

Subtitle

	MSCI ACWI INDEX	MSCI ACWI LOW CARBON TARGET INDEX	MSCI ACWI LOW CARBON LEADERS INDEX	MSCI EMERGING MARKETS^^	MSCI EMERGING MARKETS LOW CARBON LEADERS EX REIT 10/50	NT ACWI QUALITY LOW CARBON STRATEGY
Total Return* (%)	7.8	8.1	8.1	-0.8	-0.8	9.6
Total Risk* (%)	13	13	13	17.9	17.9	12.8
Return/Risk	0.6	0.63	0.62	-0.05	-0.05	0.75
Sharpe Ratio	0.59	0.61	0.6	-0.06	-0.06	0.77
Active Return* (%)	0	0.3	0.3	0.0	0.0	1.83
Tracking Error* (%)	0	0.4	0.5	0.0	0.5	1.53
Information Ratio	NA	0.65	0.53	NA	-0.05	1.20
Historical Beta	1	1	1	1.00	1.00	0.99
Carbon Emission Intensity (t CO2/ mm USD)^	237.1	55.9	118.6	329	174	46.32
Reduction from benchmark		0.76	0.5		0.47	0.81
Normalized Potential Emissions (t CO2/ mm USD)^	3875.6	257.1	1705.1	12545	4521	626.83
Reduction from benchmark		0.93	0.54		0.64	0.83

SOURCE:
* Gross returns annualized in USD for the 11/30/2010 to 11/30/2016 period

** Annualized one-way index turnover for the 11/30/2010 to 11/30/2016 period

^ At the most recent rebalancing (November 2016 Rebalance); for the MSCI EM and MSCI EM Low Carbon Leaders ex REIT 10/50 – 30 December 2016. For the NT ACWI Quality Low Carbon Strategy, the numbers for carbon intensity, normalized potential carbon emissions and their respective reductions are calculated as weighted averages.^^ Data for the Emerging Markets indices is for the period 30 Nov 2010 to 30 Dec 2016

KEY CONSIDERATIONS FOR INVESTORS

Implementing effective decarbonization strategies can follow a number of approaches, not limited to pure fossil fuel divestment. Here are some key considerations for investors to bear in mind:

- **Divestment prevents engagement:** When making the choice to completely divest from fossil fuels, investors should realize that divestment prevents engagement with fossil fuel companies. However, such constructive dialogue could enhance companies' transition to low carbon business models and help transform those companies who are currently part of the problem to becoming part of the solution.
- **Divestment can be married with targeted investment:** In order to be more consistent in achieving environmental goals and capturing climate related opportunities, divestment strategy can be coupled with investments into companies providing green solutions, such as renewable energy, energy storage, green buildings, etc.
- **Analysis allows for greater selectiveness:** Divestment can be undertaken in a selective, rather than wholesale way, based on the analysis of the type of fossil fuel reserves owned by companies and their individual carbon emissions potentials. A way to make such selective divestment more instrumental is to account for the whole spectrum of companies' carbon exposure, including current production-related CO_2 emissions and not only the ownership of fossil fuel reserves.
- **Returns still matter:** Importantly, investors do not have to give up returns when hedging their portfolios against climate risks. Many decarbonized strategies and indices can be optimized to avoid unintended risks and minimize performance deviations from their benchmarks.
- **Low Carbon strategies need not be seen in isolation:** Investors can also consider low carbon solutions alongside other compensated risk factors. This will not only address the risks, but will seek outperformance through exposure to factors in a risk-controlled framework.

These approaches are intended to help investors effectively hit both targets, doing good and doing well at the same time. Northern Trust, a Tier 1 status manager by the Financial Reporting Council in the UK, is also a member of the Institutional Investors Group on Climate Change. For more information about incorporating Low Carbon strategies in your portfolio please contact your local Northern Trust Asset Management representative.

About Northern Trust Asset Management

Northern Trust is a leading global asset management firm with more than $900 billion in assets under management. Our long-standing history of solving complex investment challenges has earned us the trust and confidence of the world's most sophisticated institutional and individual investors. We proudly offer robust investment capabilities that span all markets and asset classes, from passive and risk-factor to fundamental active and multi-manager strategies, delivered in multiple vehicles.

