



Change	%Chg	Premium	Volume
-128.3	-0.68%		
-62	-0.33%	-64	21114
-68	-0.36%	-75	212
-92	-0.50%		

CLIMATE CHANGE REPORT

An assessment of carbon risks and environmental analysis in Avon Pension Fund's equity portfolios

Prepared by Trucost

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CREDITS

Christina Weimann Senior Research Analyst, Project Manager

Lokesh Raikwar Research Analyst

Lohith Reddy Research Analyst

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CONTACT

E: Trucostinfo@spglobal.com

E: Trucostnorthamerica@spglobal.com

E: TrucostEMEA@spglobal.com

E: Trucostasiapacific@spglobal.com

E: Trucostsouthamerica@spglobal.com

T: +44(0)20 7160 9800

T: +1 800 402 8774

www.trucost.com

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1.0 EXECUTIVE SUMMARY

1.1 INTRODUCTION

This is Trucost's first analysis of the carbon footprints of Avon's listed equity portfolios, with the date of holding on the 31st March 2017. Carbon footprints and analysis of carbon "hot spots" in portfolios can be used to identify carbon-related strengths, weaknesses, opportunities and threats from the shift to a low-carbon economy. The carbon footprint analysis underpins Avon's climate change policy to carry out analysis of the investment portfolios at a top level, identifying what the key climate change impacts are, and to focus on the related risks and opportunities through further discussion with external managers and stakeholders. More information on carbon footprinting is provided in Appendix A.

The equity portfolio analysis assesses the carbon risks inherent in the Aggregate Total Fund.

Trucost's assessment of carbon risk in the Avon's equity funds includes:

- Measurements of the carbon efficiency of portfolios relative to benchmarks
- Analysis of sector allocation effects and stock selection effects
- Assessment of the transparency of carbon disclosure at portfolio and constituent level
- Identification of key contributors to the carbon footprints of the funds
- Highlighting of key (active) investees for engagement on carbon risk
- Determination of the funds' exposures to fossil fuel and renewable energy

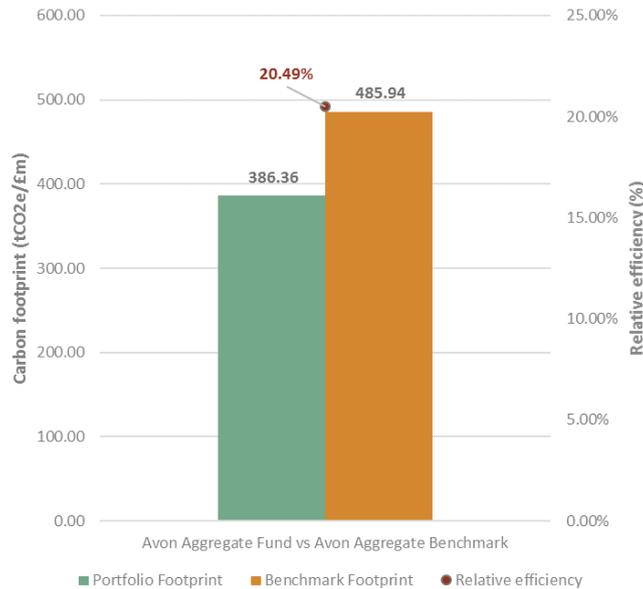
The total absolute emissions of the aggregate fund comprise of direct emissions (59%) and first tier indirect GHG (41%) emissions.

A glossary of terms can be found in the Appendices. Values expressed in percentage terms have been constructed such that a positive (negative) number is "good" ("bad") news for the fund's carbon risk exposure.

1.2 KEY FINDINGS

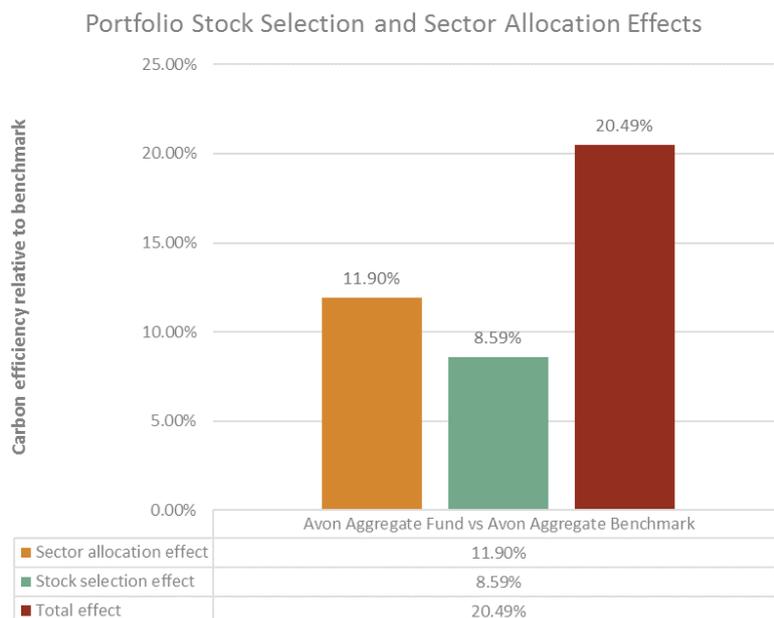
- The aggregate fund is more carbon efficient than its custom benchmark, outperforming by 20.49% owing both to positive sector allocation and stock selection effects¹ (Figure 1.2.0).

