

# Sustainability in the UK

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## Overview

Natural resources companies are prominent constituents of the FTSE UK Index, resulting in a relatively high carbon emissions and carbon reserves intensity score for the index. At the same time, the UK index has a fairly high ESG rating overall, with very few stocks averaging a higher ESG rating and low carbon emissions intensity at the same time. This feature of the UK market creates a challenge for investors looking to construct benchmarks that have a high ESG rating, and a low carbon reserves and carbon emissions intensity. There is a solution, however. In this paper, we investigate how to resolve this conundrum for the FTSE UK Index and find:

- Stocks with higher ESG scores *and* lower carbon emission intensities are only limited and concentrated in relatively few industries.
- Therefore, to achieve carbon emission and reserve intensity reduction and improvement in ESG score, an SI index would need its industrial weights to deviate from those of the underlying market capitalization benchmark.
- We apply a simple construction methodology that simultaneously tilts away from carbon intensive stocks towards stocks with higher ESG ratings. The maximum deviations are constrained to limit the tracking error with the FTSE UK Index benchmark.

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# 1.Introduction

The UK market presents an interesting challenge for the construction of SI indexes. It is a market in which many of the most carbon intensive stocks are concentrated in just a few industrial groups. As a result, this concentration makes it difficult to balance the dual goals of significantly reducing index level carbon intensity, and controlling the deviation of the industrial make-up from the underlying benchmark index. When an improvement of aggregate ESG rating is required, the analysis shows that the aggregate ESG rating of the underlying benchmark is already high, making it difficult to obtain further significant gains, without increasing the concentration in high scoring stocks.

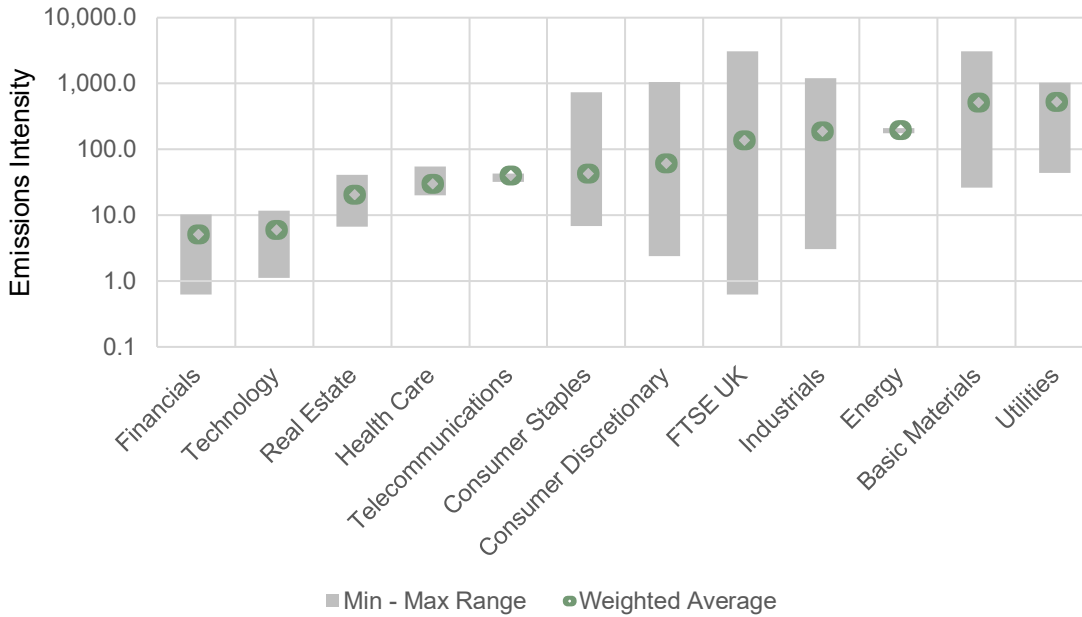
Furthermore, when both carbon intensity reduction and an aggregate ESG uplift are required at the same time, we find that there are very few stocks that have both high ESG scores and a low carbon emission intensity, and moreover, they are concentrated in a handful of sectors. Therefore, the construction of an index which delivers both carbon intensity reduction and significant ESG uplifts, while controlling for industrial weights and individual stock concentration risk, is not straightforward. In this paper, we investigate how to resolve this conundrum for the FTSE UK Index universe of stocks.

In Section 2, we look at the industrial distribution of carbon emissions and carbon reserves in the benchmark FTSE UK Index. In Section 3, we examine the industrial breakdown of ESG ratings and calculate the aggregate level for the benchmark. We then demonstrate how carbon emission intensity correlates with ESG scores at the stock and industrial levels in Section 4. In Section 5, we present an SI index that solves the problem of the ESG and carbon emissions and reserve intensity entanglement that is present in the UK market. In Section 6, we draw our conclusions.

