Russell Investments

DECARBONISATION 2.0

A sustainable investing solution for the energy transition

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As investors increasingly look to incorporate environmental, social and governance (ESG) criteria into their decision-making process, tackling the investment implications of a transition to a low carbon economy has been at the forefront of this movement. Investment solutions addressing the energy transition have primarily focused on what we refer to as "standard decarbonisation": a reduction in exposure to carbon emissions and/or divestment from fossil fuel reserves within equity portfolios.

Our research has found that this standard decarbonisation approach can unintentionally lead to reduced exposure to renewable energy and a reduction in the aggregate ESG profile of a portfolio. In this paper, we present an enhancement to Russell Investments' original decarbonisation strategy that incorporates three additional sources of insight informative to the sustainability profile of a portfolio: increased exposure to renewable energy, incorporation of ESG scores and a targeted reduction in coal exposure.

Our objective is to help investors align portfolios with the transition to a low carbon economy without changing the return profile or introducing unintentional risks. Going beyond the reduction of carbon emission alone, the portfolio is designed to have both a higher aggregate ESG score as well as higher exposure to renewables relative to the benchmark. In doing so, the solution tilts a global equity portfolio away from those companies with greatest exposure to carbon-related risks and towards those companies expected to contribute to, and benefit from, the energy transition.

Overview

Launched in 2015, the objective of Russell Investments Decarbonisation 1.0 Strategy is to reduce the carbon exposure of a universe by a specified percentage while minimising the active risk. Specifically, the Strategy achieves a 50% reduction in relative carbon emission and 50% reduction in the carbon reserves while targeting a tracking error of less than 1%. A direct response to the initiatives outlined by the United Nations supported Principles for Responsible Investment (PRI), the Strategy was designed as a means for signatories to implement a preference for decarbonisation across their listed equity portfolios while effectively managing risk at the stock, sector and country level.

In our original decarbonisation strategy, we highlight how combining carbon emission and reserves incorporates both current and future carbon criteria into our solution. We reduce exposure to companies with poor current environmental impact by reducing portfolio exposure to carbon emissions. We mitigate future carbon risks through reduced exposure to carbon reserves, many of which can never be extracted in a reduced emission scenario[1], and hence may become "stranded assets".

In Smith, Bennett & Velvadapu (2016) (SBV), we compare several portfolio construction approaches to achieving these two standard decarbonisation criteria and present a proprietary portfolio construction technique, that avoids the common pitfalls of standard decarbonisation. Currently, the two most common approaches to addressing the issues of portfolio decarbonisation are naïve fossil fuel divestment, effectively divesting from any company that holds fossil fuel reserves, and standard decarbonisation, or reducing the carbon emission of a portfolio relative to benchmark.

Building on our prior research, here we demonstrate that these common approaches to carbon emission and reserve reduction can lead to lower exposure to renewable energy and potential to increase exposure to other, non-carbon, ESG risks, as measured by overall ESG rating.

Our enhanced decarbonisation 2.0 Strategy, incorporates three additional criteria. In addition to incorporating future risks of an energy transition through carbon reserves, future opportunities are also now incorporated through the addition of renewable energy production in the form of our Green Energy Score.

[1] Unburnable Carbon 2013: Wasted capital and stranded assets (Carbon Tracker, 2013).

Building on evidence that coal energy use will need to be dramatically reduced to meet a 2-degree warming scenario[2] [3], we also increase the precision of our carbon reserve reduction through an explicit coal exclusion. In order to incorporate not only carbon outcomes, as measured by these three criteria, but also sustainable practices, the portfolio is designed to have a higher ESG[4] score relative to the benchmark. As described in more detail below, our ESG score focuses on the handful of sustainability issues that are financial material to a given industry. The purpose of these additional criteria is to provide a wider view of how a portfolio aligns with sustainability goals beyond carbon emission reductions.