FIGURE 1.2.0: AGGREGATE FUND CARBON FOOTPRINT AND ITS EFFICIENCY COMPARED TO BENCHMARK



- Sector allocation and stock selection effects combined translate into a positive overall effect, which means that as a rule the fund managers are investing in less carbon intensive sectors and picking less carbon intensive stocks than the benchmark (Figure 1.2.1). A good example of this is the utilities sector: while being the most carbon intensive sector, it contributes positively (10.15% of total effect) to the fund when compared to benchmark.

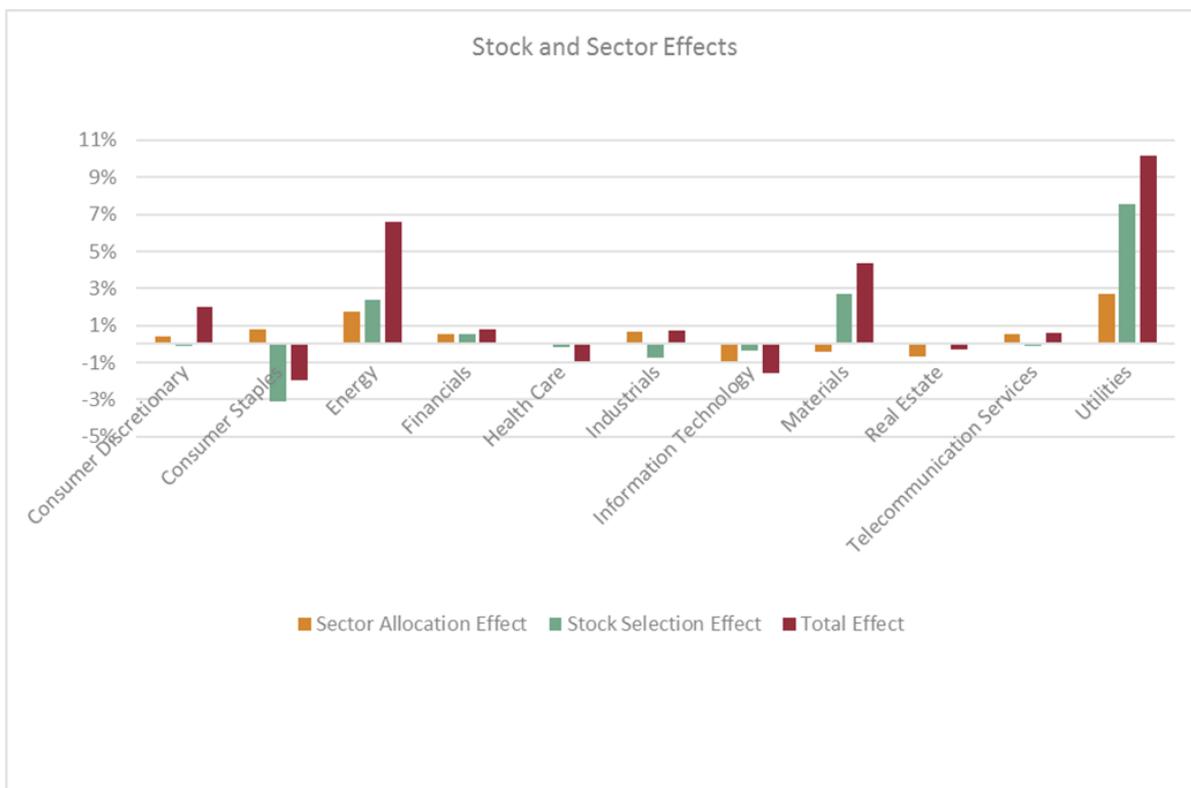
FIGURE 1.2.1: SUMMARY OF SECTOR AND STOCK EFFECTS ON OVERALL FOOTPRINT PERFORMANCE



¹ An explanation of stock and sectors effects is provided in the Appendices.

- The stock selection effects of the utilities (7.55%) and energy (2.40%) sectors heavily drive the Aggregate fund’s performance. Positive sector allocation effects from these two sectors further contribute to the Aggregate holdings’ relatively lower carbon intensity compared to the benchmark.
- Conversely, the consumer staples sector’s negative stock selection (-3.10%) and positive sector allocation (1.16%) effects make this sector the largest negative contributor to the Aggregate fund’s relative performance (Figure 1.2.2).