## 2. Carbon Emission and Reserve Intensities

First, we look at which industry produces the highest levels of carbon emission intensity. In Figure 1, we show the weighted average carbon emission intensity, and the range over which it varies, for each industrial group in the FTSE UK Index in September 2020 (see the Appendix for definition of emission intensity). (Note the log scale of the vertical axis, so that the apparent gentle increase in emission intensity for the industries moving left to right is actually exponentially steep.) It turns out that, on a weighted-average basis, Energy is not the most carbon emission intensive sector in the UK. Basic Materials and Utilities have higher weighted average emission intensities, and some stocks in Consumer Discretionary, Consumer Staples and Industrials have a higher carbon emission intensity, than the weighted average for the Energy industry.

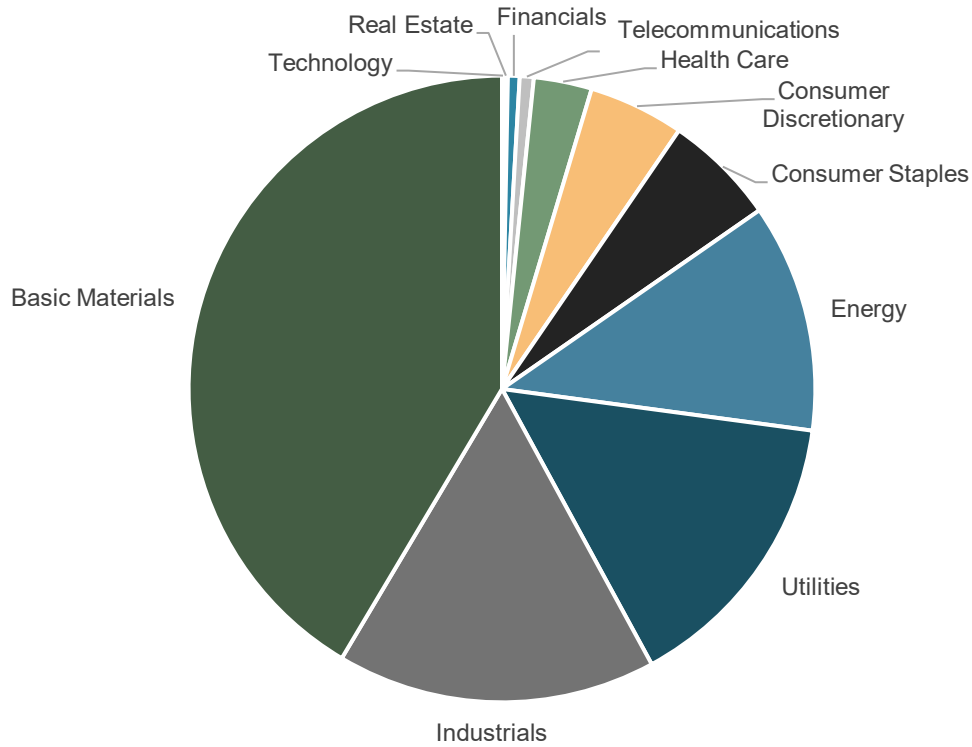
**Figure 1: Carbon Emissions Intensity of FTSE UK and Industry components: minimum, maximum and weighted average.**



Sources: FTSE Russell & Trucost. Data based on the FTSE UK Index Universe for September 2020. Please see the end for important legal disclosures.

However, Basic Materials is the largest contributor to carbon emission intensity in the FTSE UK Index, as per Figure 2. While it may look surprising that the Basic Materials industry is more carbon emission intensive than the Energy industry, a closer look at the cost structure and revenues makes it apparent that it produces less carbon emissions in the process per unit of sales. Although energy companies extract oil and gas, basic materials companies use far more energy (and hence produce high levels of carbon emissions) in the production of building materials like cement and metal mining, smelting and refining.

**Figure 2: Industrial breakdown of Carbon Emission Intensity contributions to FTSE UK Index.**



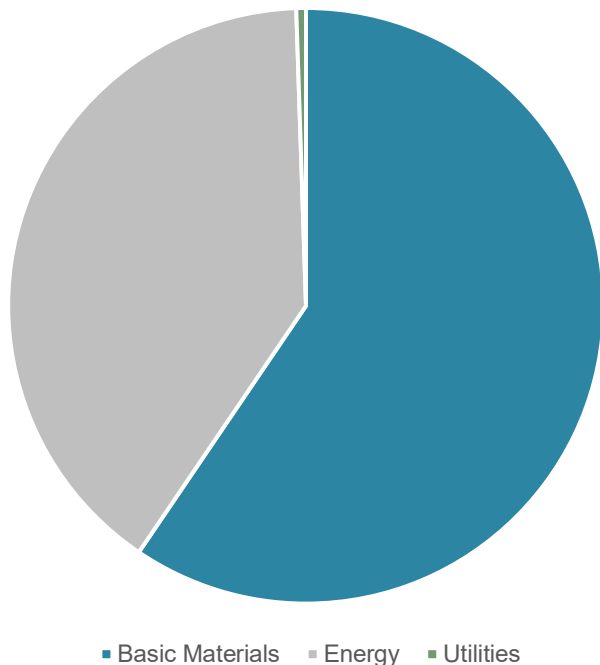
Sources: FTSE Russell & Trucost. Data based on the FTSE UK Index Universe for September 2020. Please see the end for important legal disclosures.

