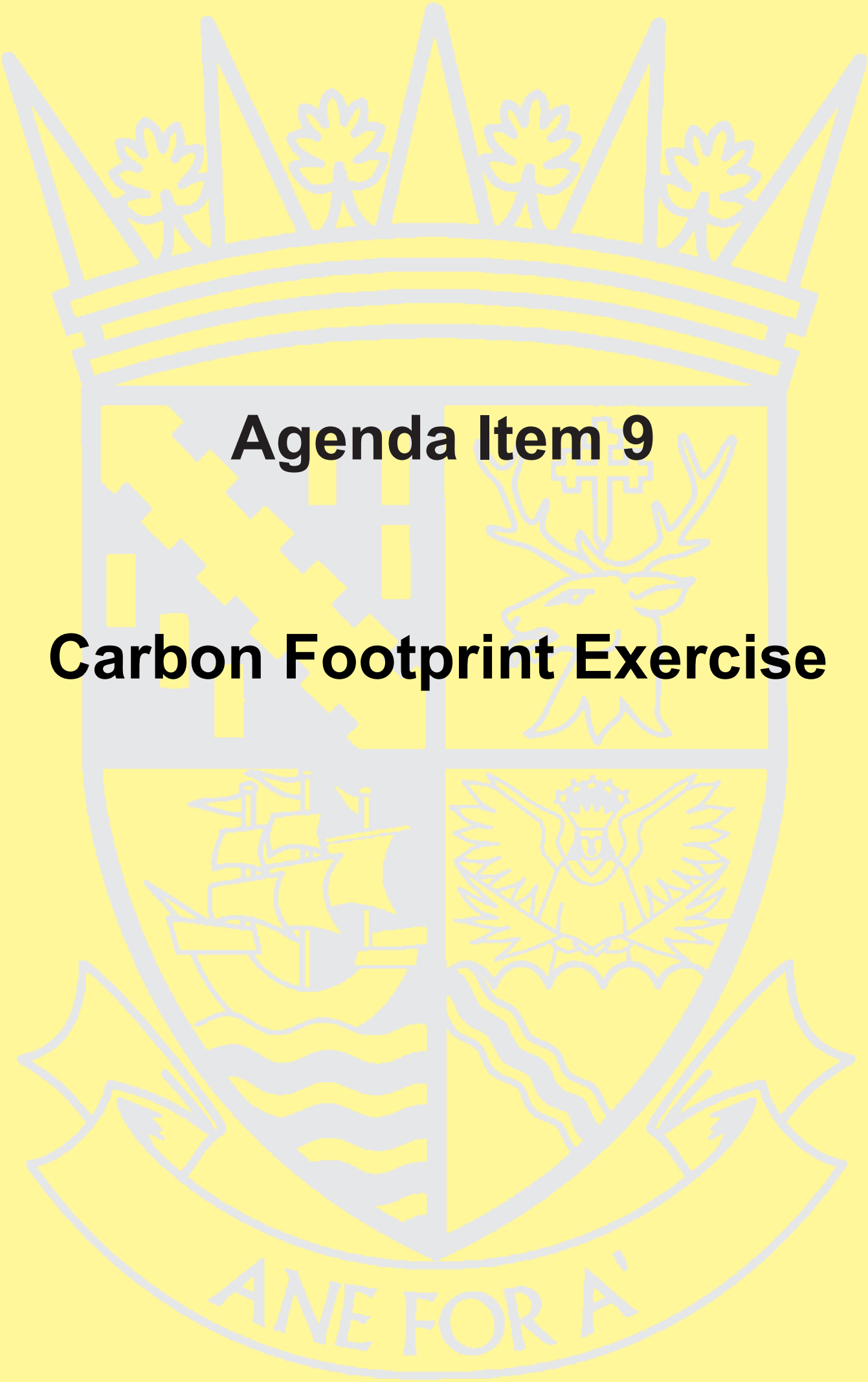


The background of the slide features a large, light blue watermark of the City of Vancouver's coat of arms. The crest is a shield divided into four quadrants. The top-left quadrant shows a sailing ship on the water. The top-right quadrant shows a stag's head with antlers. The bottom-left quadrant shows a beaver. The bottom-right quadrant shows a grizzly bear. Above the shield is a crown with four maple leaves. A banner at the bottom of the shield contains the motto "A NE FOR A".

Agenda Item 9

Carbon Footprint Exercise

FALKIRK COUNCIL

Subject: Carbon Footprint Exercise

Meeting: Joint Meeting of Pensions Committee and Pension Board

Date: 15 March 2018

Submitted by: Director of Corporate and Housing Services

1. Purpose of Report

- 1.1 This report provides the Committee and Board with a summary of the Carbon Footprint measurement exercise undertaken for the Fund by Trucost.

2. Recommendations

- 2.1 The Pensions Committee and Pension Board are asked to note the contents of the report and invited to comment on the findings.

- 2.2 The Pensions Committee is asked:

- i) to agree to the ongoing monitoring of carbon efficiency trends within Fund portfolios;
- ii) to agree to the Carbon Footprinting exercise being used to influence engagement activity with those companies performing poorly in terms of carbon efficiency;
- iii) to note that as part of the collaborative working arrangement, the Fund will participate in a joint tendering exercise for Voting and Engagement services with the Lothian Pension Fund; and
- iv) to request the Chief Finance Officer to consider, as part of the forthcoming investment strategy review, how best the fiduciary aims of the Fund can be met whilst seeking to support the transition to a low carbon economy and the aims of the Paris 2016 Climate Change agreement as outlined in the Statement of Investment Principles.