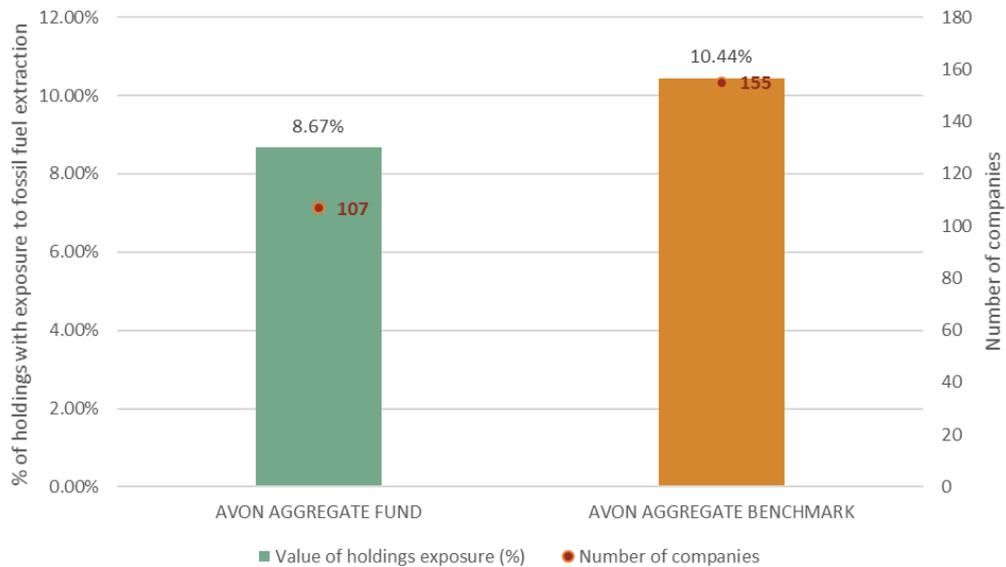
FIGURE 1.2.2: STOCK AND SECTOR EFFECTS: AGGREGATE FUND



- At present, for every £ 1 million of revenues generated by Avon’s Aggregate fund constituents, 386.36 tonnes of carbon dioxide equivalent (tCO₂e) emissions are emitted. Stated in absolute terms, the Aggregate fund “finances” 526,747 tCO₂e per year.
- The top 10 largest contributors in the Aggregate fund increase the portfolio’s carbon intensity by 20.23%. Five of these ten contributors in the Aggregate fund are European companies (HeidelbergCement AG, Royal Dutch Shell Plc, CRH Plc, International Consolidated Airlines Group SA, and Cranswick Plc) and collectively contribute -11.32% of the carbon footprint.
- In terms of disclosure, approximately 16% of the companies in the Aggregate fund by value of holdings do not currently disclose GHG data either at all, or of a sufficient quality to take as reflective of their operations – a value lower than the 18% non-disclosing constituents in the aggregate benchmark.

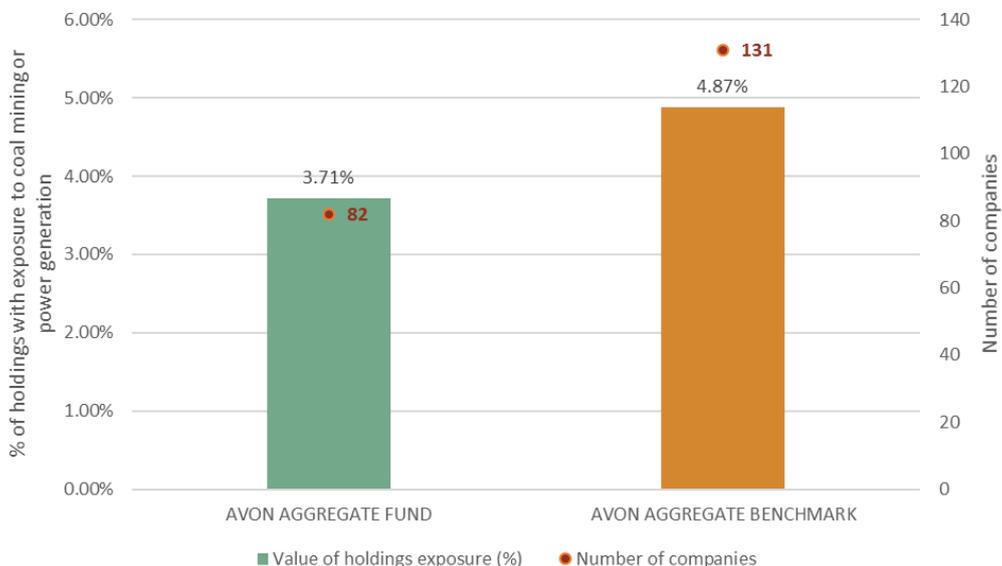
- The Aggregate fund invests in 107 companies that are exposed to fossil fuel extraction activities to various extents. Of these, 55 companies derive over 30% of their revenues from fossil fuel and support activities, 49 of which derive over 50% of their revenues from this sector (Figure 1.2.3).