Therefore, to create an index with a lower emission intensity than the FTSE UK Index benchmark, we would expect it to be underweight Utilities, Basic Materials, Energy and Industrials, and overweight Financials, Technology, Real Estate, Consumer Staples, Consumer Discretionary, Health Care and Telecommunications.

## Reserve intensity

There are only three sectors with companies with carbon reserves. Figure 3 shows that carbon reserve intensity is concentrated in Basic Materials and Energy, with a small fraction in Utilities (see Appendix for the definition of reserve intensity). Again, Basic Materials is the largest contributor to the carbon reserve intensity of the FTSE UK Index, primarily due to the highly carbon intensive reserves of coal held by mining companies.

Figure 3: Industry breakdown of Carbon Reserve Intensity contributions to FTSE UK Index.



Sources: FTSE Russell & Trucost. Data based on the FTSE UK Index Universe for September 2020. Please see the end for important legal disclosures.

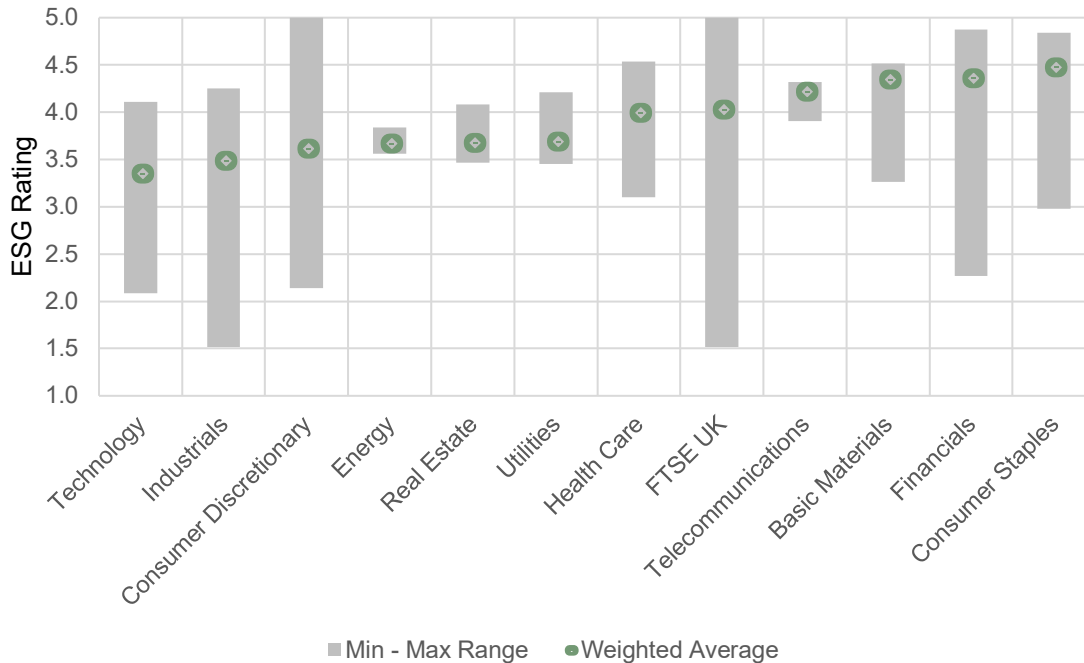
To decrease the reserve intensity, we would therefore need to reduce the weights of stocks in Basic Materials, Energy and Utilities.

Finally, when both emission and reserves intensity reductions are required simultaneously, it would seem that both Basic Materials and Energy would be most at risk of severe underweighting since they score poorly on both of these measures. However, it is worth cautioning that a simple over and underweighting of industrial groups would need to be limited, if tracking error is a concern.

### 3. ESG Ratings

Similarly, we analyzed, FTSE UK index constituents' ESG ratings in sector context. In Figure 4, we display the weighted average ESG Ratings, and the range over which they vary, for each industrial group in the FTSE UK Index in September 2020 (see [2] for ESG rating definitions). The chart produces interesting, if not surprising, insights. Technology and Industrials have the lowest weighted average ESG scores, while Consumer Staples, Financials and Basic Materials have the highest weighted average ESG scores. For Telecommunications and Basic Materials, the weighted average ESG score is already near its maximum within the industry (which implies that higher capitalization stocks have higher rating). Note also that the maximum possible rating is five.

