

RESPONSIBLE INVESTING THAT REDUCES YOUR CARBON FOOTPRINT

May 2018

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Executive summary

- Oil spills, corruption, accounting fraud, child labour, data privacy violations, fossil fuel stranded asset risk, technologies disrupting business models, worker strikes, food contamination, gender pay inequality, excessive CEO pay...all these and other issues can and have led to shareholder losses and/or reputational damage for companies and investors as well as a variety of negative impacts on people, communities and the environment.
- A growing number of investors aim to insulate their portfolios from such risks and to capture returns from better managed companies by over-weighting companies with strong environmental, social and corporate governance (ESG) ratings and under-weighting or excluding poorly rated companies.
- More than 2,000 academic studies on the link between ESG and corporate financial performance have been published since the early 1970s. Analysis by DWS and the University of Hamburg (2015) found that the majority of these studies showed a positive relationship with financial performance and very few studies showed a negative correlation.
- Major banks are increasingly publishing research on the financial materiality of adding ESG data into investment decisions. Goldman Sachs (April 2017) concluded that *“We view ESG as a rich and under-appreciated source of information regarding company culture and risks, including accountability and controls, regulatory and reputational risk, customer and employee relationships, and more”*.
- Bank of America Merrill Lynch (June 2017) concluded that *“ESG would have helped investors avoid over 90% of bankruptcies”* and that *“ESG is a better signal of future earnings volatility than any other measure”*.
- These findings are part of the reasons that investors are increasingly allocating capital to a variety of ESG index funds. While ESG fund classification can be problematic, we are aided by Morningstar data. We estimate that in the year to March 2018, ESG index funds have grown by 25%, but still account for a relatively small amount of AuM - USD39.2bn compared to an overall market of passively managed funds of USD9.0 trn.
- Climate change is one of the most important ESG issues. Consequently, numerous investment strategies are being explored to address the risks surrounding the transition to a low-carbon economy as well as the threat to investment returns from the increasing frequency and intensity of extreme weather events. DWS published a review of ways to address climate risk in investment portfolios in June 2017.

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- In this paper, we examine the characteristics of ESG indices that also aim to largely exclude companies who are significant emitters of greenhouse gases and/or corporations with large fossil fuel reserves on their balance sheet.
- Excluding high carbon emitting companies gives up the ability to influence the direction of those companies through investor meetings with companies' senior management and through shareholder resolutions.
- However, some investors may believe that shareholders will not be able to influence the direction of fossil fuel companies' business models with sufficient speed. Other investors may want to exclude fossil fuel companies on ethical grounds.
- According to Bank of England Governor Mark Carney, the longer that governments delay in sufficiently strengthening emission reduction policies, the greater the risk of a disorderly adjustment to a low-carbon economy and the greater the risk of materially damaging financial stability as well as fossil fuel companies' profitability.
- Some fossil fuel companies are beginning to increase investment in renewable energy and low-carbon technologies but could face significant share price and dividend risk if their business model is too slow to react to stronger government policies and rapid changes in the competitiveness of renewable technologies.
- Thus, some investors may wish to exclude the most carbon intensive companies due to the hazards presented by government regulation to meet climate agreements made in Paris in 2015 as well as the rapid advances in clean and renewable technologies which are increasingly stealing market share from higher carbon activities, most notably in the power generating sector.
- A group of institutional investors, Carbon Tracker and the Principles for Responsible Investment (PRI) concluded that 68 of the world's publicly listed oil and gas companies plus Saudi Aramco, risk wasting USD2.3 trillion or 33% of their planned capital expenditure to 2025. This planned capex may become uneconomic due to strengthening government climate policies and the growing deployment of electric vehicles which is likely to reduce the demand for oil.
- We find an increasing share of global emissions is now being captured by global carbon pricing policies like carbon taxes. While these policies have historically not delivered a carbon price sufficiently high enough to have any meaningful impact on business activity, the risk over time is that such trading schemes will start to impose increasing costs, which will have the greatest impact on higher carbon emitting companies.
- However, seeking to minimise a portfolio's holdings of companies with high carbon emissions or fossil fuel reserves may not insulate an investor from all climate risks. DWS' November 2017 report concluded that physical climate risks are likely to impact a wide range of sectors. As well, the development and deployment of low-carbon technologies and government policies may affect sectors beyond oil and gas and power utilities.
- There is a great deal of innovation currently underway in the investment industry, creating new methodologies for assessing all aspects of climate change risk.
- Until there is broader agreement on climate risk assessment methodologies and before such methodologies are more widely available, we conclude that individual and institutional investors could select portfolios that favour highly-rated ESG companies that also eliminate companies with very high carbon emissions and fossil fuel reserves.

