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Climate change:
a problem
that insurance
companies can't
afford to ignore

WHITE PAPER

For professional investors

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Climate change could have profound implications for property and casualty insurance companies due to the claims expected to result from an increased number of major weather events. What's more, as major investors, insurers are faced with a likely double whammy from climate change: the value of their portfolios could also fall significantly if they have high exposures to the potential losers of climate change. In fact, EIOPA, the insurance regulator in Europe, has noted that more than 10%* of European insurers' investment assets are in sectors exposed to the effects of transitioning in response to climate change. But there could be many other losers across sectors as a result of the unknowable and unquantifiable effects of this fundamental shift.

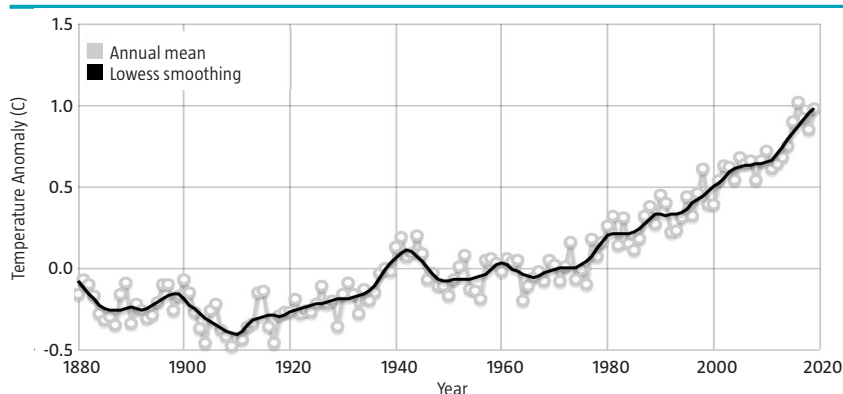
* Source: "Discussion paper: Insurance sector climate-related transition risks", EIOPA, 2019

The challenges resulting from climate change for insurers are diverse and come from multiple angles, but at the same time they are in a privileged position to be able to be part of the solution. First, they can choose which companies and projects to insure. Second, and as we discuss in this paper, they can effect change through the sheer weight of their investments while limiting their exposure to climate risk in the process.

In this document we:

- explain the recent approach of governmental institutions and regulators to climate change risk within investment portfolios;
- show how we calculate the exposure of client portfolios to climate risk;
- provide some case studies setting out the kinds of quick, simple steps that insurers can take to reduce the carbon footprint of their investment portfolios without significantly impacting expected returns;
- discuss some of our longer-term engagements with companies we invest in to persuade them to reduce their carbon footprints, resulting in a lower carbon footprint for our clients' portfolios and helping in the move towards a low-carbon world.

Global land-ocean temperature index



Source: NASA's Goddard Institute for Space Studies (GISS) and Geo Risks Research, May 2020

'Climate change is seen as a major challenge by many insurers, but they can be part of the solution'

2. The responses of governmental organizations and regulators to climate change

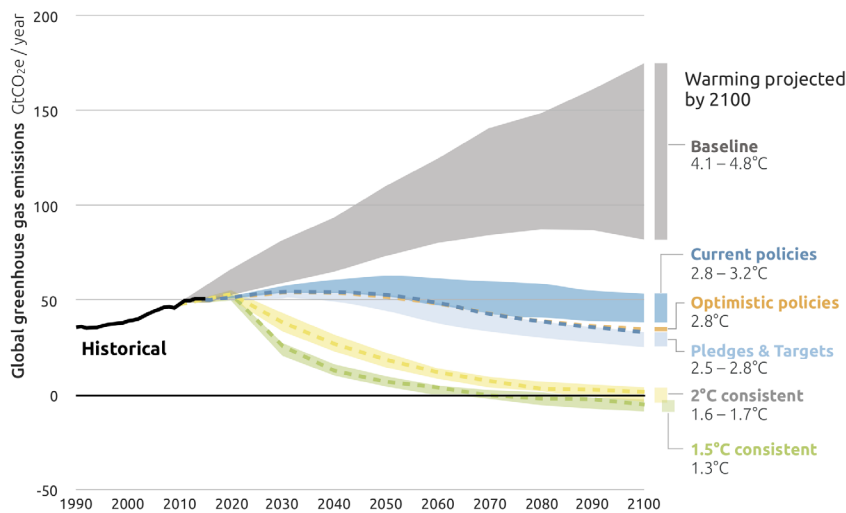
Over the past few years, governments and regulators have made significant progress in terms of setting climate change goals and considering the best ways of implementing sustainability targets through regulation. It looks inevitable that regulations will become more stringent over time as the climate emergency becomes ever more pressing.

A global push to mitigate climate change | In December 2015, parties to the United Nations Framework Convention on Climate Change reached a landmark agreement to combat climate change and accelerate and intensify investments for a sustainable low-carbon future. Widely known as the Paris Agreement¹, its central aim is to ensure that the average global temperature increases by well below 2 degrees Celsius above pre-industrial levels, and to pursue efforts to limit the increase to 1.5 degrees Celsius. Over 180 parties have ratified the agreement since it came into force in November 2016.

¹ Source: UNFCCC

Global Warming Projections

Emissions and expected warming based on pledges and current policies



Source: climateactiontracker.org/global/temperatures, June 2020

Meanwhile, the 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015, provides a shared blueprint for peace and prosperity for people and the planet, now and into the future. At the centre of this framework are 17 Sustainable Development Goals (SDGs). These goals recognize that ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality and spur economic growth – all while tackling climate change and working to preserve our oceans and forests².