**Figure 4: ESG ratings of FTSE UK and Industry components: minimum, maximum and weighted average.**



Source: FTSE Russell. Data based on the FTSE UK Index Universe from September 2014 to June 2021. Please see the end for important legal disclosures.

Therefore, to create an index that achieves an uplift in its weighted average ESG score, compared to the FTSE UK Index benchmark, Consumer Staples, Financials, Basic Materials and Telecommunication industries would need to be overweighted. Note that, since the weighted average for the FTSE UK Index benchmark is already about four (out of a maximum of five), even modest ESG uplifts will be difficult to obtain without taking reasonably large overweight positions in these industries.

It is clear that a potential problem arises to construct an index that provides both an aggregate ESG uplift and reduces the carbon intensity relative to the UK benchmark. While the Basic Materials industrial group has a high ESG rating, we have seen in the previous section that the industry is also highly polluting. We will examine this apparent contradiction in the next section.

## 4. ESG Ratings and Emissions Intensity

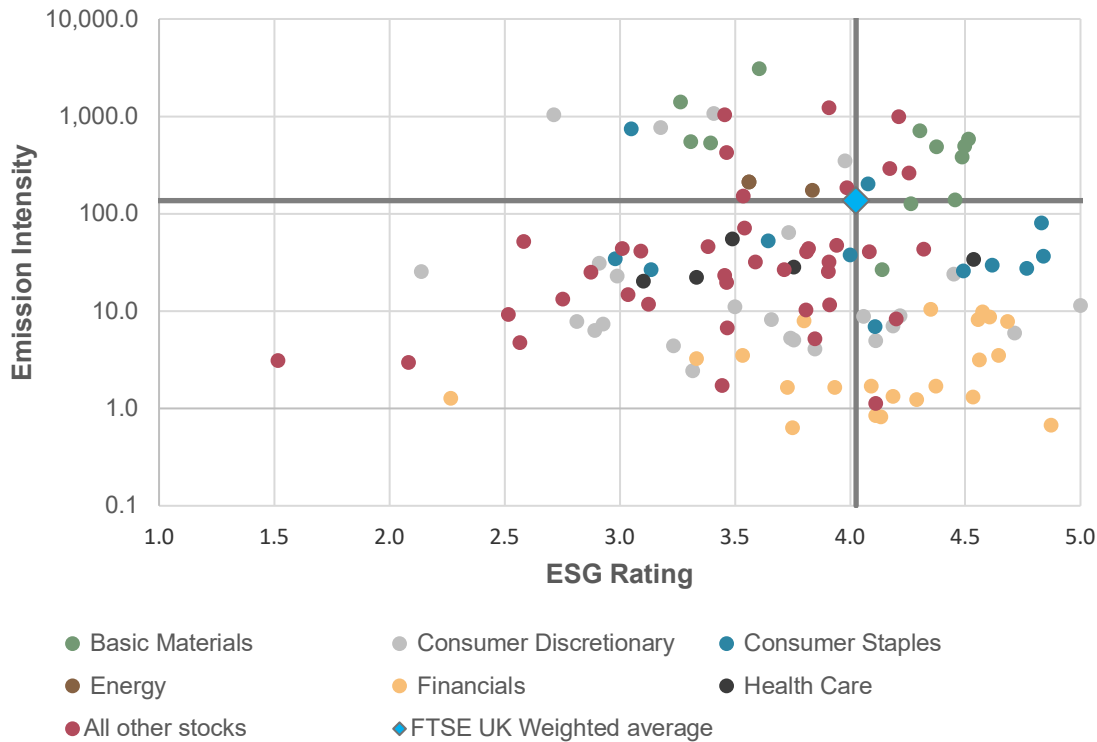
It is apparent that to achieve a simultaneous increase in ESG score and carbon emission reduction is even more challenging than achieving each target on its own. Furthermore, from Sections 2 and 3, it follows that it would not be possible to achieve this goal without allowing for a deviation in industrial weights. Figure 5 highlights this situation via a scatterplot of ESG verses Emission Intensity for all the stocks in the FTSE UK Index universe. We have also plotted a point representing the aggregate weighted average ESG and Emission Intensity for the FTSE UK Index universe as a whole and use it to divide the plot into quadrants.

We first notice that only 45, out of a total of 118 stocks, have ESG ratings above the FTSE UK Index weighted average of 4.03. On the other hand, 91 out of 118 have Emission Intensities less than the FTSE UK Index Weighted Average Carbon Intensity (WACI) of 136.26. It is therefore

clear that the opportunity set for increasing the ESG score is much smaller than that for decreasing the Emission Intensity.

