October 2015

Schroders

Understanding portfolio carbon footprinting – an introduction

Rick Stathers - Head of Responsible Investment

Schroders

CONTENTS

INTRODUCTION

There is now a growing recognition that climate change as it stands will have a negative impact not only on the environment and society but also on economic growth and asset value.

In order to minimise these impacts, global warming needs to be kept to within 2°C (if not lower) of pre-industrial temperatures. Achieving this ambition means reducing greenhouse gas (GHG) emissions and rapidly decarbonising the global economy. This was recognised in the most recent G7 Leaders' declaration that said:

"…we emphasize that deep cuts in global greenhouse gas emissions are required with a decarbonisation of the global economy over the course of this century."[1]

At the investor level, portfolio carbon footprinting has emerged as a potential tool to understand a portfolio's carbon exposure and to deliver solutions that will facilitate decarbonisation.

Portfolio carbon footprinting has gained increasing visibility over the last few years. 2014 saw the launch of the Montreal Carbon Pledge, which requires signatories to commit to measuring and publicly disclosing the carbon footprint of their portfolios on an annual basis. In 2015 the French Government introduced legislation which requires French institutional investors to report on how environmental, social and governance (ESG) criteria are taken into consideration in their investment decision making process.

This law explicitly requires a consideration of climate change and GHG emissions through the following wording:

- "risk induced by climate change, including greenhouse gas emissions associated with assets owned;
- the contribution to the international goal of limiting climate change;
- and the contribution to the realisation of the ecological and energy transition"[2]

In this report we will review:

- The drivers for why investors may wish to undertake portfolio carbon footprinting
- Challenges with the current level and quality of GHG emissions disclosure
- How we believe this type of reporting may evolve in the future.

1 G7 leaders declaration, Schloss Elmau, Germany, June 8, 2015.
2 Degrees Investing, translation of Article 48 of the French energy Transition Law.

WHY UNDERTAKE CARBON FOOTPRINTING?

There are arguably two principal reasons for undertaking carbon footprinting:

1. To understand the impact on investment of climate change (i.e. what is the portfolio exposure to carbon regulation)

2. To understand the investment impact of a portfolio on climate change (i.e. does a portfolio reduce its carbon footprint over time, is it a low-carbon portfolio or does it invest in low-carbon solutions).

Identifying carbon risk in the portfolio

Whilst the world's governments have recognised the need to keep global temperature increases below 2°C at the 2009 Copenhagen UN Climate Change Conference, the political commitment to reduce emissions at the required rate is lacking:

– There is consensus that the national emission targets put forward ahead of the December 2015 Paris UN Climate Change Conference will be insufficient to put the global economy on a 2°C path.

– Currently only 12% of GHG emissions are covered under some form of emissions trading scheme or carbon tax[3] (though the carbon price in most remains inadequate).

However, climate change related legislation around the world rose from less than 40 acts in 1997 to almost 500 acts in 2013[4] demonstrating there is growing momentum to tackle climate change.

The continued growth in climate change regulation demonstrates political willingness to address the issue. We expect that in time the proportion of global emissions covered by a carbon pricing scheme would increase and that the price of carbon would also increase (in order to stimulate a shift to more carbon efficient practices). This would imply that, though carbon risk may be low today, it is something that will continue to develop and it is therefore prudent to understand where exposure to this risk in a portfolio occurs and to manage it.

Aligning the portfolio strategy with a 2°C pathway

Measurement of climate change risk is one outcome, but investors may also want to use the carbon footprinting analysis to inform an investment strategy that will facilitate a 2°C future. This can be achieved either through the allocation of capital to companies whose emissions intensity align with that future, or by being active stewards of the companies in which they invest and encouraging the adoption of science based targets.

[3] "State and trends of carbon pricing" World Bank Group, May 2014.
[4] "Climate Legislation Study: A review of Climate Change Legislation in 66 countries" Fourth Edition.