² Source: UN Sustainable Development Goals Knowledge Platform



Source: United Nations, www.un.org/sustainabledevelopment/sustainable-development-goals

We have seen asset owners of more than USD 4 trillion sign up to even more stringent targets, with the UN-convened Net Zero Asset Owner Alliance targeting net-zero greenhouse gas emissions by 2050. This group consists of institutional investors including several major insurers such as Allianz, Aviva, AXA, CNP Assurances, Generali, Munich Re, Swiss Re and Zurich Insurance Group³. In December 2019 the EU also announced that it aims to be carbon neutral by 2050.

³ Source: <https://www.uneepi.org/net-zero-alliance/>

Climate regulation affecting insurers | Regulators have also been proactively looking at whether insurers should hold capital against climate-related risks in both the risks they underwrite and their investment portfolios. In September 2019, EIOPA released its ‘Opinion on Sustainability within Solvency II’. Although the report does not formally recommend an explicit capital charge for sustainability-related risks in insurance investment portfolios, it does state “EIOPA considers it is prudently relevant to require to take into account the impact of their investment activity on sustainability factors”. It also states that “Where undertakings have long-term assets to match long-term liabilities they should consider whether climate change would impact either their ability to hold these assets over that timeframe or their expected cash-flows”. What’s more, and as we discuss in the next section, some regulators are starting to compel insurers to stress test their investment portfolios for climate risk.

We set out the actions taken by local regulators in the appendix to this document.

3. Climate-related stress testing of investment portfolios

Financial institutions are becoming more aware of climate change, but accurately assessing its future implications is impossible because no one knows exactly what will happen. Modelling its potential impacts is complicated because many assumptions are involved and timeframes are long.

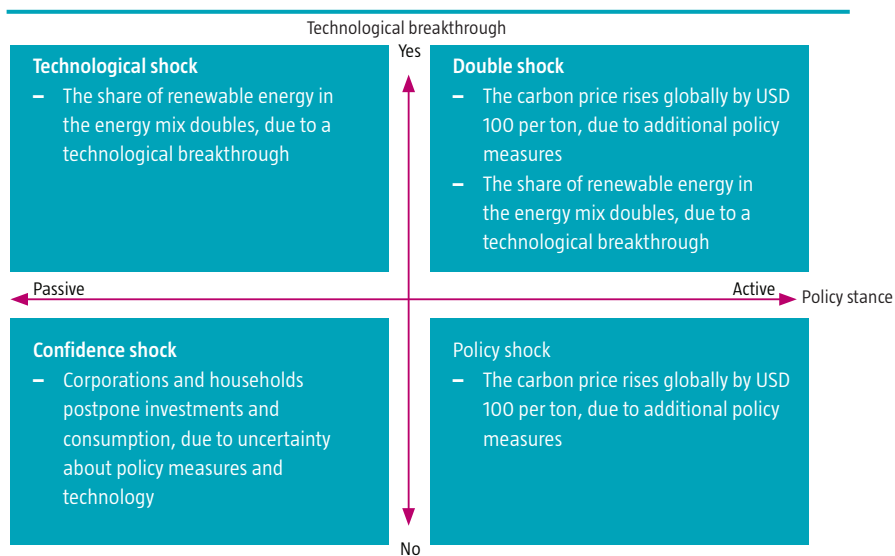
Despite the uncertainties, we can provide insurers with a clear understanding of the climate-linked financial risk that the asset side of their balance sheets could be exposed to in a range of scenarios. We do this by modelling the climate-related risks their individual portfolio holdings are exposed to.

We focus on transition risks: these are the risks linked to the move to a low-carbon world. For example, consumer preferences are likely to shift, reducing demand for polluting materials. Regulatory changes are also a major aspect: it seems inevitable that additional measures, such as punitive taxes on carbon emissions, will be imposed in the event of insufficient progress. These will affect the bottom line of all manner of companies to a varying degree. As we highlighted in the previous section, regulators are beginning to look at climate-related stress scenarios. As it stands, the Prudential Regulation Authority (PRA) in the UK and the Dutch Central Bank (DNB) in the Netherlands are leading the pack in this regard.

The DNB stress tests | At the end of 2018, the DNB published a paper⁴ to gain insight on the financial and economic impact of four climate transition risk scenarios. These scenarios, which

⁴ 'An energy transition risk stress test for the financial system of the Netherlands', 2018, De Nederlandsche Bank N.V.

DNB scenarios



Source: DNB, Q4 2018

we show in the above chart, consider the potential effects of significant policy changes and radical technological innovations.

At Robeco, we are able to evaluate portfolios and their benchmarks in our risk systems to assess how they could be affected in each of these scenarios.

While the DNB stress tests are a useful starting point, it is important to keep in mind that these scenarios are sector-based and not sufficiently granular to discriminate between the effects on individual companies. For example, firms that have committed to reduce their carbon footprint are evaluated in just the same way as a more polluting firm in the same sector. In reality, different companies in the same industry can have very different carbon footprints and different vulnerability to energy transition risk.

How Robeco assesses a portfolio's climate risk | In 2018, Robeco's Financial Risk Management department started investigating and monitoring environmental risks that portfolios are exposed to, with a particular focus on climate risks. Unlike the DNB stress tests, we aim to incorporate an accurate estimate of each individual holding's susceptibility to climate risk rather than just using sector averages. We currently focus on transition risk by considering carbon emissions and defining possible climate change scenarios in order to monitor the impact on client portfolios.

Carbon emissions: an explanation of different scopes

A company's real carbon footprint is not just what belches out of its factory chimneys: carbon emissions can be categorized into three separate 'scopes'.

Scope 1. This covers the emissions produced directly by the company itself.

Scope 2. Emissions are those that result from the generation of the energy that it uses to create its products.

Scope 3. Emissions include all of the indirect emissions that occur in the value chain, weighted according to a company's contribution; they can be produced upstream by suppliers or downstream by customers. Given their indirect nature, they are difficult to calculate and assign to each participant in a value chain, and can also be counterintuitive. For example, people are often surprised by how intense Scope 3 emissions are in the consumer discretionary sector, where there is a great deal of waste. Meanwhile, a fossil fuel producer may have lower Scope 3 emissions than an energy-intensive materials company or a utilities company that generates the energy used by others.