FIGURE 1.2.3: FOSSIL FUEL EXTRACTION EXPOSURE: AGGREGATE FUND VS BENCHMARK



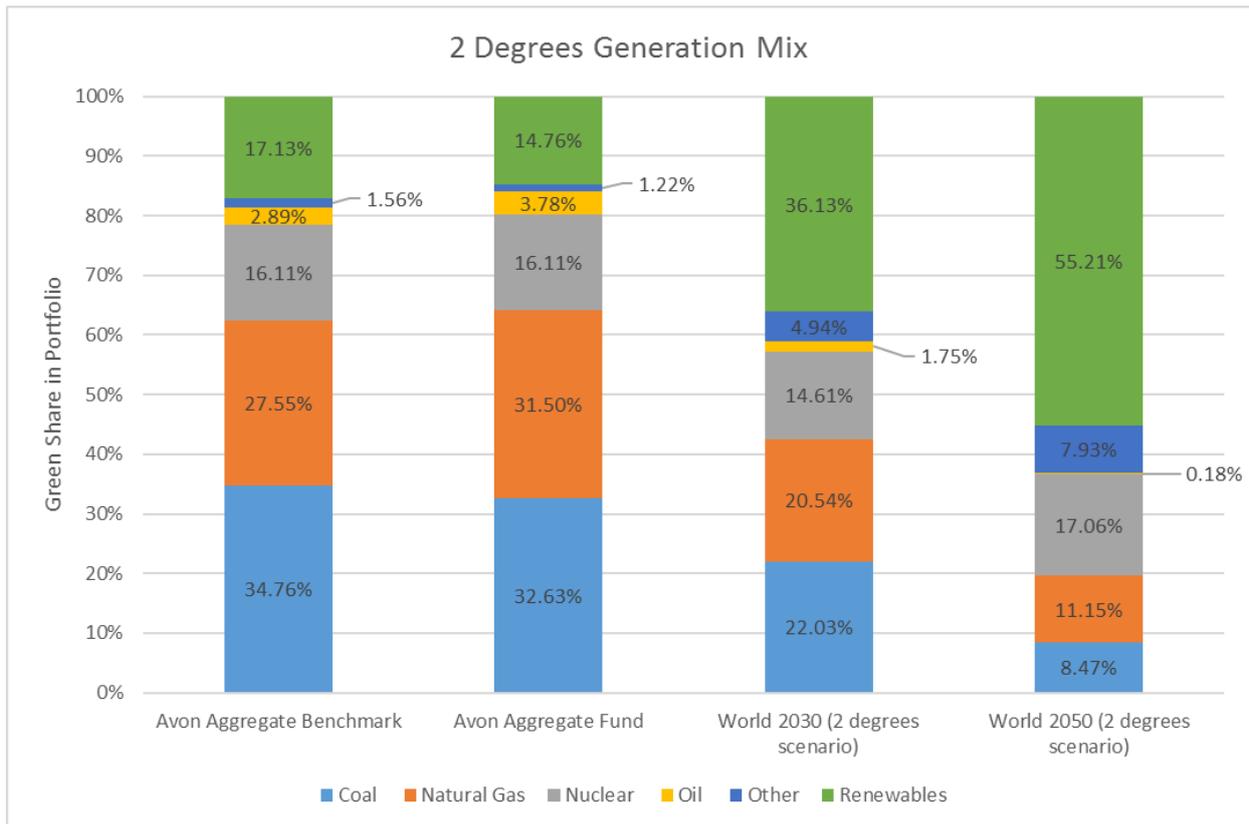
- Avon Aggregate fund invests in 82 companies, with a combined holdings value of £ 76.41 million, deriving revenues from coal business activities. These ‘coal companies’ refer to the coal mining companies that also fall under the ‘fossil fuel companies’ classification used elsewhere in the report, but also all companies involved in coal power generation activities. These holdings represent 3.71% of the portfolio while an equivalent holding of the benchmark would see 4.87% of holdings invested in coal companies (Figure 1.2.4).

FIGURE 1.2.4: COAL EXPOSURE: AGGREGATE FUND VS BENCHMARK



- The results show that the Aggregate fund is slightly less aligned to the two degree scenario than its benchmark. The underlying companies in the fund generate less renewable energy than the benchmark (14.76% versus 17.13% within the benchmark), and more fossil fuel power (67.91% versus 65.20% within the benchmark). On the positive side, there has been a transition towards less coal in the generation mix (32.63% versus 34.76% within the benchmark) (Figure 1.2.5).
- Avon’s Aggregate power generation holdings are considerably overweight in coal and natural gas power generation companies compared to other energy sources on an equity ownership basis (Figure 1.2.5). Portfolio alignment could be facilitated by appropriate management of existing fossil fuel equities and the diversification of the portfolio’s renewable energy mix.