1 | The financial performance case for responsible investment

If the number of empirical academic studies is a reliable guide, then investor interest in ESG has surged over the past 40 years. Since the early 1970s, around 2,250 academic studies have been published on the link between ESG and corporate financial performance, 70% of which have been published during the last 15 years. This surge in academic literature also tallies with the growth in assets under management dedicated to ESG investments.

DWS and the University of Hamburg reviewed this literature in a white-paper published in December 2015 (Friede, Busch and Bassen Dec 2015).

In September 2017, the Board Chair of the PRI said *"If there still should be doubts about the positive relationship between ESG and financial performance, I point investors to the academic findings of DWS and the University of Hamburg."*

The DWS/University of Hamburg white-paper found that 47.9% of vote-count studies¹ and 62.6% of meta-studies found a positive relationship between ESG and corporate financial performance. Less than 10% of studies found a negative relationship with the rest providing a neutral view.

While most studies have focused on equity funds, research shows a disproportionately positive correlation between ESG and corporate financial performance for bonds (63.9% of studies showed a positive relationship) and real estate (71.4% of studies showed a positive relationship, though there have been fewer studies on real estate compared to other asset classes).

From a regional perspective, studies show that ESG is particularly effective in North America and Emerging Markets. In terms of the individual E, S and G sub-categories, there did not appear to be a dominating single factor, but rather combinations seemed to reduce the rate of positive results between ESG and CFP.

This would seem to suggest that non-focused approaches led to a less compelling argument to deploy ESG. This might suggest that mixing various approaches together washes out the potential of outperformance. However, among the individual categories, governance exhibited the highest number of positive responses.

In terms of the correlation between ESG and CFP over time, the academic studies show that this has remained relatively constant since the mid-1990s. This suggests that the growing ESG awareness in the investment process has not led to decreasing ESG alpha.

These academic findings have been confirmed by a number of research papers from major banks. Goldman Sachs (April 2017) concluded that *“We view ESG as a rich and underappreciated source of information regarding company culture and risks, including accountability and controls, regulatory and reputational risk, customer and employee relationships, and more”*.

Goldman Sachs examined environmental and social metrics that were material to different sectors’ operations and long-term performance, metrics where there was sufficient disclosure to enable peer analysis and metrics that have the best relationship with long-term historical stock performance. They found that companies with quantifiable ESG metrics outperformed

regional sector peers based on metrics including gender diversity, resource intensity, employee turnover, energy/water/carbon emission reduction targets and the existence of business ethics tools such as ombudsman and whistle-blower hotlines.

Bank of America Merrill Lynch (June 2017) concluded that *“ESG would have helped investors avoid over 90% of bankruptcies” and that “ESG is a better signal of future earnings volatility than any other measure”*.

Bank of America Merrill Lynch found² that normal financial metrics such as return on equity and earnings per share (EPS) volatility, failed to reliably predict earnings or volatility over the next five years. In comparison, ESG was found to be a better signal of future earnings volatility. Table 1 shows that companies which initially had the most stable earnings per share, over the next five years saw the most deterioration or increase in earnings volatility.

In comparison, Table 2 shows that companies with the best ESG rank experienced the smallest median change in EPS volatility over the next five years. Companies with the worst ESG rank experienced far greater EPS volatility.