Calculating an individual company's exposure to climate risk | To be able to perform accurate stress tests on an overall portfolio, we believe it is vital to calculate the climate risk exposure of each of its individual holdings rather than using sector averages. Doing so involves a number of steps.

We calculate CO₂ exposure based on a firm's Scope 1, 2 and 3 CO₂ emissions normalized by its revenues: the rationale behind this is that when a company has a high CO₂/revenue ratio, its revenues are relatively CO₂ intensive, so we can assume that it is susceptible to transition risk.

Once we have calculated each company's CO₂ exposure, we assign them to one of ten climate risk buckets based on their CO₂ exposure (Bucket 1 consists of firms with the lowest climate risk exposure, Bucket 10 the highest). However, we first apply three corrections.

- First, since companies in some industries are more polluting by nature, we apply an industry correction, allocating companies that pollute more than their industry peers to a higher bucket and vice versa.
- Second, we apply a correction based on RobecoSAM's Smart ESG score for the stock. This score takes into account forward-looking Scope 1 and 2 emissions data. This is important because, for example, a company that has been a high emitter of greenhouse gases in the past may be in the process of reducing emissions through the use of greener technologies, in which case historic emissions data would not provide an accurate view of its future carbon exposure. The score also takes into account the firm's water-related risk and its climate strategy.
- Third, we apply a correction based on the proportion of a company's activities that are 'green' (environmentally friendly) and 'brown' (not environmentally friendly). The criteria we consider here differ per industry.

Robeco Climate Stress Test model

Industry correction



Smart ESG score



Green/brown share



Scope 1, 2 and 3 emission corrected for revenue



Climate risk indicator (1-10)

Source: Robeco, for illustrative purposes

We use the climate risk bucket that a company is in as an input for our climate risk stress test scenarios and climate risk sensitivity analysis.

Individual company stress testing and sensitivity analysis

Robeco has developed a number of scenarios in which we apply different shocks to companies based on their CO₂ exposure.

Carbon bubble

The valuations of fossil fuel dependent companies are based on the assumption that their fossil fuel reserves will be used. Under our carbon bubble scenario, these reserves would become (partially) unusable, which would have a significant effect on the companies' valuations.

Stranded assets

The stranded assets scenario reflects a situation in which companies have to write off their assets because of the transition to a low-carbon economy. Companies in several sectors (such as oil & gas, chemicals and related areas) will experience steep declines in their market values. This scenario is based on a 'hard landing', where markets abruptly re-evaluate the value of firms that are sensitive to reduced demand for fossil fuels and stranded assets.

In addition to this scenario analysis, our Financial Risk Management department performs sensitivity analysis based on the climate risk buckets, showing, for example, the sensitivity of a portfolio's value to an increase in credit spreads of, say, 1 basis point per climate bucket.

Climate risk dashboards | We have gone on to develop 'climate transition risk' sensitivity and stress scenario dashboards to provide a quick overview of the climate susceptibility of fixed income and equity portfolios.

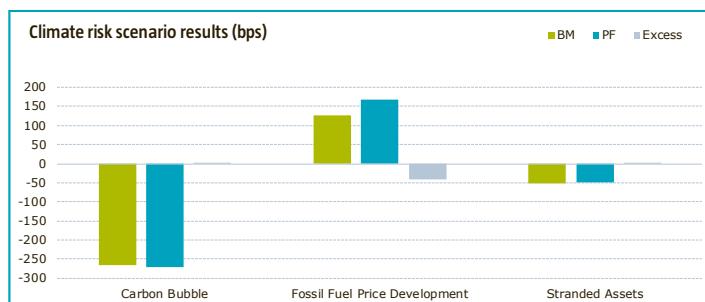
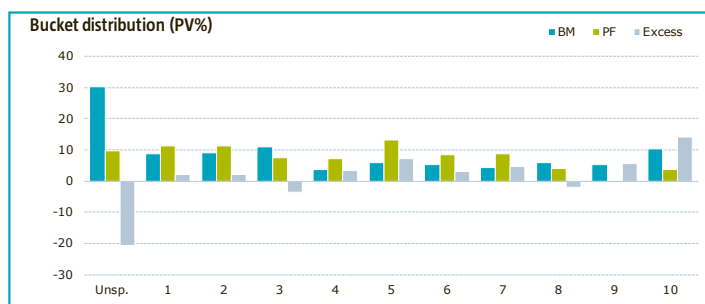
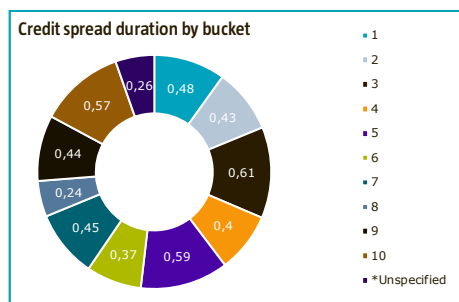
These dashboards show a portfolio's exposure to climate risk (through the distributions of its climate scores, both in absolute terms and relative to its benchmark) and the potential impacts on the portfolio's value and its performance relative to the benchmark. They help our clients evaluate the vulnerability of their portfolios to climate change, and act as a useful starting point for discussions about how they could respond to climate-related risk. We can use the data in our systems for any portfolio, whether it is run by Robeco or another manager.

Example of a portfolio climate risk dashboard

Climate risk report – Fixed income

CGF MFHY

- > Bucket distribution of the total portfolio and benchmark based on position weight. Unspecified positions are related to government debt in the portfolio
- > Relative performance under climate risk scenarios. A negative excess means that the benchmark performs worse than the portfolio
- > The credit spread breakdown per bucket of the selected portfolio



Source: Robeco, for illustrative purposes

Physical risk | Our current framework primarily focuses on transition risk, but physical risk is also an important component of climate-related risk. For example, companies with operations situated below sea level or next to rivers could be at significant risk of being flooded, which would have a major impact on their profitability. In 2020 we plan to complement our framework with a consideration of physical climate risk based on external data.