These objectives are combined in our proprietary portfolio construction process, which solves for the combination of securities that achieves the aggregate carbon emission, carbon reserves, green energy score and ESG profile targets with the minimum amount of active share and transaction costs.

This portfolio construction technique is sufficiently flexible to be applied across a range of portfolios including market-cap weighted portfolios, factor portfolios, and Russell Investments' active multi-manager portfolios.[5] Throughout this paper, we demonstrate the capability using a sample global market-cap weighted portfolio, the MSCI World Index.

Data

This study uses two primary data sources: carbon and energy data are sourced from MSCI and underlying ESG data is sourced from Sustainalytics. The history available to us for both is relatively limited with ESG metrics and carbon emission data available from 2009. Due to this restriction, our testing begins in August 2009, with ESG and carbon emission data and introduces reserves and green energy ratios from 2013 onwards.[6]

There are four primary inputs to our model: carbon emission, carbon reserves, energy production and our Material ESG scores. The rest of this section summarises the data and key considerations for each of these items.

Carbon emission

There are a variety of carbon emission techniques in use today. For our decarbonisation strategy, the use of carbon intensity defined as Scope 1 (direct) GHG emissions plus Scope 2 (electricity consumption) GHG emissions measured in metric tons of carbon dioxide equivalent (CO2e), divided by company revenue ($m USD).[7]

$$\text{Issuer's Carbon Intensity} = \frac{\text{issuer's scope 1 and scope 2 GHG emissions}_i}{\text{issuer's \$M revenue}_i}$$

The company-level carbon intensity is then rolled up to calculate a portfolio-level carbon intensity using the weighted average carbon intensity (WACI) approach. The weighted average carbon intensity is defined as:

$$\text{Portfolio Weighted Average Carbon Intensity} = \sum_i^n \left(\frac{\text{current value of investment}_i}{\text{current portfolio value}} \text{ X } \frac{\text{issuer's scope 1 and scope 2 GHG emissions}_i}{\text{issuer's \$M revenue}_i}\right)$$

[2] "Analysis of the Impacts of Clean Power Plan", U.S. Department of Energy, Energy Information Administration, Independent Statistics & Analysis. (May 2015).
[3] United Nations, Paris Agreement, 21st Conference of the Parties, Paris. (December 2015).
[4] ESG information utilised is sourced from Sustainalytics.
[5] Embedding sustainability requirements: ESG and decarbonisation. Russell Investments Client Case Study. (August 2017).
[6] We attempt to preserve the as-was nature of the data as much as possible. For ESG and carbon emission data this is possible, and the data is used as it was available for any a given research date after August 2009. Reserves and energy production data become available in 2015 and refers to years 2012 to present. For example, in August 2015 data was released for Exxon Mobil for 2012 and 2013 fiscal years. Given the limited scope of as-was data for reserves and energy production we have elected to use the reported data back to 2012 as a proxy in an effort to incorporate these criteria into our testing. The Sustainalytics ESG ranking data coverage and methodology was materially changed in 2011 (August).
[7] The relative carbon emission, reserves and green energy score formulas presented in this paper refer to security-level characteristics. To generate a portfolio-level score we take the sum product of portfolio weight and security-level scores divided by coverage.

Scope 3

The complete carbon emissions of a company's value chain, referred to as Scope 3, is currently not included in our calculation. This is primarily due to our lower confidence in Scope 3 data availability and reliability due to lower levels of company reporting and higher levels of estimation. Scope 3 emissions are also inherently more complicated to estimate because of the need first to identify and map a company's complete value chain. As data availability and robustness improves for measuring Scope 3 carbon emissions, we will continue to evaluate incorporating this data into our process. In the meantime, we take a targeted approach to addressing specific points in the value chain where carbon emissions are particularly substantial.