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AUSTRALASIA:

Bert Rebelo

Shane Teunissen

ASIA PACIFIC:

Benze Lam

Yukie Tung

APPENDIX

EXHIBIT 5: EXAMPLES OF FOSSIL FUEL FREE INDICES

Subtitle

	PARENT INDEX	EXCLUSIONS	COMPONENTS
MSCI ex Fossil Fuels	MSCI ACWI & Regional Indices	Owners of oil/gas/ coal reserves	2365 of the ACWI 2486
S&P Fossil Fuel Free Indices	S&P Global 1200 & sub-indices	Owners of fossil fuel reserves based on data from RobecoSAM	1127 out of Global 1200
FTSE Developed ex Fossil Fuels Index Series	FTSE All-World Index Series	Fossil fuels, companies receiving revenue from upstream fossil fuel sources & those with fossil fuel reserves	2954 out of 3076 FTSE All- World
Fossil Free Indexes US (FFI)	S&P 500 World ex-US and EM	Carbon Underground 200 (top 100 publically traded companies producing coal and oil & gas by the potential carbon emission of their reserves)	

SOURCE: MSCI, S&P, FTSE and FFI

EXHIBIT 6: GREEN EQUITY INDICES

Subtitle

	PARENT INDEX	SELECTION CRITERIA	COMPONENTS
S&P Clean Energy Index	S&P Global BMI	30 companies involved in clean energy production/equipment & technology	30 (fixed)
MSCI Global Environment Index	MSCI ACWI IMI	Companies that derive >50% of revenue from environmentally beneficial products and services in Alt. Energy, Sustainable Water, Green Building, Pollution Prevention or Clean Tech.	204
FTSE Global Eco Index	FTSE Developed	50 largest green tech companies globally	50 (fixed)
FTSE Green Revenues Index Series	FTSE All-World	Constituent weights based on Low Carbon Economy Industrial Indicator factor – or the ratio of LCE Industrial Classification revenue to total revenue.	3071 out of 3076

SOURCE: S&P, MSCI and FTSE

EXHIBIT 7: GREEN BOND INDICES

Subtitle

	LABELLED/NON-LABELLED	INCLUSION CRITERIA	CREDIT RATING THRESHOLD	SIZE THRESHOLD	MATURITY THRESHOLD
Solactive Green Bond Index	Both	CBI list	None	$100m	6months
S&P Green Bond Index	Labelled	CBI list plus disclosure of green rationale	None	None	1 month
Bloomberg-Barclays-MSCI Green Bond Index	Both	Use of proceed based on proprietary classification.	Investment grade	$250m	1 year
Bank of America Merrill Lynch Green Bond Index	Both	Qualified “green” purposes	Investment grade	$250m/€250m	18 months

SOURCE:

[i] Data from Institutional Investors Group on Climate Change, March 2017
[ii] The Global Fossil Fuel Divestment and Clean Energy Investment Movement. Arabella Advisors. December 2016
[iii] Economist Intelligence Unit, “The Cost of Inaction: Recognizing the Value at Risk from Climate Change”. 2015. Importantly, this present value of losses has been based on the discount rate of a private investor. When the expected losses are considered from the point of view of a government, their value may rise to the level of $43 trillion – or 30% of the entire stock of manageable assets.
[iv] Carbon Tracker. The $2 Trillion Stranded Assets Danger Zone: How Fossil Fuel Firms Risk Destroying Investor Returns. 2015
[v] Expect the Unexpected: The Disruptive Power of Low-carbon Technology”. Carbon Tracker and the Grantham Institute at Imperial College London. February 2017
[vi] Hermes Equity Ownership Services, an organization that provides engagement services on behalf of institutional investors and investment managers.
[vii] Navigating Low-Carbon Pathways. Hermes Investment Management. January 2017
[viii] Divestinvest.org as at 09/15/2015
[ix] Scope 1 includes all direct greenhouse gas (GHG; includes CO2 and other types of greenhouse gases) emissions; Scope 2 includes indirect GHG emissions from consumption of purchased electricity, heat or steam. www.ghgprotocol.org
[x] M.Anderson, P.Bolton, F.Samama. Hedging Climate Risk. Financial Analysis Journal. Volume 72.Number 3. 2016. CFA Institute
[xi] Scope 3 CO_2 emissions stand for emissions associated with the company’s supply chain and the use of its products
[xii] One provider of such innovative solution is Carbone4, whose assessment methodology incorporates all these elements.

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