Risk monitoring by Robeco can help insurers reduce the sensitivity of their portfolios to climate change | We believe we are well placed to help insurers assess and reduce the vulnerability of their portfolios to climate change. We have recognized that climate change is a source of financial risk – not just reputational risk – since early 2018.

In doing so we are able to draw upon the experience amassed over the past 25 years. In particular, our expertise is vital in enabling us to take into account forward-looking data, which are likely to give a truer reflection of each company's exposure to climate change risk than past emissions data alone.

Moving towards a risk-return-based calculation of an investment portfolio's greenhouse gas emissions

The current debate in the market about how to calculate the greenhouse gas emissions of a portfolio is mainly centered on whether to use the so-called carbon footprint or carbon intensity.

Carbon intensity is calculated as a company's total emissions divided by its total sales, and is therefore a proxy of the emission intensity of a company's activities. The carbon footprint divides a company's total emissions by its capital base (represented by the sum of its equity and debt), leading to a measure of emissions per euro invested.

These commonly used methods do not discriminate between equity and debt. With carbon intensity there is simply no direct link between these two, and carbon footprint in its simplest form assigns an equal weighting to a euro amount invested in debt or in capital. So, for example, a defensive multi-asset portfolio (consisting of 80% debt and 20% equities) would have the same carbon footprint as an aggressive portfolio (20% debt and 80% equities). This does not seem logical, as the defensive portfolio has less climate investment risk, less return potential and less influence on the company (through voting) than the aggressive portfolio.

Therefore, we do not believe that carbon intensity or carbon footprint provide a logical framework to integrally analyze and optimize carbon emissions across an insurance company's entire balance sheet, and it is needed to look beyond these measures.

Allocating according to the risk profile of the investments

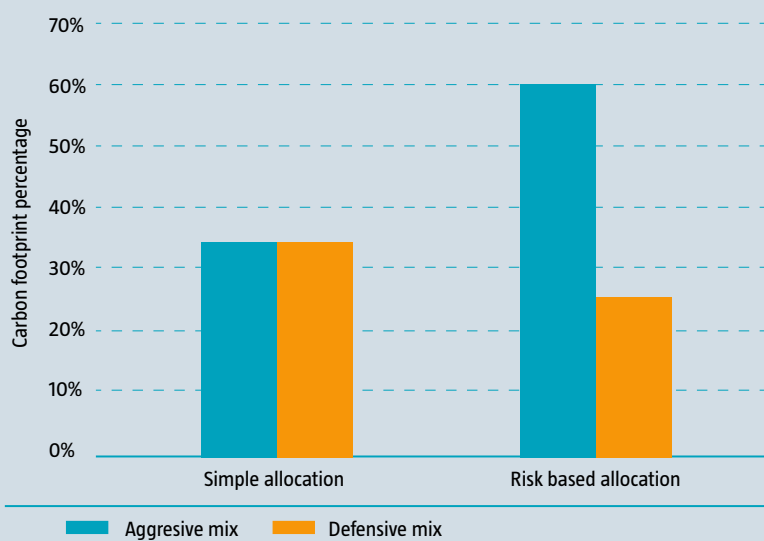
When looking to optimize a portfolio across the whole balance sheet, one first needs to address the question of how to distribute a company's carbon footprint across the various financing instruments that an investor holds (typically, equities and various forms of debt).

We propose a method that takes into account the risk-return profile of different types of securities and can be applied to both the carbon footprint and carbon intensity metrics. We believe this to be an elegant way for investors to align carbon footprint sustainability investing with risk, return and regulatory measures.

A straightforward way of doing so is to apply a carbon weighting scheme similar to the solvency capital requirement formula for insurers on how risk is 'punished', such as a 39% shock for developed equities and a rating and duration-based shock for fixed income. The example in the graph below shows the effect this would have when comparing the carbon footprint of a defensive and an aggressive multi-asset portfolio investing in the same companies.

Using the simple method, the carbon footprint impact of the aggressive and the defensive portfolio are the same. With the risk-based method, a defensive multi-asset portfolio has a much smaller carbon footprint than the aggressive portfolio. In our view, this is more in line with the principles of investment risk, return potential and climate stress testing.

Impact of simple versus risk weighted allocation of carbon emissions to equity and debt



Source: Robeco, for illustrative purposes

4. Climate change solutions: examples of how we can help our clients reduce their carbon footprints

Sustainable investing covers many different areas, from ESG data analysis and integration in the investment process through to company engagement and reporting. Ultimately, though, at Robeco we believe that sustainable investing is a tool that enables us to create better investment outcomes for our investors and benefit society.

Our clients are looking to adopt a sustainable approach for three main reasons: to improve the risk-return profile of their portfolios, to make a positive impact through their investments, and to respond to regulation.

The good news is that when it comes to climate change, investment, impact and regulation-driven reasons for investing are not mutually exclusive. In fact, they are closely interlinked. As we have already seen, insurers are likely to come under much more pressure from regulators to reduce the climate footprint of their portfolios in the coming years. Doing so will clearly have a positive impact, and this can be amplified by investing in companies helping in the move towards clean energy and actively encouraging others to reduce their own carbon footprint. And of course companies with a heavy carbon footprint could be subject to punitive penalties in the coming years, hitting the prices of their securities, so adopting a climate-friendly portfolio could also help to boost an insurer's investment returns.

In this section we first take a look at examples of the quick-win steps that we are able to take to significantly reduce the expected carbon footprints of investment portfolios, with limited impact on either yields or expected returns. We go on to look at a longer-term approach: active engagement to persuade companies to achieve carbon-neutrality. It is this approach that will really help us progress towards a low-carbon world.