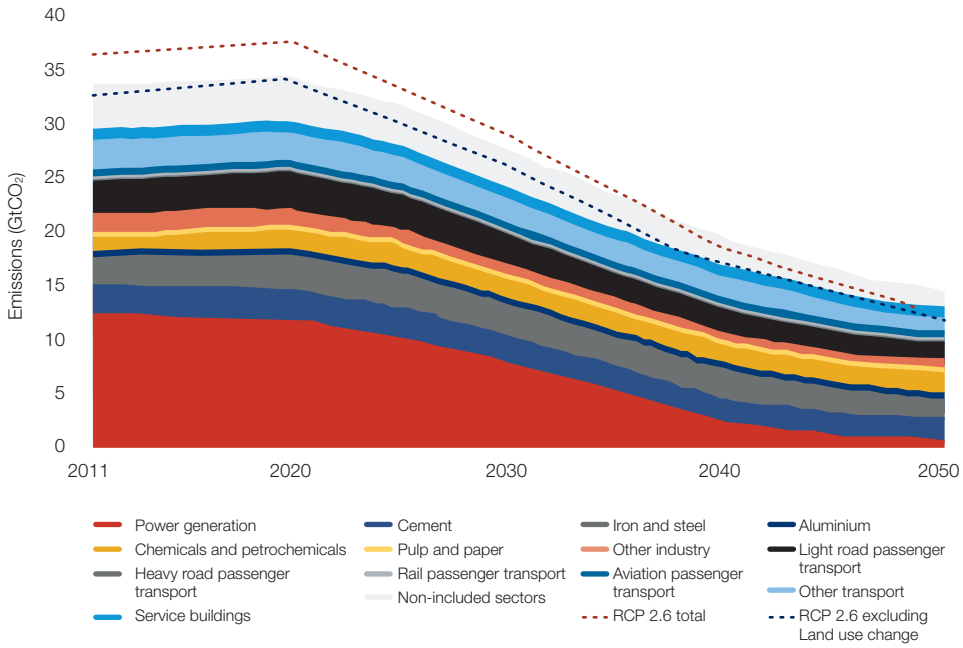
The development of science-based metrics enables analysis of the emissions reduction required by a sector in order to keep global warming within 2°C (see Figure 1, overleaf). This analysis has demonstrated that an annual rate of 1.8% improvement in either carbon intensity or absolute emission reduction is needed (current average rates of decarbonisation are around 0.8% a year since 2000)[5]. An investor is then able to use this information in two ways:

1. At the portfolio level, an investor could report against the year-on-year improvement in a portfolio's carbon footprint against this required decarbonisation rate.

2. At the stock level, investors can assess the efficacy of a company's carbon reduction performance or ambition against sector-based targets (Figure 1 demonstrates the International Energy Agency's analysis of required emissions decline, by sector, out to 2050).

A sector focused approach should help mitigate for companies claiming that it is okay for them to grow emissions as they are the most efficient in their sector. It will also be able to help inform corporate engagement objectives on climate change. We note Cheuvreux' s observation[6] that the Intergovernmental Panel on Climate Change (IPCC) recommends that developed countries need to reduce emissions by 85% between 2010 and 2050, and that developing nations have a 50% reduction target, which will need to be taken in to account when thinking about a company's international exposure to carbon regulation. We also note the observations[7] that whilst some technology can reduce GHG emissions in the long run all GHG emissions, will have to trend to zero, this could have implications for sectors whose assets have 40–50 year lifespans and the use of shareholder funds.

Figure 1: Sector breakdown of absolute CO2 emissions budget, 2011–2050



Source: SMT&IEA, Cited in "Reporting on impact: moving forward" Kepler Cheuvreux, 28 July 2015.

[5] "Reporting on impact: moving forward" Kepler Cheuvreux, 28 July 2015.
[6] "Reporting on impact: moving forward" Kepler Cheuvreux, 28 July 2015.
[7] "Climate strategies and metrics: Exploring options for institutional investors" 2 Degrees Investing, May 2015.

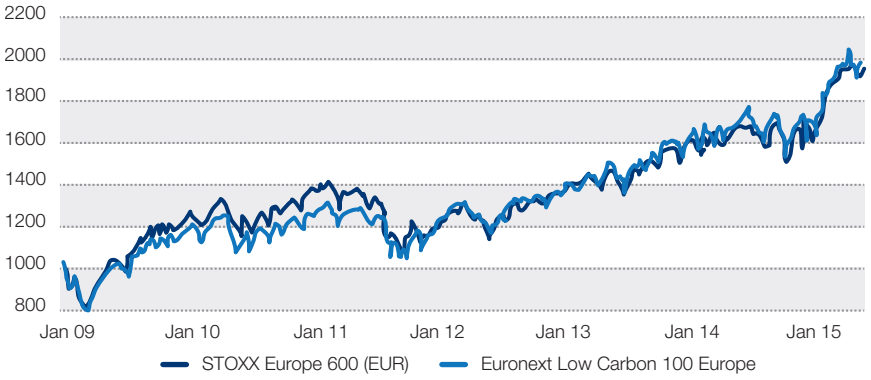
LOW-CARBON FUND

By identifying stocks with the lowest carbon intensity, investors are able to create a fund (or track a low-carbon index) that will have a lower carbon footprint to the benchmark. Cheuvreux highlights two such indices:

– Euronext Low Carbon 100 Index. This was launched in 2008 and includes companies that have the lowest carbon intensity respective to their peers. The Euronext LC 100 has a carbon intensity that is 23.5% less than the STOXX Europe 600.

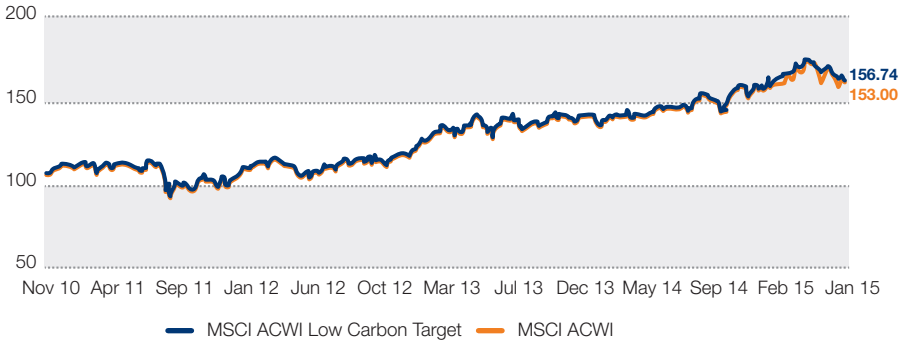
– MSCI Low Carbon indices. This index overweights companies with low carbon emissions (relative to sales) and those with low potential carbon emissions (per dollar of market capitalization).

Figure 2: Euronext Low carbon Index relative performance



Source: "Reporting on impact: moving forward" Kepler Cheuvreux, 28 July 2015. Past performance is not a guide to future performance and may not be repeated. 2015.

Figure 3: MSCI Low Carbon Index relative performance – Gross returns (GBP) (November 2010 – June 2015).



Source: "Reporting on impact: moving forward" Kepler Cheuvreux, 28 July 2015. Past performance is not a guide to future performance and may not be repeated.

Having determined why the analysis of a company's, or a portfolio's, carbon footprint may be of use, the next step is to determine how this can be calculated. The following section looks at the challenges in using GHG emissions data and how to develop a carbon footprint.

CALCULATING A CARBON FOOTPRINT

Data

The first obstacle to overcome is sourcing the carbon data from companies themselves. Corporate disclosure on carbon emissions varies around the world by sector and, to a degree, by market capitalization (see Table 1).

Table 1: Analysis of greenhouse gas emission disclosure on different indices, by sector and by market capitalisation. Analysis was undertaken using Bloomberg ESG disclosure indicators for Scope 1 and Scope 2 GHG data. High impact Sectors were defined as: Energy, Industrials, Materials, Utilities; a £5bn Market capitalisation was used to define Large cap.

Index	Number of Stocks	Companies disclosing GHG data (%)	High impact company GHG disclosure (%)	Large Cap GHG disclosure (%)
FTSE All-Share (ex-investment trusts)	467	60%	81%	81%
EUROSTOXX600	600	57%	63%	61%
MSCI World	1643	29%	34%	33%
S&P 500	500	25%	28%	27%