As explained in further detail in the sections that follow, we incorporate renewable energy production, coal, and other fossil fuel reserves exposure specifically because these are significant sources of complete value chain emissions for not only the companies impacted by these metrics but indirectly for the entire security universe. Our research agenda includes continually evaluating and expanding this targeted approach. We believe this methodology addresses material sector-specific issues that have an impact on aggregated value chain emissions while at the same time maintains a high standard for data quality.

As highlighted in our original work on decarbonisation, carbon intensity is highly skewed with a small number of companies responsible for the vast majority of a portfolio's carbon emission. The skewness of the data is observed not only at an asset level but also when grouped categorically by sector and to a lesser extent, by country.

This highlights a key opportunity of working with carbon data: high skew makes it possible to dramatically reduce carbon emission and reserves characteristics while maintaining low benchmark-relative exposures. The fact that this skewness is observed across multiple dimensions (security-, sector-, industry-, and country-levels) also highlights a key risk associated with naïve approaches to standard decarbonisation: without controlling for the size of active bets made across these dimensions, simply divesting from the largest emitters will lead to large sector, industry and country bets relative to the benchmark. In the methodology section below, we will outline our approach for addressing the issue.

Fossil fuel reserves

We refer to fossil fuel reserve intensity as the potential emissions (CO2e) of a company's fossil fuel reserves relative to total assets. Specifically, it is defined as:

$$\text{Issuer's fossil fuel reserve intensity} = \frac{\text{Fossil fuel reserves (m tonnes of potential } CO_2e)}{\text{Total assets (\$b USD)}}$$

Similar to the weighted average carbon intensity for carbon emissions, we also take the weighted average of the fossil fuel reserve intensity to arrive at a portfolio metric. Potential emissions from fossil fuel reserves is also sourced from MSCI. Whereas carbon emission data is (theoretically) applicable to the entire universe, reserves data only applies to the subset of companies holding reserves implying that reserves data has a theoretical upper limit well below 100% and will be even more concentrated than carbon emission in a few sectors.

Renewable energy data

Following the Paris Climate Agreement, consensus has coalesced around a global warming target of less than 2 degrees Celsius. Achieving this proposal will involve a shift in energy production away from traditional sources of energy such as coal and oil to more renewable sources of energy. The green energy score was developed to help ensure that in the process of reducing exposure to high carbon emitters, utility and energy companies that are investing in renewable technologies are not inadvertently excluded from the portfolio. This type of information is potentially relevant to positioning for the energy transition and goes beyond looking at carbon emission and reserves metrics. Our analysis highlights that some of the companies with the highest carbon emissions also have high green energy scores, making them easily targets for exclusion in standard decarbonisation.

Specifically, the green energy score calculates the percentage of total energy produced from renewable energy sources. Classification of different energy sources is defined in the table below. This score ranges from a maximum score of 1 (entirely renewable energy) to a minimum of 0 (entirely sourced from brown or grey energy).

$$\text{Green energy ratio} = \frac{\text{Green power generation (GWh)}}{\text{Total power generation (GWh)}}$$

This is also calculated as a weighted average for the portfolio. In our process we calculate the green energy score for all applicable companies in the universe and calculate an aggregate score for the universe. In our optimisation process we constrain the final portfolio to have green energy score that is greater than the parent universe score. This additional piece of information allows us to distinguish between two otherwise similar companies, one of which has invested in renewable power generation and is positively exposed to the energy transition. This helps ensure that our Strategy is targeting those firms that are positively exposed to the energy transition.

It is interesting to note that decarbonising a portfolio can, at the same time, reduce exposure to renewables if one does not consider unintended exposures. While this result may be initially unintuitive, it highlights a key point that companies currently involved in energy production are well-positioned and well-incentivised to invest in renewable energy programs and without further considerations, standard decarbonisation has a tendency to underweight these companies. Our goal is to maintain the same aggregate reduction in standard carbon criteria[8] but use renewable energy as another consideration in evaluating which companies to underweight.