Table 1: Earnings per share (EPS) volatility quintiles was a poor predictor of subsequent changes in EPS volatility

EPS volatility quintile (median) 2005 – 2015	Subsequent five year percentage point change in EPS volatility (negative = deteriorating)
1 (most stable)	-81%
2	-23%
3	-2%
4	40%
5 (most volatile)	106%

Table 2: ESG quintile ranks were a better signal of earnings volatility³

ESG rank (best to worse)	Median changes in EPS volatility over the next 5 years
1 (most stable)	92%
2	64%
3	65%
4	37%
5 (most volatile)	32%

¹ Vote-count studies count the number of primary studies with significant positive, negative, and non-significant results and “votes” the category with the highest share as the winner. Such studies provide robust insights, but, are less sophisticated from a statistical point of view. Meta-analyses aggregate findings of studies econometrically.

² Past performance is not indicative of future performance. No assurance can be given that any forecast or target will be achieved. Back-tested performance is NOT an indicator of future actual results. The results reflect performance of a strategy not historically offered to investors and do NOT represent returns that any investor actually attained. Back-tested results are calculated by the retroactive application of a model constructed on the basis of historical data and based on assumptions integral to the model, which may or may not be testable and are subject to losses. This information is provided for illustrative purposes only. See the end of the report for more information about back-tested performance.

³ Source: Bank of America Merrill Lynch (June 2017).

2 | Carbon risk and financial stability

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Climate change is one of the most important ESG risks and investment opportunities. Increasing investor attention on fossil fuel exposures have been brought into stark focus following the Paris climate agreement and increasing central bank and financial regulator attention on the financial stability risks of climate change and hydrocarbons in particular.

At the first ever conference for financial regulators and central banks on climate risk in April 2018, Mark Carney, Governor of the Bank of England said that “Once climate change becomes a clear and present danger to financial stability it may already be too late to [avoid dangerous climate change] ...as climate related risks become re-evaluated, [this] could destabilise markets and spark a pro-cyclical crystallisation of losses and lead to a persistent tightening of financial conditions: a climate Minsky moment.” He advises that such a future could be avoided by “early transitions in thinking and action”.

The financial stability concern amongst other factors, is the potential of an abrupt revaluation of asset prices in response to the risk of unburnable carbon or stranded asset risk as well as physical climate risks.

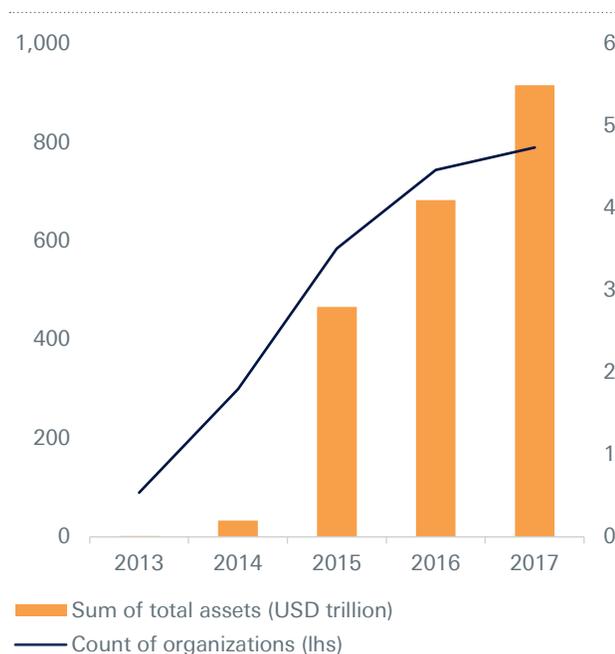
According to research published by Carbon Tracker (Unburnable Carbon, April 2013), to reduce the chance of global temperature rising to no more than 2°C above pre-industrialised levels, the world has an estimated global carbon budget for 2000 – 2050 of 886Gt CO₂. Accounting for emissions from the first decade of this century, leaves a carbon budget of 565Gt CO₂ for the remaining 40 years to 2050.