A: Quick steps to reduce a portfolio's carbon footprint

1. Carbon reduction within a fixed income portfolio | For a typical insurer, fixed income assets will make up over 90% of their balance sheet investment portfolio. Therefore the biggest reductions in carbon reduction will come from their bond allocation.

The insurance example below illustrates how client-specific considerations on impact investing, risk management and regulation can be addressed within an ESG-integrated buy-and-maintain portfolio.

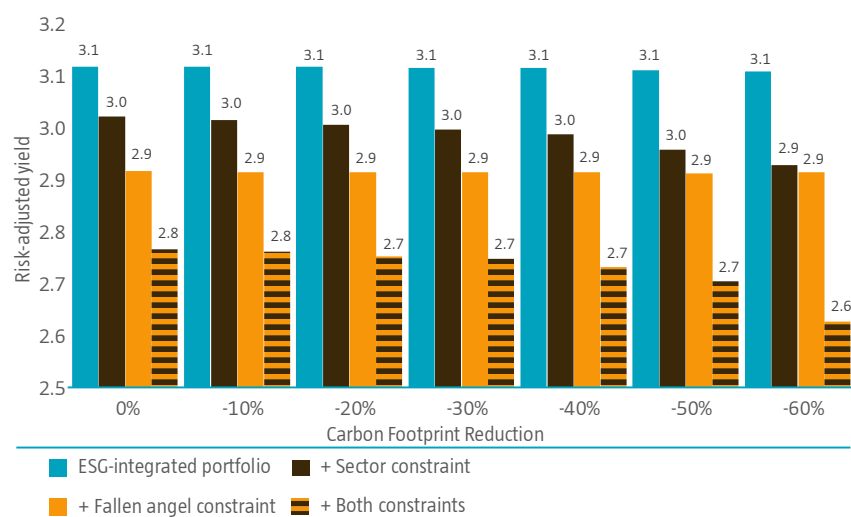
The client objective is to match a target cash flow profile of between 5 and 15 years maturity with an ESG-integrated global credit portfolio that should ideally have no turnover. It should have an average rating of at least A, aim to maximize its return, and ensure it has:

- a low carbon footprint;
- good sector diversification to limit tail risk;
- a low probability of downgrades to high yield to avoid forced selling.

The chart below shows the impact on the portfolio of the three targets above relative to a base-case scenario (represented by an A-rated, ESG-integrated portfolio that matches the desired cash flow profile, strives to maximize returns and invests in issuers based on Robeco’s fundamental credit research).

The horizontal categories are based on different carbon footprints for the portfolio relative to the client’s benchmark: the bars on the far right, for example, show portfolios with a carbon footprint 60% lower than that of the base case. Within each carbon footprint category, the overlapping bars show the impact on the portfolio’s risk-adjusted yield of setting a 20% constraint on sector exposure and a target of 40% fewer fallen angels than the benchmark.

Impact of sector, fallen angel and carbon footprint restrictions on portfolio return potential



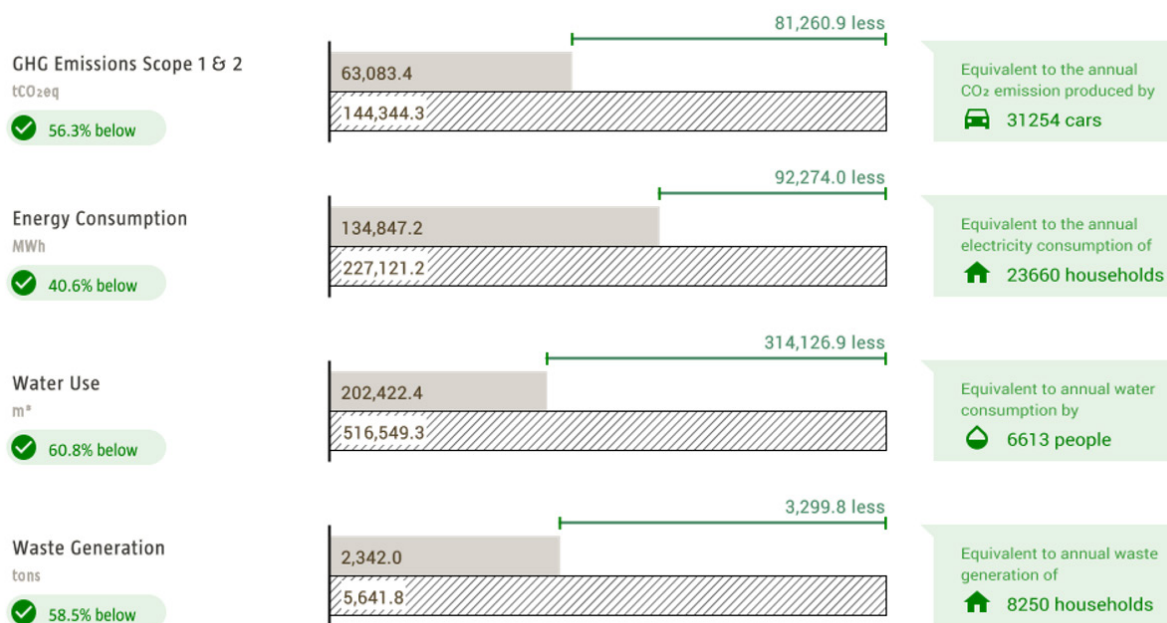
Source: Robeco. Risk adjusted yields and Fallen Angel probabilities calculated based on September 2019 yields and model assumptions estimating the impact of defaults and fallen angels leading to forced selling on the portfolio.