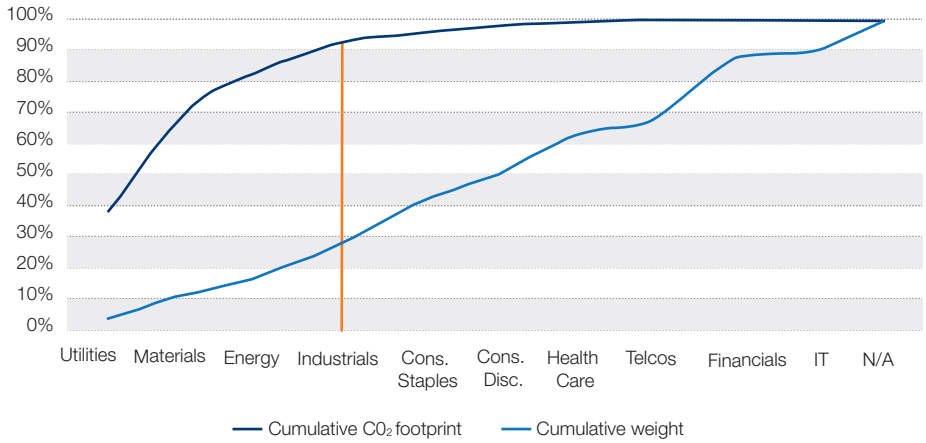
Source: Schroders, Bloomberg 10 September 2015.

Availability/Non disclosure

Methodologies for dealing with the gaps in disclosure vary from complex algorithms based on business activities to simple sector-based average emission figures. With any approach it is important to recognise that there are limitations. For example, if you are trying to analyse data at a highly granular (i.e. business activity) level then there is the risk that the sample size becomes very small and so data could be skewed. Using sector-based averages works well (Exane used an averaging approach to the EUROSTOXX600 based on a company's sector, sub-sector or most relevant peer group and derived a carbon footprint that was only 5% higher than that reported[8]), and the rationale for doing so is reinforced somewhat by Figure 4 and Table 1. This shows that high impact sectors have high levels of disclosure and account for the majority of industrial emissions.

[8]"Carbon 15" Exane BNP Paribas, 9 April 2015.

Figure 4: Percentage of CO2 footprint generated by sector for the EUROSTOXX600



Source: "Carbon 15" Exane BNP Paribas, 9 April 2015.

This analysis would work well from a Pan-European perspective but Table 1 clearly demonstrates the lack of GHG disclosure outside of Europe, meaning that the margin for error would increase when using algorithms or averages to fill in missing data points. In addition, global analysis based on a sector average could be dominated by certain geographies where the energy framework for that location may have a different overall carbon footprint to that in which a company with missing data is located. If a company is based in an economy where electricity generation is predominantly by nuclear power, then the emissions associated with the electricity that company uses will be a lot less than for a similar company in an economy where electricity generation is predominantly from coal.

Scope of reported emissions

The GHG Protocol is the most widely used international accounting tool for understanding, quantifying and managing GHG emissions. It was developed by the World Resources Institute and the World Business Council for Sustainable Development. The first corporate standard was published in 2001. In 2006 the International Organisation for Standardisation adopted the corporate standard for its "ISO 14064–1: Specification with Guidance at the Organisation Level for Quantification and reporting of Greenhouse Gas Emissions and removals"[9], effectively making the standard the international standard for corporate and organisational GHG accounting and reporting.

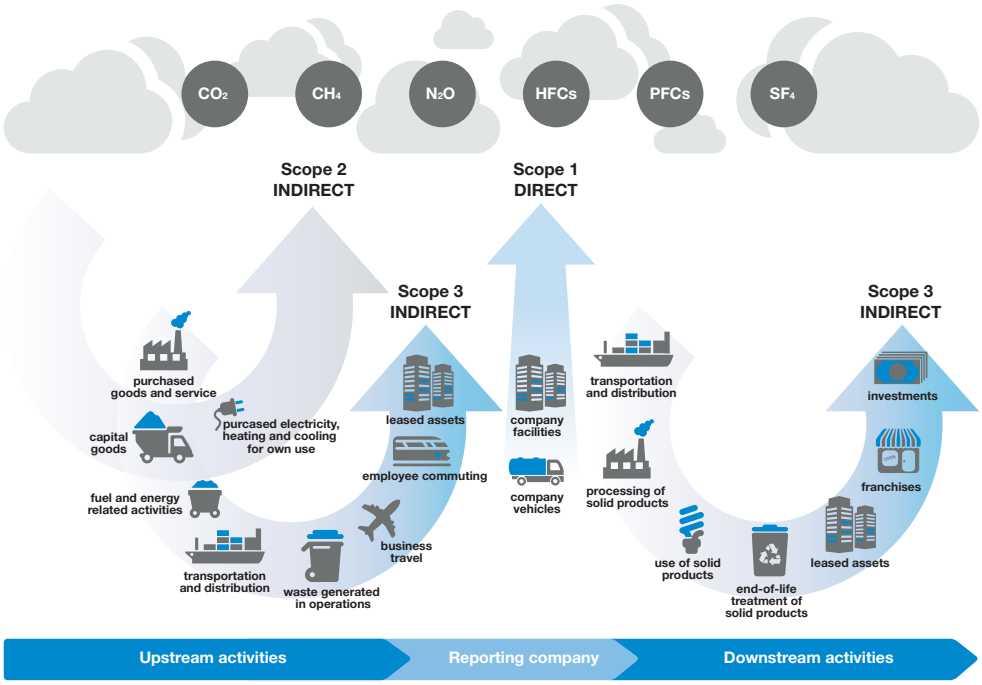
The GHG protocol recognises that companies have direct and indirect GHG emissions throughout their value chain.