To create an index that increases the aggregate ESG ratings and decreases the WACI relative to the benchmark, we would expect to increase the aggregate weighting of the 35 stocks in the bottom right quadrant, and reduce the aggregate weight of the 16 stocks in the top left. As for the other two quadrants, where scores are a mixture of good and bad, we expect that since higher than average ESG scores are relatively rare, the aggregate weight of the top right quadrant's 10 stocks to be increased, while the aggregate weight of the 57 stocks in the bottom left quadrant should be either near neutral or slightly underweighted.

**Figure 5: Emission Intensity versus ESG Scores for the FTSE UK Index constituents.**



Sources: FTSE Russell & Trucost. Data based on the FTSE UK Index Universe for September 2020. Please see the end for important legal disclosures.

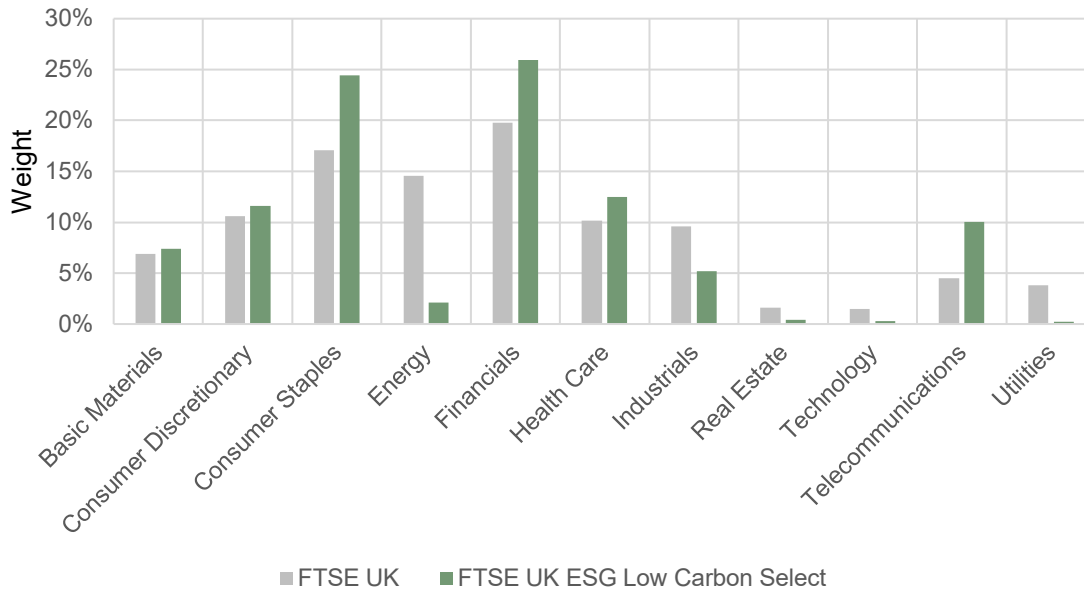
## 5. UK ESG & Low Carbon Index

In this section, we present the FTSE UK ESG Low Carbon Select Index that sets out to provide significant reductions in emission and reserve intensities, along with improvement in the aggregate ESG rating relative to the FTSE UK Index benchmark. As pointed out in the previous sections, this is potentially challenging for portfolio construction because of the way that carbon intensive and high ESG-rated stocks interact with each other and the industrial groupings in the UK universe. The target exposure is a transparent methodology, which weights each stock by tilting away from heavily polluting stocks and towards higher ESG rated stocks, while controlling for industrial weightings. It is also possible to control the weight concentration in individual stocks by applying a maximum stock weight of 10%, and maximum capacity ratio of 10 (see [1, 4, 5] for more details).



Figure 6 shows the quarterly time averaged industry weightings for the FTSE UK Index and the FTSE UK ESG Low Carbon Select Index between September 2014 and June 2021. Note that all Industrial groups have similar weightings to the benchmark, with the exception of Energy. We allow significant underweighting of Energy to aid in our ability to hit our low carbon, and high ESG targets. As we have seen earlier, this is because Energy uniquely includes stocks that are high in carbon emission *and* reserve intensive, as well as have relatively low ESG ratings.