We can see from the chart that we can generally reduce a portfolio’s carbon footprint with a very limited impact on its performance potential and quality. Only for the most constrained portfolios does a large reduction in the carbon footprint start to have a significant impact on its quality and return potential. This is mostly a result of sector constraints. The reason for this is that carbon footprints are not just company-specific, but also very much sector-dependent.

2. Making a positive impact through our SDG credit strategies | The 17 SDGs are an urgent call for action by all countries in a global partnership. They recognize that ending poverty and other deprivations must go hand-in-hand with tackling climate change and working to preserve our oceans and forests. SDG 7 (affordable and clean energy) is directly linked to the reduction of CO₂ emissions. Companies that offer solutions to help achieve the SDGs may well be the winners of the future as well as attractive investment candidates.

In 2018 we became the first asset manager to launch specialist credit strategies dedicated to meeting the SDGs. Based on our proprietary impact reporting tool, we can see in the figure below that our Euro SDG credit strategy produces far lower greenhouse gas emissions than its benchmark and uses much less energy. The firms it invests in also use much less water and generate less waste than the mainstream index.

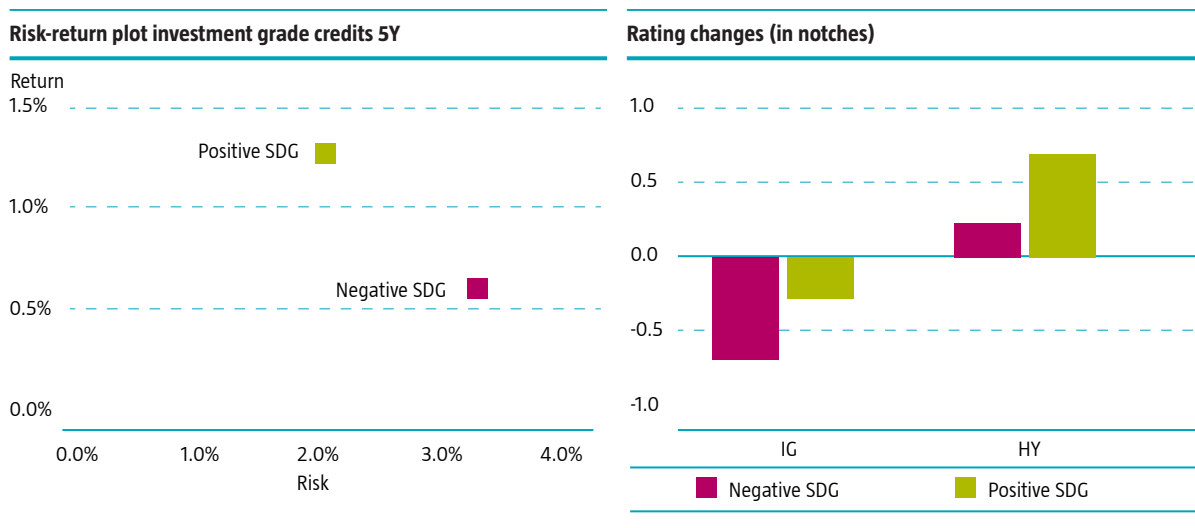
Footprint Ownership-for 1171 mUSD invested



Source: RobecoSAM AG. Certain underlying data is sourced from third parties (such as e.g. CDP Europe Services GmbH).

Impact investing is not just about doing good - it can lead to attractive investment returns over the medium to longer term. As we can see in the left-hand chart below, investment grade corporate bonds in sectors that generally make positive contributions to meeting the SDGs (such as banking, healthcare and communications) produced better risk-adjusted returns than bonds in sectors that generally made a negative contribution (such as food & beverages, automotives and energy) over the five years to 31 March 2019⁵. Along the same lines, firms in positive SDG sectors are more likely to receive ratings upgrades and less likely to be downgraded than firms in negative SDG sectors.

⁵ Sources: Barclays, Robeco calculations based on global IG and HY universes covered by RobecoSAM. Data cover the five years to the end of March 2019. The charts below are for illustrative purposes only and do not represent the performance of any specific Robeco investment strategy.



Source: Robeco. Barclays, Robeco calculations based on global IG and HY universes covered by RobecoSAM. Data cover the five years to the end of March 2019. The charts are for illustrative purposes only and do not represent the performance of any specific Robeco investment strategy.

3. Reducing the carbon footprint of a passive equity portfolio without significant increases in its turnover or tracking error |

The figure on the next page shows a sensitivity analysis that we performed looking at how the tracking error, outperformance and turnover of a passive global equity portfolio changes for every 10% that we reduce its carbon footprint. This analysis is based on Robeco’s index construction algorithm, which aims to maximize the level of carbon reduction per unit of tracking error while at the same time keeping turnover to a minimum. We can see how a reduction in its carbon footprint by up to 30% can be achieved while keeping the tracking error level below 0.5% over the 2006-2020 period that our analysis covered. Reducing the footprint by 40-60% results in a tracking error of 0.5-1.0%. Carbon footprint reductions in excess of 60% lead to higher tracking errors, reaching 1.7% in the case of an 80% reduction.

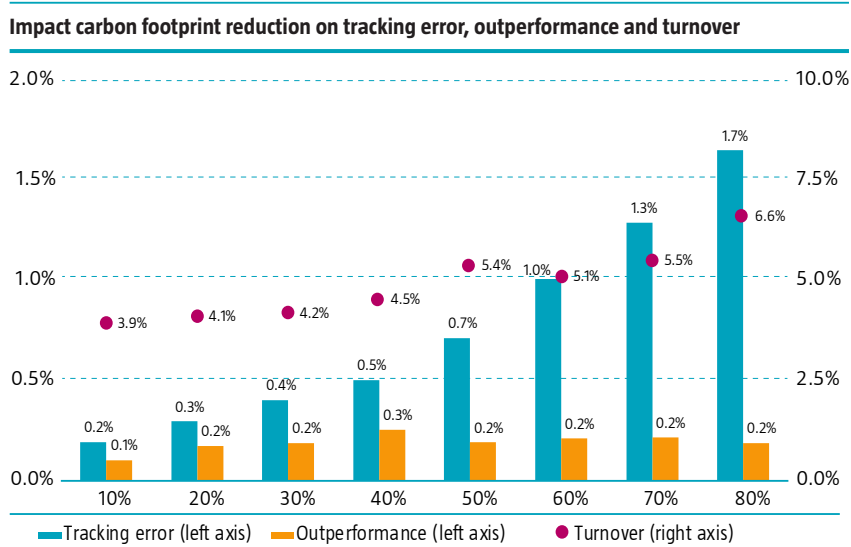
We saw above that integrating carbon-reduction measures in index construction involves three main aims: reducing the carbon footprint, minimizing tracking error and minimizing