- Direct GHG emissions: emissions from sources that are owned or controlled by the company
- Indirect GHG emissions: emissions that are consequences of the activities of the reporting entity, but occur at sources owned or controlled by another entity

These direct and indirect emissions have been further categorized into three broad scopes (see Figure 5), which tend to form the basis of corporate GHG emissions reporting

- Scope 1: All direct GHG emissions from sources owned or controlled by the company (e.g. emissions from combustion in owned boilers, furnaces).
- Scope 2: Indirect GHG emissions that occur from the generation of purchased electricity, steam or heat consumed by the company.
- Scope 3: GHG emissions are a consequence of the activities of the company, but occur from sources not owned or controlled by the company (e.g. extraction and production of purchased materials, use of sold products).

Figure 5: The 3 scopes of corporate GHG emissions



Source: The Greenhouse Gas Protocol, 2011 Cited in: "Portfolio Carbon" UNEP FI Investor Briefing July 2013.

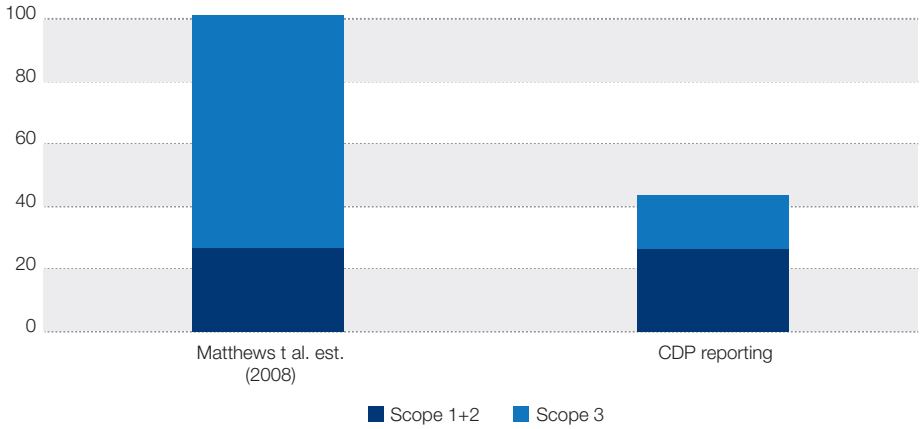
As mentioned earlier, companies tend to report on Scope 1 and Scope 2 emissions, and Scope 3 emissions are typically not included in corporate disclosure. Scope 1 and Scope 2 data is estimated based on the application of emission factors to primary energy, raw material consumption and electricity purchase. Uncertainty around emission factors creates room for error in reported emissions data which ranges from 5% (oil, gas, coal) to 10–15% (electricity) .

In addition to the uncertainty around emission factors the "completeness" of GHG reporting by companies varies. This "completeness" refers to the type of economic activities covered and the extent to which GHG emissions were reported by the whole company. A 2009 review of Scope 1 and 2 reporting by 222 GHG emissions reported by companies revealed that only 23% received the highest disclosure completeness score[10].

This level of uncertainty is, according to academic research, magnified when it comes to reporting on Scope 3 emissions. Figure 6 shows the discrepancy between academic estimates and company estimates for Scope 3 emissions, with company estimates averaging less than 30% of the academic estimate.

[9] www.ghgprotocol.org
[10] "Climate strategies and metrics: Exploring options for institutional investors" 2 Degrees Investing, May 2015.

Figure 6: Unit of emissions of a company by academic estimates versus reporting by companies



Source: "Climate strategies and metrics: Exploring options for institutional investors" 2 Degrees Investing, May 2015.