However, the total carbon potential of the Earth’s known fossil fuels reserves comes to an estimated 2,860Gt CO₂. 65% of this is from coal, and oil providing 22% and natural gas 13%. This means that governments and global markets are currently treating as assets, reserves equivalent to nearly five times the carbon budget for the next 40 years. Not surprisingly, investors are keen to gain increased reporting of fossil fuel reserves and potential CO₂ emissions by listed companies and those applying for listing to assess these risks more closely.

Investors are also beginning to assess broader systemic risks posed by unburnable carbon and are also seeking reassurance that financial stability measures are in place to prevent a potential carbon bubble bursting. In certain instances this has led to an increasing number of investors to commit to divest from fossil

fuel investments. This divestment activity started with US universities and colleges, but over the past few years has seen significant growth in the total assets of institutions that have committed to divest, Figure 1.

Figure 1: Tracking fossil fuel divestment by assets and number⁴



Following divestment from academic institutions, divesting from fossil fuels has been undertaken by governmental, philanthropic, faith-based, health and educational institutions. More recently, the recent growth in AuM divestment commitments has come from private sector investors who have committed to phase out coal and/or fossil fuels or to divest after an (unsuccessful) engagement programme. Examples of investor coal and fossil fuel policies are outlined in Table 3.

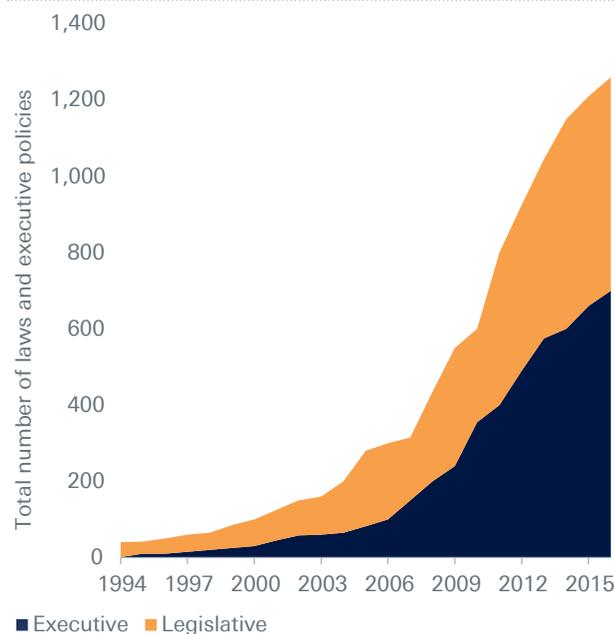
⁴ Source: Divest-Invest (March 2018)