FIGURE 1.2.5: TWO-DEGREE ALIGNMENT: AGGREGATE FUND VS. BENCHMARK & IEA 2 DEGREE TARGET

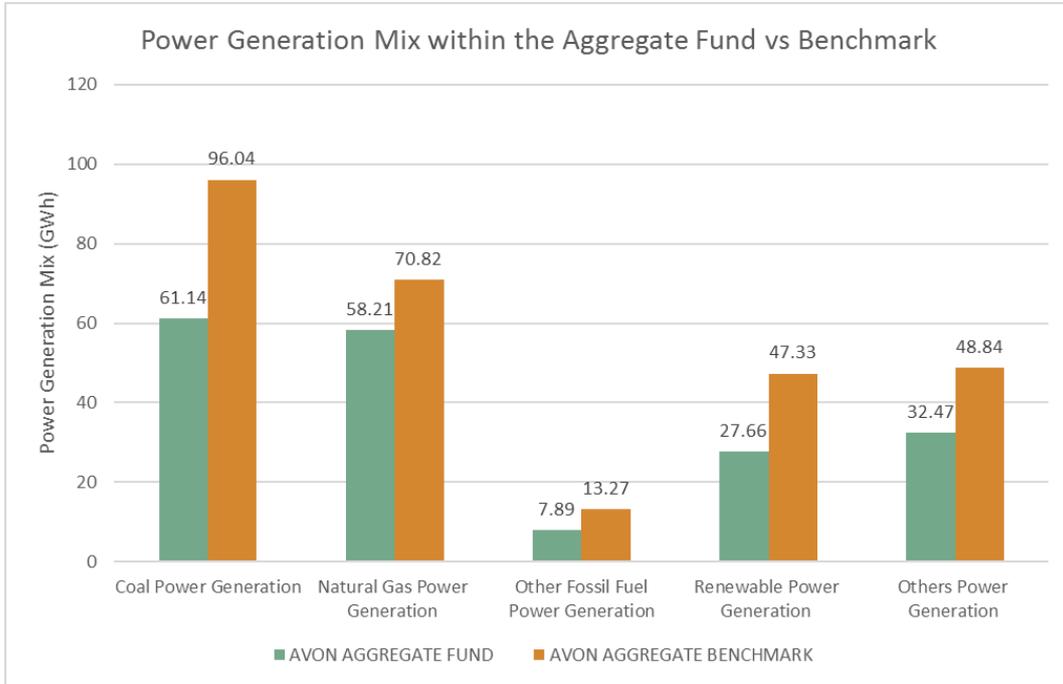


The above graph illustrates alignment of Avon’s Aggregate fund and the benchmark to the IEA 2 degree 2030 and 2050 targets. It shows power generation mix by type of energy (coal, oil, renewables, others² etc.) for the companies based on the publicly disclosed GWh data whenever such was disclosed by the companies.

² Other refers to generation based on biomass, landfill gas and unclassified energy sources.

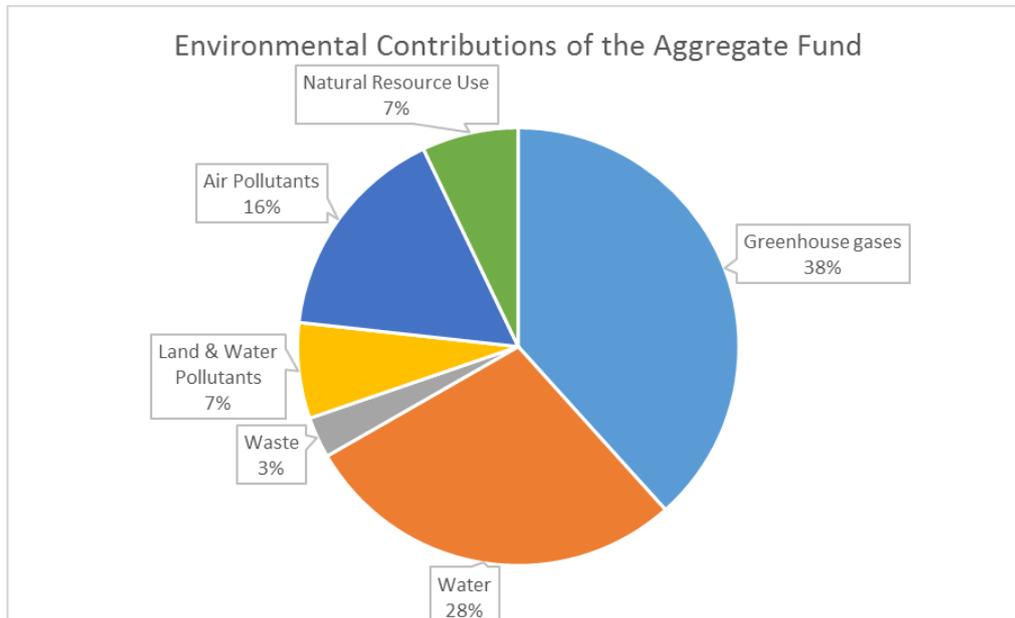
- The power generation mix in GWh within the aggregate fund and benchmark is shown in Figure 1.2.6.

FIGURE 1.2.6 POWER GENERATION MIX (GWH) WITHIN THE AGGREGATE FUND VS BENCHMARK



- The total environment footprint of the aggregate fund outperforms it benchmark by 7.88%. A combination of positive sector allocation (4.54%) and stock selection (3.34%) effects drive the overall relative environmental performance of the Aggregate fund.
- Environmental footprints quantify the greenhouse gas (GHG) emissions, water, waste, land & water pollutants, air pollutants, and natural resource use associated with the fund. The Figure 1.2.7 shows the relative contribution of each of these six impacts to the environmental footprint of the fund. The fund is most exposed to greenhouse gases (38%) and water (28%).

FIGURE 1.2.7: ENVIRONMENTAL IMPACT OF THE AGGREGATE FUND



1.3 RECOMMENDATIONS

The findings in this report should help Avon in two ways. Firstly, through demonstrating superior and comprehensive monitoring and reporting on key operational carbon and stranded asset risks within equity investment, the communication of these findings both internally and to wider stakeholder groups will be easier to fulfil. Moreover, the report raises interesting discussion points in regard to how Avon could position investment funds to benefit from the shift to a lower carbon economy.

1.3.1 Key Recommendations

- Monitor the carbon disclosure of Anhui Conch Cement Co., Ltd. This company is among the top ten aggregate footprint contributors and does not currently disclose carbon data. Given that this company operates in high impact sector, it should be encouraged to calculate and disclose data for five reasons:
 - To start to measure and manage their emissions
 - To identify process inefficiencies
 - To stay ahead of pending legislation
 - Risk management strategy
 - To understand their position in the competitive landscape
- The portfolio managers should engage with companies on their short term and long term GHG reduction targets that cover all operations. In particular how these align with recommendations by scientists to keep global temperature increased to below 2 degrees. Setting guiding principles for companies, along with defined objectives, is also an effective way of defining a trajectory for companies to aim for and milestones to deliver on.
- Periodically review asset class characteristics and how they contribute to lower carbon economy. The green bond market is rapidly expanding, with US\$81bn issued in 2016, and US\$150bn estimated to be issued by the end of 2017 according to the Climate Bonds Initiative³.
- Monitor the trend of the carbon footprints of the portfolios over time. In particular, how the top negative contributing companies in each portfolio perform. Some companies may demonstrate a reduction in their carbon intensity in the future, whereas others may see an increase, thus highlighting the importance of ongoing monitoring to identify companies' trends and improvements in disclosure.