**Figure 6: Average Sector Weights of FTSE UK ESG Low Carbon Select index versus FTSE UK index**

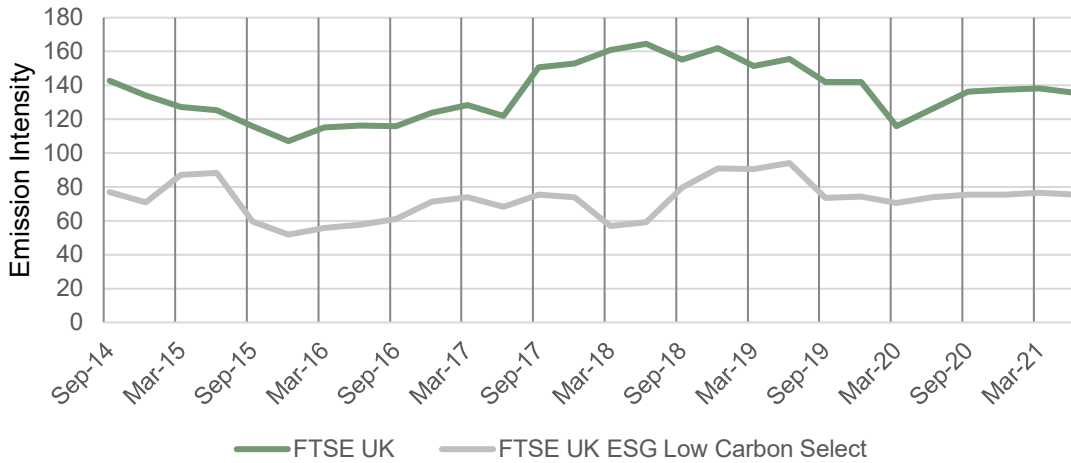


Source: FTSE Russell. Data based on the FTSE UK Index Universe from September 2014 to June 2021. Please see the end for important legal disclosures.

Naturally then, Energy, Utilities and Industrials are underweighted to achieve the carbon reduction. To achieve the ESG uplift, Telecommunications, Financials and Consumer Staples sectors are overweighted. Basic Materials has a slight overweight exposure since its poor carbon intensity scores are more than compensated for by its superior ESG ratings.

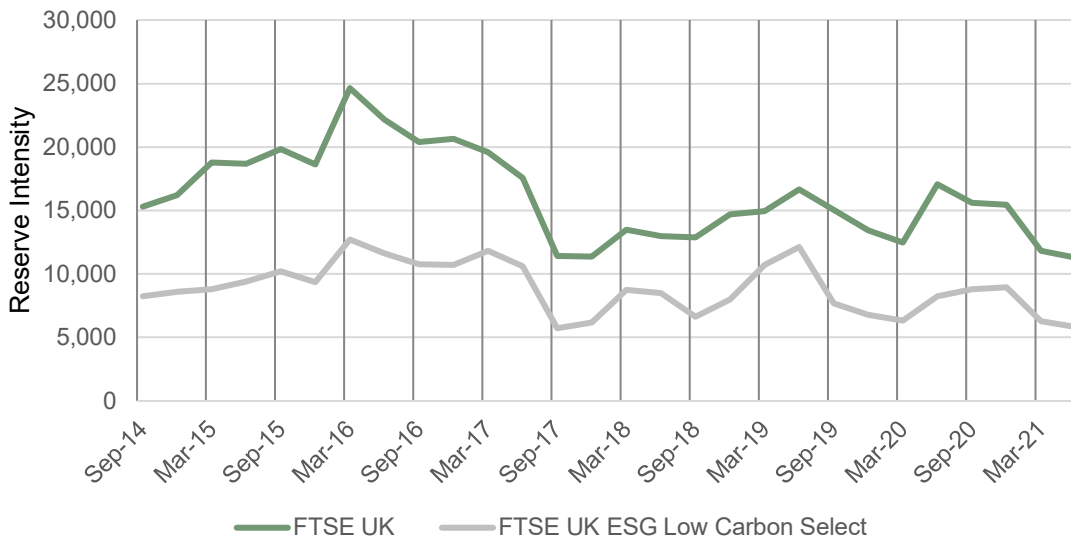
Figure 7 shows the improvement in the Weighted Average Carbon Emission Intensity through time for the FTSE UK ESG Low Carbon Select Index compared to the FTSE UK Index benchmark. Figure 8 shows the corresponding improvement in Carbon Reserve intensity. (See the Appendix for definitions of emission and reserve intensities.)

**Figure 7: Weighted Average Carbon Emissions Intensity: FTSE UK and FTSE UK ESG Low Carbon Select indices**



Sources: FTSE Russell & Trucost. Data based on the FTSE UK Index Universe from September 2014 to June 2021. Please see the end for important legal disclosures.