Whilst the analysis by 2 Degrees Investing highlights some potential pitfalls it goes on to conclude that "analysis suggests uncertainty of data drops significantly at a portfolio level. Uncertainty is more problematic at the stock picking level"[11].

Double counting

Double counting of emissions can occur when a portfolio has exposure to an electricity utility company and a company using that utility's electricity. Both will report on the emissions with the electricity utility reporting them as Scope 1 emissions and the company as Scope 2 emissions.

Calculating a portfolio's carbon footprint

Once the data has been collected the next step is how to make this relevant at the portfolio level. It is important to realise that in aggregating up to a portfolio level the carbon risks that are relevant at a company level will be lost.

Step 1 – Company emissions data

This first stage has been discussed previously and refers to the calculation for estimating a company's GHG emissions.

After this stage, the analysis should produce a figure for the amount of GHG emitted over a certain time period (e.g. CO_2eq[12] /year)

Step 2 – Normalising the data

Having obtained the company data the next step is to normalise it in order to make corporate emissions data comparable across the portfolio. The relative carbon footprint of a company could then be expressed as a function of its absolute carbon emissions over the normalisation variable. There are several variables that can be used:

- Physical variables. This could be based on the number of employees or square foot of floor space, however this would be more useful in comparing companies within a sector
- Financial flow variables. In this instance the denominator would be revenues, earnings or cash flow
- Financial stock variables. This would use variables such as market cap, balance sheet sum or equity book value for example.

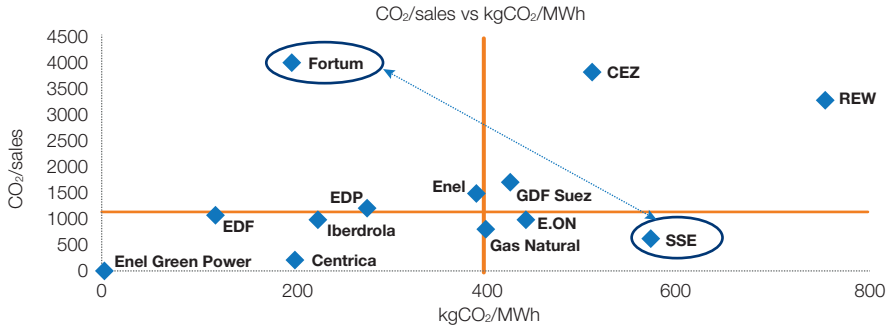
[11] "Climate strategies and metrics: Exploring options for institutional investors" 2 Degrees Investing, May 2015.
[12] CO_2eq stands for CO_2 equivalent and refers to the practice of calculating all GHG emissions from a CO_2 perspective.

Whichever variable is chosen to normalise the data it invariably creates challenges with what the information is actually telling you. For example, if normalising by sales then it has to be recognised that similar products will be sold at different prices and currencies in different regions (e.g. cars). The use of sales as a variable will also have different levels of relevance depending on the sector.

Exane[13] points out that sales metrics are of little relevance for utilities and tend not to be considered by financial analysts. Exane uses the examples of Fortum and SSE to demonstrate the shortcomings of using GHG emissions/unit of revenue. Fortum's electricity is predominantly generated by nuclear and hydro, whereas SSE's is purely coal fired, which means that SSE is much less carbon efficient than Fortum (as demonstrated by its positioning on the x-axis). If you look at CO_2 per unit of sales then the picture is completely different, which is partly driven by the differing prices paid for electricity generated from different sources and also due to different business models (e.g. Fortum has much more exposure to revenues from electricity generation, whereas SSE has higher exposure to revenues from electricity supply). However in order to get a portfolio relevant figure you need to use a cross-sector common variable, though whichever variable is used an appreciation of the potential sector biases should be acknowledged.

After this stage, the analysis should produce a figure for the absolute emissions/variable (e.g. CO_2eq/$m).

Figure 7: A comparison of financial vs operational CO_2-intensity metrics for the European utilities sector



Source: "Carbon 15" Exane BNP Paribas, 9 April 2015.

Step 3 – Portfolio constituents' carbon footprint

The next step in this process is to apportion a company's carbon footprint to a portfolio or investor based on the proportion of the overall capital that is held. Analysis of portfolio carbon footprint disclosures would indicate that most investors are focusing, to date, on a share of equity approach[14] , though there will be a need to address equity and debt ownership structures.