Table 3: A comparison of investors' coal and fossil fuel policies⁵

Investor	Policy
Aegon	Divested all coal holdings
Allianz SE	No investment in companies with 30%+ revenue from coal mining or 30%+ coal-fired electricity - €4bn of investments (90% in bonds which are allowed to mature). Committed to double renewable energy investment
Amundi	Total exclusion of companies with significantly more than 50% of revenue from coal extraction
Aviva Insurance and Asset Management	In 2015, started 'well-resourced' engagement with 40 companies with 30%+ coal related revenue. 2 of these have been earmarked for divestment due to their new coal plans. 8 companies declined to engage and a divestment decision is due unless companies start engaging
Axa Insurance	Divested €500m from mining & power companies with 50%+ coal revenue
AP2	Divested shares from 23 coal companies, 15 oil and gas companies
AP4	Decarbonising its USD14.7bn global equity portfolio by 2020
Berlin doctors fund BÄV	Divested company shares with 25%+ coal mining or coal power revenue
CalPERS & CalSTRS	California state legislature mandates all public pensions to divest from coal producing companies (>50% revenue)
California insurance companies	California insurance regulator asked all insurance companies in the state to voluntarily divest coal
CNP Assurances	Dropped €300m of coal related bonds, 25%+ revenue limit
FRR	Exclude equity and bonds from companies with 20%+ revenue from coal mining or coal power
LGIM	Launched smart beta low carbon fund for HSBC's £1.85bn UK pension. No coal, reduced oil/gas exposure.
Lloyds	Divested coal companies
Nordea	Divested 40 coal mining companies
Norges	Divested coal & carbon intensive companies
PFZW	Divest all coal investments by 2020, cut fossil fuel exposure by 30%
PKA	Divested 31 coal-only companies. Will pull money from other companies if they lack plans for a low-carbon future
Zurich Insurance	Divested coal investments and decided to stop providing insurance to companies with 50%+ revenue from coal
Universities	Cambridge, Oxford, Yale and others exclude coal and some exclude all fossil fuel investments
Cities	Resolutions to divest have been passed including Berlin, California, Copenhagen, Duesseldorf, 30 cities in France, Melbourne, New York, Oslo, Seattle, Stockholm, Stuttgart, Sydney, Washington DC

that curb energy demand or push through carbon pricing policies as well as promote low carbon energy sources such as renewables.

Figure 2: Climate laws and executive policies around the world⁶



According to the World Bank, 42 national and 25 subnational jurisdictions, such as cities and states, are putting a price on carbon. As a result, since 1997 the number of jurisdictions with carbon pricing initiatives has therefore doubled such that today they account for about half of the global economy but still only encompassing just 15% of global GHG emissions.

As of 2017, about three quarters of emissions covered by carbon pricing was priced at less than \$10/tCO₂e. This is below the \$40-80/tCO₂e price range by 2020 that is viewed as necessary to be consistent with the Paris Climate Agreement.

The World Bank also reports that in 2017 nearly 1,400 companies are using an internal carbon price to guide and test business and investment plans. The use of internal carbon pricing is a good signal of companies having a relatively advanced internal climate risk management approach as they are anticipating eventual government policies. This seems prudent since the direction of carbon prices is likely to increase over time.

3 | Climate-focused regulation

The increased scrutiny of fossil fuel assets is also occurring at a time of widening climate legislation. Data from the Grantham Research Institute on Climate Change (May 2017) reveals that there has been a 20-fold increase in the number of global climate change laws since 1997, Figure 5. Put another way, in 1997 there were just 60 climate laws in place, while today this figure has risen to 1,260. Legislation encompasses 164 countries which account for 95% of global greenhouse gas emissions. Legislation is typically focused on the energy sector and specifically policies

⁵ Source: Arabella Advisors Dec 2016, DWS research, Zurich (Nov 2017)

⁶ Legislative laws are passed by parliaments, whereas executive laws or policies are enacted by governments, source: Grantham institute (May 2017):

Global Trends in climate change legislation and litigation

Forecasts are based on assumptions, estimates, opinions and hypothetical models or analysis which may prove to be incorrect.

7 | 4 | The divestment-engagement debate

Some investors question the effectiveness of fossil fuel divestment in publicly listed companies. For instance, research by Oxford University concluded that the direct impacts of divestment campaigns are likely to be limited: share prices are unlikely to suffer precipitous declines and holdings will likely be taken up by neutral investors. If divestment is to have any impact on company valuations, changes are needed in market norms and by constraining debt markets.

For other investors, full divestment out of the fossil fuel sector is not considered a viable investment strategy. In many instances the removal of certain stocks not only leads to a reduction in risk adjusted returns, but, it can lead to less efficient portfolio diversification. As a result, investor strategies should also be able to select and prioritise companies that are best placed, prepared and positioned to manage and profit from the low-carbon transition.

These factors may therefore have contributed to divestment programmes that are less aggressive in scope. Rather than the complete elimination of all fossil fuel companies, divestment can be confined to companies developing high-cost, high-carbon reserves, such as in the coal and oil sands sectors or to companies who are not managing climate risk sufficiently strongly.