Environmental, social, governance (ESG) characteristics

The Strategy also incorporates our aggregate ESG rating, the Material ESG Score.[9] This metric is designed to capture a company's performance on the sustainability issues that are financially material to the company's business. The methodology combines the Materiality Map from the Sustainability Accounting Standards Board (SASB) with underlying ESG data provided from Sustainalytics and MSCI. Our Material ESG Score ranges from 0 to 10, where 0 represents weak performance on a company's material sustainability issues, and 10 represents strong performance.

Unlike carbon data that is highly skewed, ESG ratings across a variety of providers approximate a much more bell-shaped distribution. This is because aggregated ESG scores are based on many characteristics, which are standardised and aggregated, leading to an averaging effect in the overall score. As a result, it is not feasible to achieve improvements at the same magnitude as the carbon objectives without dramatically changing the investment outcomes. For example, while a 50% reduction in carbon intensity generates approximately 30 basis points (bps) of tracking error, it takes only a 3% improvement in ESG rating to incur 30bps of tracking error. In our portfolio construction process, we look to achieve an aggregate ESG profile that is higher than the underlying universe and calibrate targets so to take similar amounts of active risk, rather than similar targets.

It would be reasonable to guess that a dramatic reduction in reserves and relative carbon emission would result in an upward bias in the environment sleeve and, ultimately, the aggregate ESG score of a portfolio, rendering this constraint redundant. However, our analysis of the data showed this is rarely the case. Low carbon strategies have a natural tendency to overweight companies in sectors that are less carbon-intensive, such as financials and technology. These sectors have their own ESG risks that are not well

[8] See "Portfolio Carbon. Measuring, disclosing and managing the carbon intensity of investments and investment portfolios. UNEP Finance Initiative - Investor Briefing. 2013".
[9] See "Materiality Matters: Targeting the ESG issues that can impact performance – the material ESG score". Russell Investments Research. Bennett, S. & Steinbarth, E. (February 2018).

measured by the carbon characteristics. Our goal with the inclusion of this more industry-relevant ESG metric is to identify that when we overweight companies in a low carbon strategy, we are doing so in an informed way, and not inadvertently loading up on other sustainability risks.

In addition to providing this industry-specific materiality lens, the ESG score is also additive in that it gives insight into practices and a means to focus on forward-looking indicators, rather than the carbon metrics which are historical outcomes. We strive to strike a balance between the inclusion of forward-looking information such as company targets and momentum in indicators, while still maintaining high standards for data quality. For more details on the Material ESG methodology please refer to our Materiality Matters research papers.

Coal exclusions

In addition to the criteria outlined above which are used to tilt the portfolio, our enhanced decarbonisation strategy also includes a coal exclusion.

Coal usage is already declining in its share of energy mix and projections extend this decline even more precipitously. In the U.S., coal production is projected to decline by 26% between 2015 and 2040. Beyond the economic rationale, there is also a recognition that coal contributes disproportionately to climate change. While exclusions are black and white in terms of outcome names on the list are simply not held – defining what constitutes involvement is less black and white. We start by defining coal companies as companies with more than 10% of their revenue derived from mining thermal coal and coal power generation.

Next, we also consider forward-looking information about a company's overall positioning for an energy transition. Specifically, companies who produce a significant share of their power generation from renewable sources may be exempt from the exclusion list and companies who have made public commitments to divest from their coal-related activities and have made net zero emission targets which are deemed to be credible may also be exempt. We find that these additional forward-looking considerations, while more time consuming to produce, are critical aspects of identifying which companies in the very high-stakes utility sector are actively seeking to facilitate the transition to a low carbon economy.

Methodology

The Strategy we have developed builds directly on insights gained from our previous research on decarbonisation strategies and existing client mandates. Specifically, we have previously argued and continue to maintain that an active share minimisation approach is more relevant than the standard decarbonisation alternatives[10] in that it allows us to meet multiple objectives while maintaining benchmark-like returns without introducing a risk model or covariance matrix.