After this stage, the analysis should produce a figure for the relative carbon footprint of a company multiplied by the proportion of company capital owned by the investor (e.g. tCO_2eq/unit of company revenue owned by the investor).

Step 4 – Portfolio carbon footprint

Having calculated the individual carbon footprints of a portfolio's or investor's positions these can then be added to get an overall figure. (e.g. tCO_2eq/unit of average revenue).

We also note that investors may also use an analysis of the carbon generated through investing in the fund as an indicator (e.g. tCO_2eq/£1m invested).

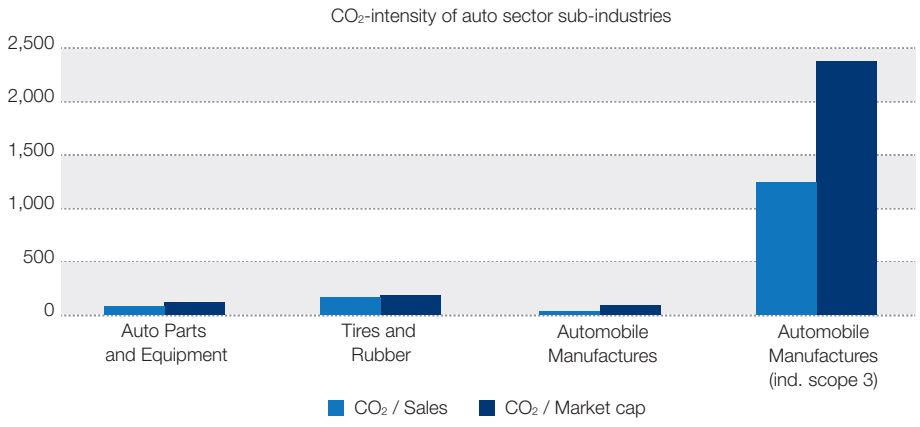
[13] "Carbon 15" Exane BNP Paribas, 9 April 2015.
[14] "Reporting on impact: moving forward" Kepler Cheuvreux, 28 July 2015.

PORTFOLIO CARBON FOOTPRINT IS ONLY HALF THE STORY

A portfolio's carbon footprint analysis (with all caveats considered) only provides an indication of the operational risk a portfolio has to climate change (i.e. it only focuses on a company's Scope 1 and Scope 2 emissions). However it is not just a company's operational performance that will be affected by efforts to decarbonise the economy, but demand for products and services will change depending on their carbon contributions. Taking account of a company's products' end-use and changing demand patterns under low carbon scenarios will align more with investment risks and opportunities than an assessment of operational emissions does.

One clear example of this is within the extractive industries where the achievement of a carbon neutral economy will mean demand for high carbon products such as oil, coal and gas will significantly reduce (as highlighted by the Carbon Tracker Initiative's work on carbon budgets and stranded assets[15]). Another example of the need to consider this more holistic value chain analysis comes from the auto sector.

Figure 8: CO_2 intensity of Auto sector sub-industries



Source: "Carbon 15" Exane BNP Paribas, 9 April 2015.

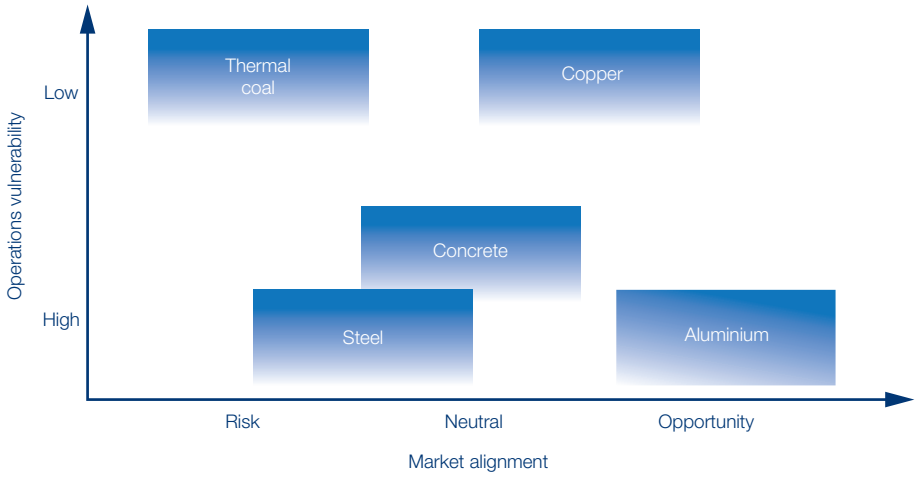
As figure 8 shows, if the analysis solely focuses on the operational carbon emissions of a company then the automobile manufacturers would be preferred to tyre manufacturers and auto parts and equipment companies as they have the lower carbon intensity. However, when the emissions associated with the use of their product (where carbon regulation will impact) then the Auto equipment manufacturers carbon footprint significantly increases (as the bars on the right of figure 8 show) and auto-part providers would have the lower carbon footprint. However the data for the consumer phase of a company's products tends to be poorly reported both by disclosure and accuracy (as highlighted in Figure 6).