turnover. However, these three aspects are conceptually misaligned, as higher levels of carbon reduction inevitably result in increased levels of tracking error. At the same time, managing tracking error typically results in high levels of turnover, which leads to higher implementation costs and consequently lower risk-adjusted returns. Therefore, generic sustainability indices can realistically only satisfy two out of the three dimensions while sacrificing the third. Current sustainability index offerings either involve high carbon reduction with low ex-ante tracking error but high turnover, or high carbon reduction with high ex-ante tracking error and relatively low turnover.

However, Robeco’s index solution addresses all three of the concerns above by providing high carbon reduction, low tracking error and low turnover at the same time.

How are we able to meet all three criteria in our index solutions? Robeco’s index construction methodology is designed to make an optimal trade-off between carbon reduction, tracking error and turnover. Our index construction process also takes into account other stock-specific information, such as liquidity and transaction costs. We achieve this through an innovative tracking-error control technique and smart trading rules.

Consider a real-life example: imagine that an index’s target carbon footprint reduction is 50% relative to the benchmark. If at the time of rebalancing its carbon footprint is 55% lower, we would not perform any trades so the index would remain the same as before rebalancing. If, however, its carbon footprint had fallen to 45% lower than the benchmark, we would perform trades to increase it back to 50%, selling the stocks in the index with the highest carbon footprints and using the proceeds to buy low-carbon stocks.



The figures refer to simulated past performance and that simulated past performance is not a reliable indicator of future results.

Source: Robeco, FactSet, MSCI. Sample period: Jan 2006 – Feb 2020, developed markets universe. All returns are in USD, based on portfolio simulations, gross dividends reinvested, gross of transaction costs. Annualized returns are geometrically calculated based on monthly data. Outperformance and tracking error are relative to the MSCI World Index. Carbon reduction is measured as percentage reduction in the carbon intensity score relative to the carbon intensity score of the MSCI World Index. Turnover is single-counted and calculated over the full sample period.

4. Combining factor investing and sustainability | Our quantitative portfolios are based on the exploitation of a number of proven factor premiums, such as low volatility, quality, value and momentum. But marrying this approach with ESG criteria is far from mainstream.

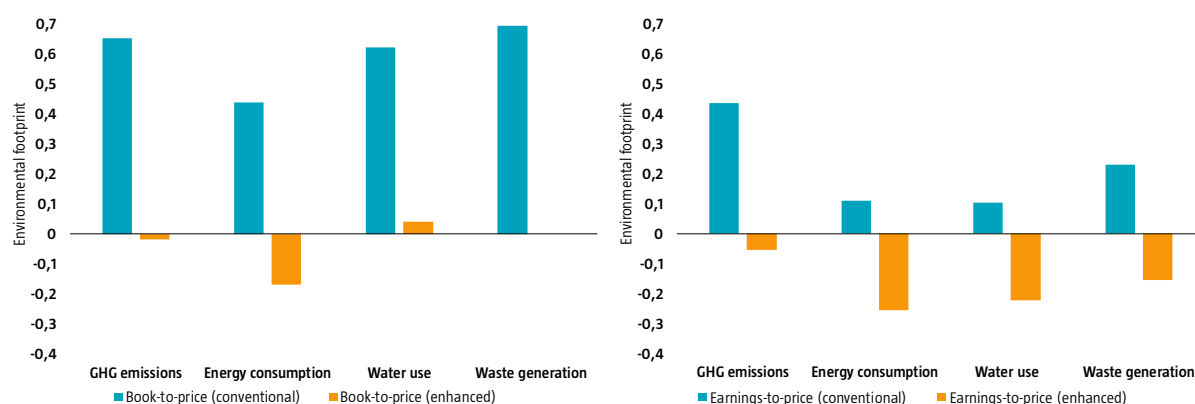
Our research has shown that the best way to proceed is to incorporate ESG criteria in the factor strategy’s stock selection model with the aim of increasing the portfolio’s exposure to firms with a strong sustainability profile. Doing so makes it possible to produce a portfolio with significantly enhanced sustainability criteria with little impact on performance potential. Once fully implemented, the carbon footprints will never be higher than those of the benchmarks they follow at the time of rebalancing. And our Sustainability Focused strategies go a step further: they seek to minimize their carbon footprint, and ensure that their carbon emissions are at least 20% lower than those of the benchmarks they follow. They also systematically exclude companies that derive 10% or more of their revenues from thermal coal.

Decarbonizing an individual factor | Sometimes, combining factor investing with sustainability leads to unexpected difficulties: the equity value factor, for example, tends to have a high carbon footprint because it generally has a structural tilt to carbon-heavy companies in sectors such as energy, utilities and materials. Our answer to this is a ‘decarbonized value factor’.

We have developed an innovative methodology to adjust a stock’s value score based on its environmental footprint. The result is that if we find that certain cheap firms have significantly higher carbon footprints we would adjust their valuations to this tilt, as we do not like the idea of buying firms that are cheap because they are exposed to a carbon risk factor. Removing

Environmental footprint of two conventional and enhanced value factors

The figures refer to simulated past performance and that simulated past performance is not a reliable indicator of future results.