For decarbonisation and ESG related strategies, we believe that it is extremely important to have a direct relationship between a company's exposure and the subsequent weight in the portfolio. The use of a risk model can compromise this direct relationship and provide unintuitive positions at the company level. To avoid the pitfalls of using a risk model we have focused on maximising the commonality (minimising active share) of the Strategy.[11]

The portfolio construction process begins with the parent benchmark or underlying strategy as the starting universe for our optimisation process. The optimisation methodology and objective function are the same regardless of whether the starting universe is a market-cap weighted benchmark, a smart beta strategy or another active strategy.

Our optimisation process solves for the combination of securities that achieves the aggregate carbon emission, carbon reserves, green energy score and ESG profile targets with the minimum amount of active share and transaction costs. We employ several risk-related constraints including maximum asset, country, sector and industry deviations. Unlike the objective function, carbon and ESG criteria, the portfolio risk constraints will differ depending on the starting universe. Typically for narrower and more concentrated universes, we will utilise broader risk constraints and for broader and more diversified universes, we will utilise narrower constraints.

[10] "The Russell Investments Decarbonisation Strategy: Investigating different approaches to reducing the carbon emission of an equity portfolio without materially impacting performance", (Smith, Bennett, Velvadapu 2016).
[11] See Appendix A for a further discussion of active share or our earlier research for an analysis of its benefits relative to other decarbonisation methodologies.

Results

We evaluate the Strategy on the basis of its ability to meet the carbon and ESG objectives while maintaining low levels of active risk relative to the underlying portfolio. These results are summarised in the table below, using the MSCI World Index as our starting point, for the testing period of 31 August 2009 to 30 June 2020. Throughout this paper, results refer to a backtested simulation of the described strategy over the testing period.

Objectives versus results:

FACTOR	OBJECTIVE	RESULTS VS MSCI WORLD
Carbon emissions	50% reduction	Average carbon emission reduction of 55%
Carbon reserves	50% reduction	Average carbon reserves reduction of 54%
Active risk	Less than 1%	Annualised tracking error over the period was 0.47%
Coal related exclusions	Zero holding of companies with significant involvement in coal	No holdings of excluded stocks
Energy transition	Positive exposure	Green energy power generation is 106% higher than MSCI World
ESG	Greater than benchmark	Average Material ESG Score improvement of 3% (5.6 vs 5.4)

Source: Russell Investments. Simulated past performance data is presented for illustrative purposes only and is not necessarily a guide to future performance.

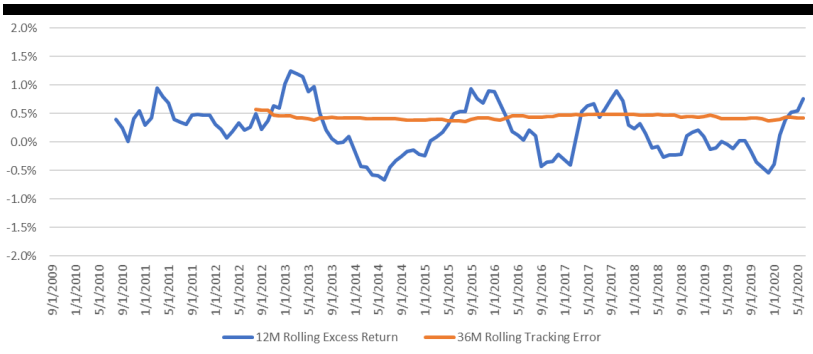
Over the period the Strategy displayed low levels of active risk with tracking error well below 1%. Given a goal of replicating the return profile of the underlying strategy, we do not have excess return expectations for the Strategy. During the period Sept 2009 – June 2020, the annualised return was higher than the benchmark, largely due to small underweights to the energy sector, which underperformed during this period. Despite the outperformance observed during this period, we do not hold a return expectation or target for this Strategy.