Engagement is therefore another route to bring about change and can cover a wide range of topics from business strategy, performance, risk, capital structure and ESG issues including climate change. In January 2018, 256 investors with USD 28 trillion in assets launched the Climate Action 100+ as a five year initiative to engage the largest carbon emitters to improve governance of climate risks, curb emissions and strengthen climate-related financial disclosures.

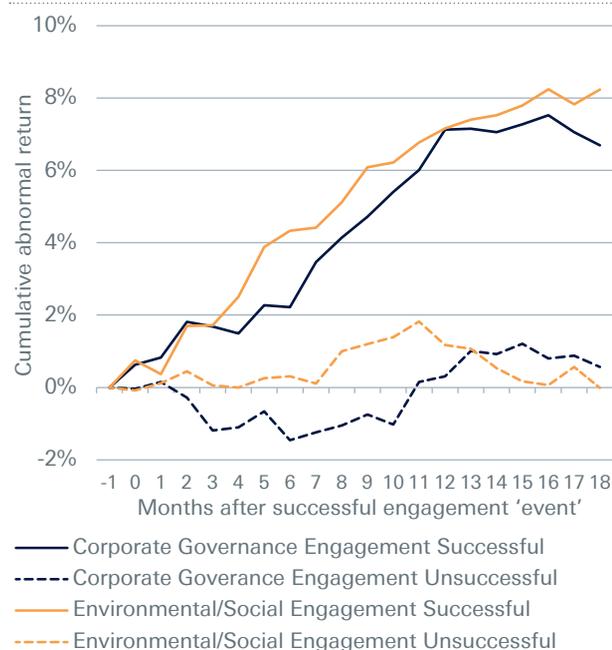
A high profile example of climate engagement is with ExxonMobil. In 2017, shareholders voted 62% in favour of a resolution that called for the company to assess and disclose how it is preparing its business for the transition to a low-carbon future. Two years previously similar resolutions at other companies only averaged 23% support (Ceres May 2017). ExxonMobil published its response to this vote in February 2018. Carbon Tracker concluded that their analysis was a step in the right direction but *“lacks clarity across a number of areas, including the impact on the value of Exxon’s existing and potential assets thereby minimizing the ‘decision-usefulness’ to investors”*.

Investors holding fossil fuel company shares would be able to engage companies like this in further dialogue (and further shareholder resolutions if necessary), aiming to improve the usefulness of company disclosures and strengthens low carbon investment plans.

Research (Dimson, Karakas and Li, Aug 2015, p3-4) has found that engagement can also have positive financial benefits. Figure 3 shows a positive return for companies which made changes following an investor engagement with them on environmental and corporate governance issues. The academics studied 613 U.S. companies engaged between 1999 and 2009. While it took 2 – 3 engagements of 1 – 1.5 years each for a ‘success’, the time and effort appears to be worthwhile. The companies engaged were large, mature and before engagement had poor performance both financially and reputationally.

Based on an analytical comparison to similar firms, for the year following a successful engagement, the performance of the company improved 7.1% (cumulative abnormal return). The performance improvement was even higher when the investor engagement focused on corporate governance (8.6% cumulative abnormal return) and for climate change (10.3% cumulative abnormal return).

Figure 3: Investment returns from engagement⁷



⁷ Source: Dimson, Karakas and Li (Aug 2015). Latest data available

5 | ESG indexes

Investor demand has led to a growing number of sustainable equity indexes to be launched in the marketplace over recent years. In all cases, sustainable indices can be classified according to three investment styles:

1) Negative/Exclusion

This has been the oldest and most traditional route whereby certain companies or sectors are excluded from the investment universe. Exclusions are usually enforced by “what does a company produce?” and “how do they operate?” The most common exclusionary criteria relates to armaments and specifically cluster bombs and land mines. However, in certain instances this approach can prove challenging. For example, excluding companies that are producing alcohol is relatively straightforward, but, it is more challenging, but possible, to exclude companies that sell it.