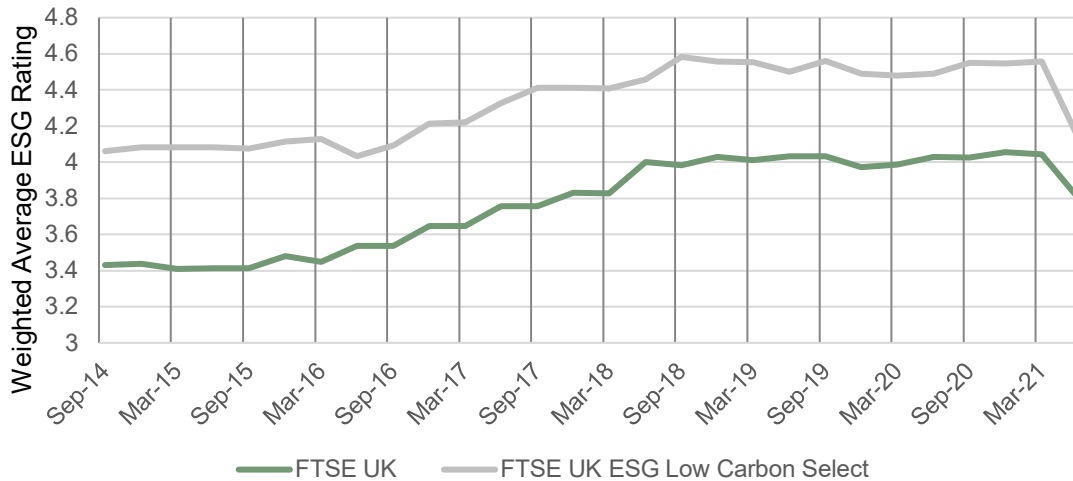
**Figure 8: Weighted Average Carbon Reserves Intensity: FTSE UK and FTSE UK ESG Low Carbon Select indices**



Sources: FTSE Russell & Trucost. Data based on the FTSE UK Index Universe from September 2014 to June 2021. Please see the end for important legal disclosures.

Figure 9 shows the improvement in the aggregate ESG ratings. Of note is the general trend of increase in the underlying aggregate ESG Rating through time. This means that in the past, an uplift of roughly 20% was possible, but recently an uplift of about 10% is more typical.

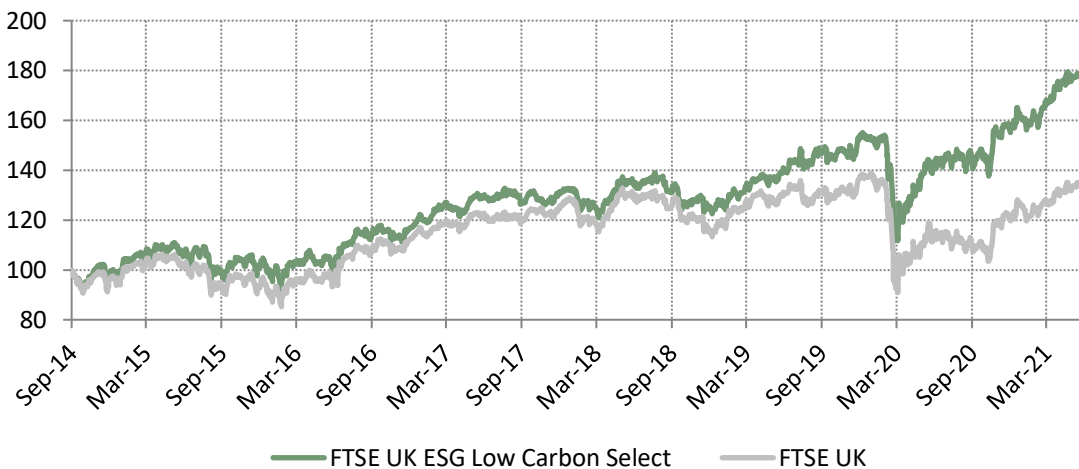
**Figure 9: Weighted Average ESG Ratings: FTSE UK and FTSE UK ESG Low Carbon Select indices**



Source: FTSE Russell. Data based on the FTSE UK Index Universe from September 2014 to June 2021. Please see the end for important legal disclosures.

Although the index was not designed to target improved performance relative to the underlying benchmark, figure 10 shows it has outperformed in excess of 30% in the last two years.

**Figure 10: Performance of FTSE UK and FTSE UK ESG Low Carbon Select indices.**



Source: FTSE Russell. Data based on the FTSE UK Index Universe from September 2014 to June 2021. Performance shown for the SI Index is hypothetical and for illustrative purposes only. Past performance is no guarantee of future results. Please see the end for important legal disclosures.

There could be several explanations for this. One is the wider investor awareness about sustainable investment resulting in a switch to higher ESG-rated stocks and lower carbon emissions stocks. Another could be the COVID crisis. Although challenging for many people, the crisis had a silver lining in a decreased mobility, lower demand for oil, and hence decreased demand for carbon intensive stocks.

Finally, Table 1 details the index characteristics of simulated FTSE UK ESG Low Carbon Select index. All performance figures are annualised total return and measured in GBP. Implementation and diversification measures and SI characteristics are averaged on a monthly basis. For detailed definitions of these quantities see the Appendix and references [2] and [3].