[15] http://www.carbontracker.org/

Whilst we recognise the benefits that measuring company and portfolio carbon footprints has in enhancing understanding of operational risk exposure to carbon legislation and in making decisions about managing this exposure (whether through company stewardship or the reallocation of funds to low carbon stocks), we also believe that this type of analysis should, and will, evolve to capture a company's market alignment with a low-carbon future (or the Green Economy) through the products and services it offers and hence the revenues (green revenues) it generates.

One such solution, which could be adapted, is Solvay's Sustainable Portfolio Management model[16] as highlighted by Exane[17]. Figure 9 shows this model at a product level, though it could easily be scaled up to a company level.

Figure 9: Solvay's adapted Sustainable Portfolio Matrix, charting operational vulnerability with market risks/opportunities



Source: "Carbon 15" Exane BNP Paribas, 9 April 2015.

Figure 9 shows that thermal coal has a lower operational vulnerability to carbon regulation than steel as coal extraction is less carbon intensive than steel production, but coal is exposed to high levels of market risk due to demand for high-carbon products waning. In the case of steel and aluminium for example, they both have high exposure to carbon regulation in their production, but CO_2 regulation in the auto sector will increase demand for the lighter aluminium as a substitute for steel and so aluminium has a positive market exposure.

There are some tools emerging to measure a company's exposure to the green economy. FTSE's Low Carbon Economy Industry Classification system[18] is one such tool and it will enable users to track a company's revenue exposure to the green economy (e.g. renewable energy, energy efficiency products), this could be used to aggregate up to a portfolio level or to compare companies within a sector.

[16] http://www.solvay.com/en/sustainability/product-responsibility/index.html
[17] "Carbon 15" Exane BNP Paribas, 9 April 2015.
[18] http://www.ftseangle.com/2014/12/developing-tools-to-analyze-the-transition-to-a-low-carbon-economy/

CONCLUSION

As acceptance of the importance of decarbonising the global economy continues to grow, then portfolio carbon footprinting offers investors a tool with which they can assess their exposure and contribution to decarbonisation.

The establishment of a portfolio's carbon footprint enables an investor to determine:

- The contribution of the portfolio to GHG emissions
- The degree of operational risk within a portfolio to carbon regulation
- The effectiveness of ESG engagement and integration at decreasing portfolio (and corporate) emissions
- Engagement strategies with portfolio companies to adopt sector-based targets for emissions reduction
- Allocation strategies for creating a lower-carbon portfolio.

At this stage, the predominant GHG data is for Scope 1 and Scope 2 emissions data. Whilst there are some challenges with the use of this data it would appear that, at the portfolio level, these issues are less relevant. However, this lack of global disclosure underlines the importance of engagement with companies on GHG transparency either directly or through the CDP[19].

The paucity of disclosure (and methodologies) of Scope 3 emissions means that there is a disconnect between portfolio carbon footprinting and actual financial risks and opportunities presented by the impact of climate change regulation on the use and pricing of a company's products and services. However, this is something that we believe solutions are being developed to address, and that shouldn't prevent the use of portfolio carbon footprinting on Scope 1 and 2 data as a tool for engaging in the management of portfolio climate change risks and opportunities.

[19] CDP currently represents 822 institutional investors (with $95tn assets under management) and works with companies to encourage GHG data disclosure. www.cdp.net

The views and opinions contained herein are those of Rick Stathers, Head of responsible Investment, and may not necessarily represent views expressed or reflected in other communications, strategies or funds.