2) Positive/Best-in-Class

This investment approach focuses on companies that have historically performed better than their peers within a particular industry or sector on measures of environmental, social and corporate governance issues. Strategies can vary such that inclusion captures the top percentile of the sector or in certain instances inclusion can be based on momentum whereby low, but, improving ESG-rated companies become incorporated into an index strategy. In some Strategic Beta methodologies, the Best-in-Class companies are assigned higher weightings than others and the index then differs from traditional market cap weighting.

3) Thematic investing

Small, but, growing this investment style traditionally refers to targeted investments, typically undertaken in private markets that are aimed at solving specific environmental or social problems. This has tended to be concentrated around environmental issues such as climate change for example investing in industries that promote clean technologies, improve energy efficiency and reducing pollution.

6 | MSCI Equity ESG indexes

In this section we examine the family of MSCI indexes and specifically the MSCI ESG Leaders Low Carbon indexes given increasing investor demand for low carbon investment solutions, highly rated ESG company exposure and excluding controversial sectors such as tobacco and firearms.

In terms of index development, in September 2010, the FTSE KLD indices transitioned into the MSCI ESG indexes. The range of MSCI KLD indexes, such as the FTSE KLD 400 Social index, were originally launched in May 1990 and so can claim to be the longest running sustainable indexes in the marketplace.

MSCI ESG Research provides a broad range of ESG research services analysing all companies that are part of the MSCI All Country World Index (ACWI). ESG ratings, data and analysis from MSCI ESG Research are systematically used in the construction of the MSCI ESG index family. MSCI provides index solutions for all major ESG investing approaches, namely exclusion, Best-in-Class and thematic investing. Most MSCI ESG indices are designed to provide low active sector and country biases relative to their parent indices in order to ensure a low tracking error.

Table 4 outlines the broad categories of the MSCI ESG index family. For example, the MSCI ESG Universal indexes tilt the securities based on their ESG rating and ESG Trend and as such ensure the inclusion of best-in-class companies. In addition they exclude only companies found to be in violation of international norms for example where severe controversies exist in relation to human rights, labour rights, as well as companies involved in controversial weapons such as land mines, cluster munitions, depleted uranium and biological and chemical weapons.

The MSCI ESG Leaders Indexes target companies that have the highest environmental, social and governance (ESG) rated performance in each sector, but, also in each region/country of the parent index. The indexes target a 50% sector representation versus the parent index, aiming to include companies with the highest MSCI ESG Ratings in each sector.

Meanwhile the MSCI Low Carbon Indexes, launched in September 2014, are intended to help identify potential risks associated with the transition to a low carbon economy while representing the performance of the broad equity market. As a result, this suite of low carbon indices is designed to address two dimensions of carbon exposure first, carbon emissions and second, fossil fuel reserves.

The MSCI Low Carbon Leaders indexes aim to achieve at least 50% reduction in the carbon footprint of the parent index by excluding companies with the highest carbon emissions intensity and the largest owners of carbon reserves (per dollar of market capitalization). They also aim to minimize the tracking error relative to their parent index.

Table 4: The methodology and weighting scheme for the family of MSCI ESG indexes⁸

ESG index family	Methodology overview	Weighting scheme
MSCI ESG Universal	Tilts the securities based on the ESG rating and ESG Trend and excludes companies involved in controversial weapons and severe controversies	ESG weighted
MSCI ESG Leaders	Provides exposure to companies with the highest ESG rating relative to their sector and regional peers. Companies showing involvement in alcohol, gambling, tobacco, nuclear power and weapons are excluded	Market cap weighted
MSCI ESG Focus	Optimisation that aims to maximise exposure to ESG factors, subject to a target tracking error and other constraints. Indices are sector-diversified and designed to over-weight companies with high ESG ratings and vice versa. Tobacco and Controversial Weapons are not eligible for inclusion	Optimisation weighted
MSCI Socially Responsible (SRI)	Consist of companies with the highest ESG rating making up 25% of the adjusted market capitalisation in each sector of the underlying index and exclude companies involved in certain businesses like alcohol, tobacco, gambling, civilian firearms	Market cap weighted
MSCI Low Carbon Leaders	Excludes companies with the highest (potential) carbon emissions	Market cap weighted
MSCI ESG Leaders Low Carbon	Provides exposure to companies with the highest ESG rating relative to their sector and regional peers. Companies showing involvement in alcohol, gambling, tobacco, nuclear power and weapons are excluded as are companies with high carbon emissions	Market cap weighted