Active return and active risk

As stated previously, an objective of the Strategy is to offer a return profile similar to the underlying benchmark and so here we report the rolling one-year active return of the Strategy, or the difference between the benchmark and the actual return. The Strategy is effective in matching the return pattern of the underlying portfolio.

Unlike other optimised decarbonisation solutions, our Strategy explicitly minimises active share rather than tracking error. An implication of this approach is that realised tracking error does not systematically overshoot predicted tracking error, the active share targeting is successful in keeping tracking error within the range of a tracking error optimisation even though it is not explicitly targeted.

Rolling active return (12 months) and active risk (36 months) of Decarbonisation 2.0 Strategy vs. MSCI World Index



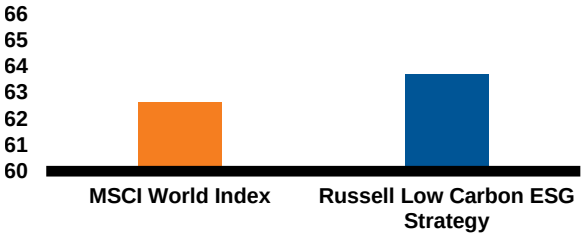
Source: Russell Investments, MSCI as at 30 June 2020. Simulated past performance data is presented for illustrative purposes only and is not necessarily a guide to future performance.

Sustainability results summary

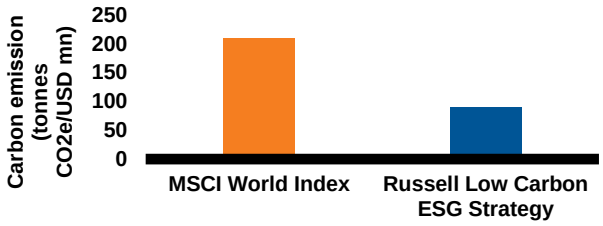
In addition to meeting risk and return objectives, the Strategy is also successful in consistently improving the aggregate ESG score, carbon emission, reserves and green energy exposure to the targeted levels. Below we report the average ESG outcomes of the low carbon ESG Strategy relative to benchmark through the testing period.

Carbon and ESG outcomes

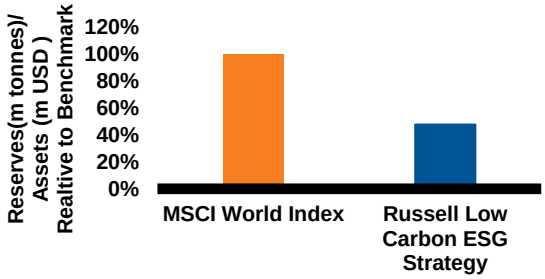
ESG Score



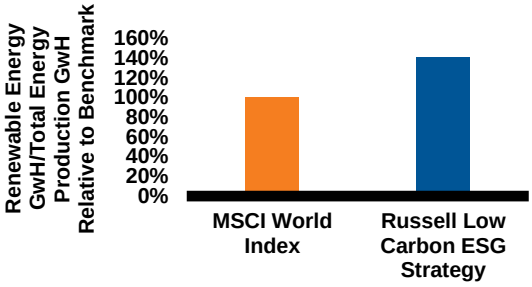
Carbon emission



Fossil fuel reserves



Green energy ratio



Source: Russell Investments, MSCI, Sustainalytics, average over testing period of September 2009 - June 2020. Simulated past performance data is presented for illustrative purposes only and is not necessarily a guide to future performance.

Conclusion

As outlined in the Montreal Pledge and the Portfolio Decarbonisation Coalition, the decarbonisation initiative looks to "mobilise a critical mass of institutional investors committed to gradually decarbonising their portfolios" in the 'financial economy' that will help facilitate and incentivise decarbonisation of the 'real economy'.[12] [13] To this end, we argue that decarbonisation portfolios can and should go beyond just carbon reduction to incorporate a broader sustainable development, including exposure to renewable sources of energy and responsible business practices in support of a more sustainable 'real economy'. Further, we seek to enable investors to meet goals of positively positioning their portfolios to the potential effects of the energy transition without changing their investment objectives.