³ The Climate Bonds Initiative, 2017: <https://www.climatebonds.net/>

- Challenge fund managers to explain their climate change strategies. Although the Aggregate fund outperform its benchmark, is this by accident or design? The Financial Stability Board (FSB) Task Force is calling for increased transparency and disclosure in order to better understand climate change related risks. With rapidly declining costs and increased deployment of clean and energy-efficient technology, the FSB Task Force emphasizes the reality of significant, near-term financial implications for organisations dependent on extracting, producing and using coal, oil and natural gas. It would therefore be beneficial to request that managers rationalise their selection of companies involved in fossil fuel extraction.

2.0 APPENDICES

2.1 APPENDIX A

Trucost's approach to calculating carbon footprints of portfolios

The carbon footprint is a measure of the greenhouse gas emissions (GHGs) associated with each portfolio. This is calculated by allocating GHGs from each constituent company held in the portfolio in proportion to the equity ownership of that company. The GHGs measured are converted into their carbon dioxide equivalents (CO₂e). The carbon footprint is expressed as metric tons of GHGs emitted by the companies within the portfolio, per million GBP (£m) of revenue from holdings. This normalized measure of carbon performance enables comparison of portfolios and benchmarks, irrespective of the type and size of the portfolios. The GHGs and revenue allocated to each holding are summed to calculate the overall carbon footprint of listed equity holdings.

GHG emissions data for companies analysed are the latest available in Trucost's database (the Trucost Environmental Register) – the world's largest and most comprehensive database of corporate natural capital impact data covering 93% of global markets by market capitalization. Where companies do not provide usable data on GHG emissions, Trucost uses its environmentally extended input-output (EEIO) model to calculate likely emissions based on business activities in 464 sectors.

2.2 APPENDIX B

Company Analysis

Trucost maintains the world's largest database of standardised corporate natural capital impact data. Trucost's comprehensive coverage of more than 6,000 companies since 2000 ensures that virtually all companies in a portfolio or Index are included, not just those that disclose environmental information.

To calculate the carbon emissions of companies included in the study, Trucost reviewed company annual reports and accounts, environmental/sustainability reports, public disclosures and corporate websites. However Trucost might standardise or normalise disclosed data where necessary. Where a company only discloses data for part of its overall activities, analysts may standardise or normalise quantities in order to calculate the carbon impacts of the business's entire operations in line with the Greenhouse Gas Protocol. Where companies only disclose resource use, such as fuel consumption, this information is used to derive emissions data where possible.

Trucost uses its environmental profiling model to calculate the environmental impacts of companies that do not disclose adequate data, as well as the upstream impacts from supply chains. These include GHG emissions from the production of purchased goods and services, under Scope 3 of the Greenhouse Gas Protocol. The input-output model examines interactions between 464 sectors to calculate each company's likely direct and supply chain environmental impacts. These calculations combine quantitative government

census and survey data on natural resource use through economic interactions between sectors with information on pollutant releases from national emissions registries. Information on company revenues in different industries is used to map environmental impacts from business activities.

Environmental profiling using an input-output model, overseen by an academic advisory panel, is a “best efforts” attempt to understand environmental impacts in the current absence of sufficient and comparable company disclosures on the environmental impacts of operations and supply chains.

Calculations incorporate disclosed quantitative data on industrial facilities’ actual pollutant releases where available. Trucost engages with companies so that they have the opportunity to verify their environmental profiles and provide more information. Analysts quality check any further disclosures made, which are exclusive to Trucost and further augment the database.

GHG emissions for each company analysed are measured in tonnes of carbon dioxide equivalents (CO₂e). The analysis includes the six GHGs covered by the UN Kyoto Protocol. Each GHG has a different capacity to cause global warming. Trucost’s conversion of GHGs to CO₂e is based on the Global Warming Potential (GWP) index published by the Intergovernmental Panel on Climate Change, which assesses the effect of the emissions of different gases over a 100-year time period relative to the emission of an equal mass of CO₂.

Where reported, data on GHG emissions from operations and purchased electricity, under Scopes 1 and 2 of the Greenhouse Gas Protocol corporate accounting standard, are included in Trucost’s database.

To limit any issues associated with double counting greenhouse gas emissions, Trucost analysed only the direct and first-tier indirect emissions for each company. First-tier emissions are emissions purchased upstream from the company’s direct suppliers. These included purchased electricity and business air travel. Most companies are not major emitters of direct greenhouse gases and adopting this method ensures that the study assesses the carbon impacts of business activities – such as extraction, production, transport and logistics – outsourced to companies excluded from this analysis. In many sectors, indirect greenhouse gas emissions are greater than their direct emissions. It is important to take into account indirect exposure to carbon costs as suppliers may pass these on down the value chain.

Company carbon intensity is calculated throughout this report as total direct and first-tier indirect greenhouse gas emissions per GBP million of revenue, unless stated otherwise. This quantitative approach enables businesses of different sizes within different industries to be compared.