The creation of the MSCI ESG Leaders Low Carbon indexes offers a blend of ESG best-in-class and exclusion approach with an additional carbon screen. This is achieved through the following methodology:

- (i) **Business involvement:** companies with USD 1 billion or 50% of revenue deriving from alcohol, gambling, conventional weapons, civilian firearms are excluded. In addition, companies with any involvement in nuclear power or controversial weapons, tobacco production or over 5% revenue in the distribution or supply of tobacco linked products are excluded
- (ii) **ESG Ratings:** ensures highly rated ESG companies are included
- (iii) **Controversies:** then any companies adjudged to be involved in a serious ESG controversy are excluded

In terms of the carbon screen, the indexes then take the following approach:

- (iv) **Current carbon emissions** whereby MSCI parent index constituents are ranked by carbon emissions/sales (carbon intensity). Securities are excluded until 20% of constituents from the parent index, by number, are excluded. However, no more than 30% by weight can be excluded from any particular sector.
- (v) **Potential carbon emissions** whereby constituents are then ranked in order of potential carbon emissions/market cap. Securities are then excluded until index potential emissions normalized by market cap becomes 50% of the potential emissions by market cap of the MSCI parent index.

⁸ MSCI (October 2017)

7 | Conclusions

Over recent years institutional investors have become focused on the risks associated with investments in controversial sectors such as tobacco as well as across high carbon intensive industries. Indeed increasing evidence is finding that not only do highly-rated ESG companies display the most stable earnings per share over the medium term, but also the hazards from carbon intensive company investments. This reflects government regulation to meet climate agreements made in Paris in 2015 as well as the rapid advances in clean and renewable technologies which are increasingly stealing market share from higher carbon activities most notably in the power generating sector.

Not surprisingly, these trends are encouraging the growth of specific thematic ESG indexes which aim to address pressing environmental and/or social challenges. One of the most popular among this group are low carbon or environmentally focused indexes. The development of these indexes reflects the growing interest to divest out of fossil fuel investments to address the threat posed by global warming as well as excluding investments that are in conflict with the UN Sustainable Development Goals.

8 | References

- Arabella Advisors (December 2016). The Global Fossil Fuel Divestment and Clean Energy Investment Movement
- Bank of America Merrill Lynch (June 2017). ESG Part II: a deeper dive
- Bank of England (September 2015). Breaking the tragedy of the horizon
- Carbon Tracker (Apr 2013). Unburnable Carbon 2013
- Dimson E., Karakas O. and Li X., (Aug 2015). Active Ownership
- DWS, University of Hamburg (December 2015). ESG and Corporate Financial Performance
- DWS (February 2016). Sustainable Finance Report Issue #1. A Guide to benchmark sustainable equity indexes
- DWS (June 2017). Sustainable Finance Report Issue #2. Measures to address climate risk in investment portfolios
- DWS, Four Twenty Seven (November 2017). Measuring physical climate risk in equity portfolios
- Goldman Sachs Global Investment Research (April 2017). ESG – From article of faith to mainstream investment tool
- Grantham Institute (May 2017). Global trends in climate change legislation and litigation
- University of Oxford, Smith School of Enterprise and the Environment (Oct 2013): Stranded assets and the fossil fuel divestment campaign
- World Bank (November 2017). State and trends of carbon pricing 2017

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