Developing solutions to incorporate climate change into a portfolio is an area that will continue to develop and evolve. We maintain an active research agenda on these topics with the goal of continuously fine-tuning our knowledge base and evolving our approach. Since first releasing our research on decarbonisation, we

[12] "Portfolio Carbon. Measuring, disclosing and managing the carbon intensity of investments and investment portfolios." UNEP Finance Initiative Investor Briefing. (2013).
[13] "The Portfolio Decarbonisation Coalition, Mobilising financial markets to catalyse economic decarbonisation". UNEP Finance Initiative. (2014).

introduced our new Material ESG score[14] and investigated the efficacy of adding broader criteria for resource efficiency such as water intensity metrics.[15]

In addition to ongoing research, there is also an ongoing evolution in industry practices and frameworks. Most recently, these have included the EU Climate Benchmarks and the IIGCC's Net Zero Investment Framework. Both of these frameworks highlight the need to reduce carbon emissions while simultaneously staying invested in high stakes sectors, and in particular increasing investment in climate change solutions. We look forward to the opportunity to enhance our alignment to these frameworks as the data develops.

As data quality improves and new concepts and challenges arise, we believe that these strategies will need to evolve and adapt accordingly. Russell Investments is committed to enhancing our approach in line with these developments and actively engaging the investment community in this area. While we have conviction that our Decarbonisation 2.0 approach has taken us further, we are cognisant that as data availability continues to evolve, we will undoubtedly be able to do better. This commitment to research and strategy evolution is at the heart of our approach to sustainable investing for the energy transition.

Appendix A: Active risk

Tracking error is a measure that we utilise for monitoring the portfolio, but it is not explicitly targeted in the optimisation. There are a number of reasons why we do not target tracking error as our measure of active risk in the optimisation process.

By incorporating a "minimise active risk" objective it would introduce an additional dimension to the portfolio which is the co-variance matrix of the risk model. Thus, differences in individual security weights are driven not just by CO2 emissions but also by their covariance. This can result in two securities with the same CO2 emissions having opposing active positions (i.e. same carbon emission but directionally different positions). For example, we often see risk model based optimisations with solutions that have large underweights across the energy sector (e.g. Shell, Total and Chevron etc.) and a single large offsetting position in one energy company (e.g. Exxon Mobil). These positions are driven primarily by the stocks' co-variance driven by their return and risk characteristics as opposed to their carbon emissions; we don't believe that a strategy that holds a large position in ExxonMobil (for example) is the desired intent of a decarbonisation Strategy.

The underlying risk models that provide the co-variance matrix and subsequent tracking error can be very unstable over time. This can lead to dramatic changes in the portfolio despite no changes in the underlying carbon emission characteristic.

As this Strategy explicitly targets a low carbon emission, to the degree that this factor is uncorrelated with other risk model factors, the risk model treats the reduction in aggregate carbon emission as risk-free. This can result in the under-prediction of tracking error and is referred to as the alignment problem in Ceria, Saxena and Stubbs (2012).

We control tracking error (active risk) by ensuring that we have the highest possible commonality with the underlying benchmark (i.e. lowest possible active share). We further minimise the tracking error through conservative asset, sector, industry and country constraints. These pragmatic constraints help confirm that the Strategy delivers consistently low tracking error and that our forecasted tracking error is very close to the realised tracking error.

[14] Bennett, S. & Steinbarth, E. (February 2018). Materiality Matters: Targeting the ESG issues that can impact performance – the material ESG score. Russell Investments Research.
[15] Steinbarth, E. (May 2019). From black to blue: Moving the climate focus beyond carbon and on to water. Russell Investments Research.

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