**Table 1: Summary Statistics: FTSE UK and FTSE UK ESG Low Carbon Select indices.**

	FTSE UK Index	FTSE ESG Low Carbon Select Index
<b>Performance</b>		
Geometric Mean (%)	4.25	8.48
Volatility (%)	16.68	15.75
Sharpe Ratio	0.25	0.54
DD (%)	-34.48	-28.03
Excess (%)		4.06
Tracking Error (%)		4.94
Information Ratio		0.82
Beta		0.90
<b>Implementation</b>		
Two Way Turnover (%)		33.09
Capacity (%)	100.00	25.6
Active Share (%)	0.00	43.2
<b>Diversification</b>		
Number of Stocks	132	63
Effective N	42	17
Top Ten Weight (%)	40.3	70.2
<b>SI Characteristics</b>		
Reserves Reduction (%)		45.2
Emissions Reduction (%)		46.4
ESG Ratings Uplift (%)		14.8

Sources: FTSE Russell & Trucost. Data based on the FTSE UK Index Universe from September 2014 to June 2021. Performance shown for the SI Index is hypothetical and for illustrative purposes only. Past performance is no guarantee of future results. Please see the end for important legal disclosures.

We would like to comment on the relatively high tracking error of about 5% per annum. This is due in part to the deliberate choice of allowing a large underweight in the Energy industry. A lower tracking error solution could be obtained by imposing tighter constraints on Energy active weights. This would, however, result in lower reductions in carbon emissions and reserves intensities, and a smaller improvement in aggregate ESG rating.

## 6. Conclusion

We have looked at the challenge of constructing a UK index with a higher aggregate ESG score and reduced carbon intensity relative to the FTSE UK Index benchmark.

It appears that in the UK, stocks with higher ESG scores *and* lower carbon emission intensities are limited and concentrated in relatively few industries. This means that to achieve carbon emission and reserve intensity reduction and improvement in ESG score, an SI index would need its industrial weights to deviate from those of the underlying market capitalization benchmark.

To produce such a SI index, we applied a simple construction methodology that simultaneously tilts away from carbon intensive stocks towards stocks with higher ESG ratings. Although this does result in significant active industry weights, particularly in the Energy industry, the maximum deviations are constrained to limit the tracking error with the FTSE UK Index benchmark. Tighter constraints could be applied to further limit the tracking error but only at the expense of smaller SI improvements.

# Appendix

This Appendix contains the definitions for the implementation, diversification and carbon metrics used in this document.

## Diversification

To assess the degree of diversification in portfolio, we define Effective N of a portfolio as the inverse of the Herfindahl measure of concentration:

$$\text{Effective N} = 1/(W \cdot W) = 1 / \sum_{i=1}^N W_i^2 \quad (1)$$

Effective N attains its maximum under an equal weighting scheme when it is equal to the actual number of stocks. Hence, Effective N can be seen as a measure of “how far” a given portfolio is from this maximally diversified portfolio.

## Active share

The active share is defined as half the sum of the absolute weight differences of two portfolios:

$$\text{Active Share} = \frac{1}{2} \sum_{i=1}^N |W_i - \widehat{W}_i| \quad (2)$$

where  $W$  and  $\widehat{W}$  are two sets of portfolio weights.

## Capacity

Portfolio capacity is defined as the reciprocal of the weighted sum of stock capacity ratios:

$$\text{Capacity} = 1 / \left[ \sum_{i=1}^N W_i * \frac{W_i}{W_{M,i}} \right] \quad (3)$$

where  $W_{M,i}$  are the market capitalization weights. This yields a number between 0% and 100% and reflects the ease of investment relative to a market capitalization weighting (100%) scheme.

## Weighted Average Carbon Intensity (WACI)

The Weighted Average Carbon Intensity is defined by:

$$\text{WACI} = \sum_{i=1}^N W_i * \frac{\text{Emissions}_i}{\text{Revenue}_i} \quad (4)$$

where, for the  $i^{\text{th}}$  stock,  $W_i$  is the portfolio weight,  $\text{Emissions}_i$  is the annual value of operational carbon emissions in metric tons of CO2 and  $\text{Revenue}_i$  is the annual sales in millions of USD.

## Reserve Intensity

The Reserve Intensity is defined by:

$$\begin{aligned} \text{Reserve Intensity} \\ = \sum_{i=1}^N W_i * \frac{\text{Reserves}_i}{\text{MCAP}_i} \end{aligned} \quad (5)$$

where, for the  $i^{\text{th}}$  stock,  $W_i$  is the portfolio weight,  $\text{Reserves}_i$  is the estimated value of carbon reserves measured in equivalent metric tons of CO2 and  $\text{MCAP}_i$  is the full market capitalization of the company.

## References

[1] FTSE Global Factor Index Series Ground Rules, FTSE Russell, April 2020.

[2] FTSE ESG Index Series Ground Rules, FTSE Russell, April 2020.

[3] FTSE Global Climate Index Series Ground Rules, FTSE Russell, April 2020.

[4] “Target Exposure: Investment applications and solutions,” FTSE Russell, February 2020.

[5] [Targeted Sustainability](#), FTSE Russell Research, 2020.



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