2.3 APPENDIX C

Interpretation of sector allocation & stock selection effects

Attribution analysis identifies drivers of carbon performance relative to a benchmark. Trucost conducts attribution analysis to identify the effects of sector allocation (based on the ICB Super Sector breakdown) and stock selection decisions on portfolio carbon footprints relative to the relevant indices selected as their benchmarks. The sum of these stock and sector allocation effects results in either a positive or negative overall portfolio carbon efficiency relative to a benchmark.

Where the percentage difference in the carbon efficiency of the portfolio against its benchmark is positive (indicated by a “+” sign), the portfolio is more carbon efficient than its benchmark. This indicates that the portfolio has a smaller carbon footprint than this benchmark. Conversely, where the percentage difference in the carbon efficiency of the portfolio against its benchmark is negative (indicated by a “-” symbol), the portfolio is more carbon intensive than its benchmark. The portfolio therefore has a larger carbon footprint than the benchmark index.

Sector allocation effects are based on a combination of the amount of the portfolio’s assets allocated to a sector relative to the benchmark allocation to that sector in apportioned revenue terms, and the average carbon intensity of the sector compared to the benchmark’s total footprint. For example, a portfolio derives 1.92% of its total apportioned turnover from the Oil & Gas sector, whereas the benchmark derives 24.64% of its total apportioned revenue from the oil & gas sector. The benchmark’s total footprint is 664.66 metric tons of CO₂e/£m, whereas the benchmark’s Oil & Gas sector carbon footprint is 1,382.5 metric tons of CO₂e/£m. The Oil & Gas sector allocation effect would therefore be +24.54%:

$$\frac{(1.92\% - 24.64\%) * (664.66 - 1,382.51)}{664.66}$$

Portfolio is underweight the Oil & Gas sector in revenue terms

The sector is less carbon efficient than the benchmark

Stock selection effects are based on the average carbon intensity of the companies held in the portfolio, combined with the holdings per company, compared with the companies present in their sector and their allocation in the benchmark. Stock selection effects indicate the potential to reduce carbon risk in the holdings without adjusting sector weightings. The carbon performance of companies directly contributes to the carbon embedded within portfolio holdings. For example, a portfolio derives 1.92% of its total turnover from the Oil & Gas sector. The portfolio’s sector carbon footprint is 4,443.62CO₂e/ £m. The benchmark’s

total footprint is 664.66 metric tons of CO₂e/ £m and the benchmark's Oil & Gas sector carbon footprint is 1,382.5 metric tons of CO₂e/ £m. The Oil & Gas stock allocation effect would be -8.84%

Portfolio derives
1.92% of total
turnover from the Oil
& Gas sector

$$1.92\% * \frac{(1,382.51 - 4,443.62)}{664.66}$$

The portfolio invests in *less* carbon
efficient Oil & Gas companies than
the benchmark

2.4 APPENDIX D

APPROACHES TO REDUCE STRANDED ASSETS RISK

This section of the report reviews approaches investors can take to mitigate the future risk from stranded assets in their portfolios.

Engagement

Investors may choose to use their influence to engage with companies highlighted as particularly at risk from fossil fuel stranded assets – for example, pure-play coal extraction companies. Engagement often is achieved through collaborating with larger investor organizations – for example the Institutional Investors Group on Climate Change (Europe) and the Investor Network on Climate Risk (North America). A recent example of collaborative engagement was the Global Investor Statement on Climate Change, which was presented to the United Nations Secretary General’s Climate Change Summit in September 2014 by over 360 investors representing over 24 million US dollars in assets. They called for governments to provide a stable, reliable and meaningful carbon price, and to develop a plan to phase out fossil fuel use⁴.

A key area for engagement could be the development of new fossil fuel reserves. It may also be helpful to discuss with company management the risks of capital being potentially wasted on carbon intensive projects that may not generate value in the future, and to learn what plans management have in place to make a transformational shift to a lower carbon economy, to aid assessment of the potential asset stranding risk within these companies.

Hedging the risk

Another approach would be to identify opportunities to reduce risk through reducing exposure to fossil fuel companies, and/or to allocating capital towards low carbon industries such as renewable power generation and clean technology. In terms of reducing carbon exposure, there are many possible strategies. In terms of listed equities, fund managers including Impax Asset Management, RobecoSAM, Allianz, Generation Investment Management and First State have developed investment products which focus on companies making a positive contribution to addressing climate change. First State Investments also has a specific sustainability mandate and integrates ESG factors into its investment processes. The Swedish pension fund AP4, asset managers Amundi and Legal and General have created de-carbonized portfolios where the weights of carbon-intensive companies are reduced whilst closely tracking the benchmark index. In addition, index providers such as FTSE, MSCI and S&P have developed environmental indices to be used as alternative benchmarks for portfolios⁵.

⁴ Towers Watson, 2015. *Fossil Fuels: Exploring the stranded assets debate*.

⁵ UNEP, 2014. *Financial Institutions Taking Action on Climate Change*

Divestment

Divestment from the fossil fuels extractives industry is one option currently advocated by organizations such as 350.org, although the physical and moral ramifications of such a decision need to be carefully assessed before any divestment program is initiated.