Source: Robeco Quantitative Research. The graph shows the average environmental footprint (GHG emissions, energy consumption, water use, and waste generation) of the highest value quintile portfolio minus the lowest value quintile portfolio as a percentage of the footprint of the equally-weighted universe. A positive number means that the high value stocks have a larger footprint than the low value (growth) stocks. The value characteristics are the book-to-price (left) and earnings-to-price ratio (right) and the enhanced versions in which environmental footprints have been dynamically reduced using cross-sectional dummy regressions. Portfolios are monthly rebalanced. The sample period is January 1986 to December 2018. The stock universe is MSCI All Country World Index constituents supplemented with large off-benchmark stocks.

potential portfolio risks that are not compensated with additional expected returns is an important element in our investment philosophy.

In the chart on the previous page, we show the environmental footprints of two conventional measures of value against our own enhanced (decarbonized) value factors. The footprints of the enhanced value factor are close to zero, and even negative in some cases. These decarbonized value scores enable us to construct decarbonized value portfolios with similar risk, return and correlation characteristics to traditional value portfolios, and show that a lower carbon.

B: Engagement – an effective way to get impact

Reducing a portfolio's carbon footprint is a quick way of limiting exposure to future risks, but it transfers the exposure to someone else – another investor will buy the polluting companies. The most effective way for investors to truly play a role in solving the climate crisis is through engagement, persuading polluting companies to adopt less carbon-intensive business models. It is also an excellent way of reducing the climate risk of an existing portfolio.

We have played an active role in encouraging companies in several sectors to reduce their carbon footprints. What's more, in line with our belief in the importance of reducing global carbon emissions, decarbonization is one of our main engagement themes for 2020, so we are proactively engaging with companies across sectors to encourage them to reduce their carbon footprints. We are also an active member of Climate Action 100+, an investor initiative to ensure the world's largest corporate greenhouse gas emitters take necessary action on climate change.

Below we provide some examples of engagements that we have carried out on our clients' behalf with the aim of persuading firms to reduce their carbon footprints.

Persuading oil & gas companies to support the energy transition | Oil & gas firms have a crucial role to play in the transition to cleaner sources of energy, and we have been engaging with companies in the sector since 2016. One prominent success story is our engagement with Royal Dutch Shell, which in 2018 publicly acknowledged its ambitions to support the energy transition process and subsequently implemented a number of initiatives such as linking executive pay to carbon reduction. In 2020, this was followed by a statement setting out its plans to become a net-zero emissions energy business by 2050, or sooner, both after in-depth engagement with Robeco and the Church of England.

Attempting to hold automakers to their word | Another sector that features heavily in our climate-related engagement activities is automakers, as it is responsible for large emissions

of greenhouse gases. Automakers themselves have made some virtuous statements about reducing emissions in recent years, but so far our dialogues with companies in the sector have provided little evidence that there is adequate oversight by their boards on their carbon reduction policies.

A public call to utilities to decarbonize | We have engaged with a number of electric utilities in recent years, and they have all committed to not developing new coal-fired plants. However, they have been unable to commit to a phase-out date for their existing coal assets. In December 2018, Robeco was among a group of investors that wrote a letter to the Financial Times publicly calling on utilities firms to end their use of coal by 2030 and to spell out their strategy to prepare for a global shift towards low-carbon fuels.

5. Summary

The challenges resulting from climate change for insurers are evident, but at the same time they are in a privileged position to be part of the solution. If insurance companies choose to reduce their exposure to companies that are contributing to climate change, or actively encourage them to make profound changes to their business models, they could act as a powerful force for good. It is also important to remember that financial opportunities linked to climate change abound as regulators increasingly incentivize investments in companies effecting positive change – it is not all doom and gloom.

As we have discussed in this document, Robeco is able to help insurers pinpoint the climate risk that their investment portfolios are exposed to. As a follow-up from there we can take quick steps to reduce that exposure as well as taking part in longer-term active engagements to urge the companies we invest in to reduce their carbon footprints as part of the movement towards a carbon-neutral world.

Furthermore, we have long experience working with insurance companies to create customized solutions to meet the distinct regulatory and investment challenges they are faced with. We believe we create strong partnerships with insurers because we have so much in common. In particular, insurers adopt a highly analytical approach to mitigate risk, and this is something that Robeco has been doing from its very beginnings.

Appendix

Several local regulators have announced plans to compel insurers to take climate change into account, as we can see in the following table.

Country	Body	Year	Action
France	Banque de France	2019	The ACPR (the French insurance supervisory body) announced plans to subject banks and insurers to climate stress tests, including scenario analysis, in the following 2-3 years.
Germany	Deutsche Bundesbank	2019	States that "Financial supervisors will need sophisticated methods to identify the vulnerabilities caused by climate risk more clearly. A climate stress test should form part of the toolkit. But before this can happen, we need the right data and a better understanding of the basic issues."
UK	Bank of England	2019	The PRA defined climate change stress tests for the largest regulated insurers. The test is called an 'exploratory exercise'.
Netherlands	De Nederlandsche Bank	2018	The DNB defined four shock scenarios relating to a (disruptive) energy transition (see Section 3 for more details).
Australia	Australian Prudential Regulatory Authority	2020	The APRA is seeking to estimate the financial impact of climate change on the country's largest financial institutions by conducting 'vulnerability assessments' (i.e. stress tests).
China	People's Bank of China	2020	The PBoC is to begin a study to assess the effects of climate change on different parts of the financial sector and how policy makers should respond. The bank will also conduct a feasibility study on factoring the impact into its macro-prudential framework.
Singapore	Monetary Authority of Singapore	2020	The MAS started climate risk stress testing in 2018, and plans to include a broader range of climate-change-related risks in a future stress test for its financial industry.

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