One question is whether the size of an investor's assets to be removed from the fossil fuel industry would be sufficient to affect the values put on the future cash flows of fossil companies simply by divesting its holdings in those companies. As extrapolated in the report 'Stranded Assets and the Divestment Campaign: What does Divestment mean for the Valuation of Fossil Fuel Assets?' the likely universe of divestment candidates of university endowments and public pension funds, following a well exercised history of divestment campaigns, would have, at the upper limit, between 240-600 billion US dollars of possible equity divestment for fossil companies⁶. To reiterate the magnitude, the current market capitalization of the largest 10 global oil and gas companies exceeds 2 trillion US dollars. Even if the removal of 400 billion US dollars of investment in a coordinated action by these investors did have a tangible effect on the market valuations of fossil companies, this would undoubtedly be rapidly corrected by neutral investors eager to take advantage of a temporary depression in market sentiment. The result would be that fossil fuel companies would be even further in the hands of non-disposed, indifferent investors.

It is also important to acknowledge the indirect effects that a divestment strategy may bring, such as an increase in consumer awareness of the specific concerns with that industry, and the emergence of societal stigmas attached to the perception of each industry – for example, the high profile divestment campaign for the tobacco industry. This is akin to a recent conclusion made by the University of Oxford Stranded Assets Programme that the largest impact of the fossil fuel divestment campaign is likely going to come indirectly, from the stigmatization effect on fossil fuel companies.

There have been some recent high profile cases of fossil industry divestment, most notably in the Nordic region:

Storebrand: the Norwegian pension fund and life insurance firm announced in July 2013 that it has excluded 13 coal and 6 oil sands companies from all investments, following recent sustainability analysis of the energy sector.

AP4: the state owned Swedish national pension fund announced in October 2013 that it plans to invest in a tailored emerging markets fund comprising companies that have both low carbon emissions and low fossil fuels reserves, citing the belief that such companies will be valued differently in the future to how they are now.

⁶ Smith School of Enterprise and the Environment, 2013. *Stranded assets and the fossil fuel divestment campaign: what does divestment mean for the valuation of fossil fuel assets?*

AP2: another state owned Swedish national pension fund has announced this month that it will divest from 20 fossil fuel extraction companies – 12 coal and 8 oil and gas production. The aim of this is to reduce its exposure to risk associated with fossil-fuel based energy, and thus protect the fund’s long-term return on investment.

Each of these examples describes a more specific strategy than a straightforward full equity divestment, but it is interesting to see that some European financial institutions are also distancing themselves from the fossil industry, be that for economic or social motivations. In addition, MSCI recently announced that companies and individuals who have divested of fossil fuel holdings have outperformed business as usual over the past five years. This finding was based on tracking the performance of its ACWI ex Fossil Fuels Index, using ACWI Index as a benchmark⁷.

⁷ BusinessGreen, 2015. *Fossil fuel-free portfolios have proved better than undiscerning funds*. [Online] Available at: <http://www.businessgreen.com/bg/news/2403616/fossil-fuel-free-portfolios-have-proved-better-than-undiscerning-funds>

3.0 GLOSSARY

% Improvement/ % Difference:

The presentation of percentage figures in this report has been constructed such that a positive (negative) number is “good” (“bad”) news for the fund’s carbon risk exposure.

Carbon Footprint (tonnes CO₂e/£m):

The direct and first tier indirect GHG emissions apportioned to the portfolio per million GBP revenue generated by the portfolio. Each holding's contribution to the carbon footprint of the portfolio is calculated on an equity ownership basis. The carbon footprint of the fund is the sum of these contributions, normalised by revenue owned.

CO₂ Equivalent (CO₂e):

Each greenhouse gas differs in its ability to absorb heat in the atmosphere. HFCs and PFCs are the most heat-absorbent. Calculations of greenhouse gas emissions are presented in units of millions of metric tons of carbon equivalents (MMTCE), which weights each gas by its GWP value, or Global Warming Potential. The Global Warming Potentials used in this analysis are:

GREENHOUSE GAS	CO ₂ EQUIVALENT
Carbon Dioxide	1
Methane	21
Nitrous Oxide	310
Sulphur Hexaflouride	23,900
Per Fluoro Carbons	7,850
Hydro Flouro Carbons	5,920

See www.unfccc.org for more information about global warming.

Exposure (Coal Exposure and Renewable Energy Exposure):

An investor’s “Coal Exposure” (or “Renewable Energy Exposure”) is a measurement of the value of the fund facing the risk of a “stranded asset” – such as an inefficient coal power plant becoming uneconomic to run owing to stringent carbon regulation – considering both the value of holding in that company and the revenue-dependence of the company on coal. For example, a £1m investment in a company deriving 50% of

its revenue from coal power generation and 50% from mortgage finance would contribute £0.5 to the Coal Exposure metric.

GHG:

Abbreviation for Greenhouse Gases. Emissions to air that contribute to the greenhouse effect and global warming. Each greenhouse gas differs in its ability to absorb heat in the atmosphere. HFCs and PFCs are the most heat-absorbent. Methane traps over 21 times more heat per molecule than carbon dioxide, and nitrous oxide absorbs 270 times more heat per molecule than carbon dioxide. Often, estimates of greenhouse gas emissions are presented in units of millions of metric tons of carbon equivalents (MMTCE), which weights each gas by its GWP value, or Global Warming Potential.

Sector allocation effects, Stock selection effects:

Please refer to Appendix C.

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