3. Background

- 3.1 The Fund is required to maintain a Statement of Investment Principles ("SIP") stating, *inter alia*, how Environmental, Social and Governance (ESG) considerations will be taken into account in the investment process.

- 3.2 Notwithstanding the Fund's fiduciary duty to pursue the best financial position for Fund members and employers, the Falkirk SIP contains three ESG specific investment beliefs, namely:

- that ESG issues can affect long term Fund returns;

- that engagement with companies is preferable to divestment, although divestment could be considered as a last resort;
- that the Fund should seek to invest in a manner consistent with the aims of the Paris climate change agreement

- 3.3 The Fund is invested in a broad range of global assets, including the energy, utilities and mining sectors. As Governments seek to meet climate change targets (e.g. by imposing carbon taxes) and as consumers potentially shift spending habits away from more carbon intensive products, there is a risk that certain companies may no longer have sustainable business models. This could represent a risk to the value of the Fund's assets if it remains invested in companies which fail to adapt to a lower carbon economy.
- 3.4 In order to understand more about the associated risks and level of carbon exposure across the Fund, the Committee agreed at the joint meeting of March 2017 to undertake a carbon measurement exercise using a specialist research company called Trucost.
- 3.5 The measurement exercise has been completed and Trucost's Carbon Footprint Audit report is attached as an appendix to this report. Further Trucost reports on individual Fund portfolios have also been uploaded to the Objective Connect portal.
- 3.6 The carbon measurement exercise should be viewed as a starting point for greater Fund awareness of carbon risk and a baseline against which any future measurement exercise can be compared.
- 3.7 ESG risks (including those posed by climate change) should already be getting factored into the investment decision making process of Fund Managers and Companies. The measurement exercise will be useful in challenging managers on the extent to which such carbon risk analysis is being undertaken.
- 3.8 As a general point, the findings of the Trucost exercise need to be considered in the context of global energy consumption being expected to grow over the next 20 years. Coal demand will decline in absolute terms while gas demand is expected to grow (see Appendix 1). Consequently, the rate at which energy companies become less profitable will, as the transition to a lower carbon economy occurs, will vary. It is also important to note that some companies that are seen as "part of the problem" may actually be "part of the solution" in terms of the research and development they undertake in a bid to evolve. In these circumstances, thoughtful carbon risk analysis by Fund managers is likely to be the order of the day rather than outright divestment.

4. Approach and Methodology

- 4.1 Trucost has assessed the following portfolios:

- Newton Global Equity
- Aberdeen Standard Global Equity
- Schroders UK Equity
- Legal and General Fundamental Weighting
- Legal and General Passive

- 4.2 Their approach has been to compare the carbon footprint of the individual portfolios with the carbon footprint of the benchmark index for that portfolio. This demonstrates whether a portfolio is more or less carbon intensive than its associated benchmark – but not whether the portfolio is, of itself, carbon efficient.
- 4.3 The measurement exercise captures the direct emissions from a company's production processes (i.e. Scope 1 emissions) as well as emissions emanating from a company's supply chain (e.g. electricity provision) (Scope 2 emissions) and the emissions from purchased goods and services (Scope 3).
- 4.4 Emissions are expressed in *tonnes of CO₂* (n.b. in this context, the term CO₂ encompasses all greenhouse gases, not just carbon dioxide). Emissions reported are the tonnes of CO₂ that are "owned" by the Fund – ownership being the Fund's share of a particular company's market value.
- 4.5 Comparison of companies and portfolios is done on the basis of a *carbon intensity number* which is obtained by dividing the Fund's share of CO₂ emissions by a company's sales revenues.

5. Context and Limitations

- 5.1 Carbon measurement is not an exact science and there are some limits to the reliance and importance that should be attached to the published numbers in the findings.
- 5.2 Firstly, carbon footprinting is by necessity a backwards looking view of company activity and so does not capture any new products/techniques/technologies that a company may be developing to reduce emissions.
- 5.3 Secondly, accurate and up to date emissions data is not always available so the provider, in this case, Trucost, has had to estimate some company emissions.
- 5.4 Thirdly, complexity means that there is scope for emissions to be double counted or for results to be misleading (e.g. banks and financials who may be lending to high carbon companies are only required to report the carbon they use themselves).
- 5.5 Fourthly, the measurement of carbon efficiency – the carbon intensity number – can be skewed by changes in sales revenue (e.g. if the oil price doubles the carbon intensity number will halve) or by the level of company debt.
- 5.6 This is not to say that monitoring the carbon footprint is a worthless exercise. It provides:
- comparative data between companies and sectors;
 - a basis for targeted engagement with companies
 - information with which to challenge managers
 - improved understanding of carbon risk
 - demonstration of Fund awareness of carbon risk

6. Summary of Findings

6.1 A summary of the findings at portfolio / manager level is set out below:

Portfolio	Total Portfolio Carbon Emissions (CO ₂ tonnes)	Portfolio Carbon Intensity No. (CO ₂ tonnes per £1m Revenue)	Benchmark Carbon Intensity No (CO ₂ tonnes per £1m Revenue)	Portfolio in Comparison with Benchmark
Newton Global	23,966	143.43	320.79	65% less carbon
Aberdeen Global	25,776	309.40	418.59	26% less carbon
Schroder UK	186,209	522.36	319.62	63% more carbon
L&G Fundamental	54,026	577.20	544.09	6% more carbon
L&G Passive	100,772	424.03	401.68	6% more carbon

6.2 The Newton and Aberdeen portfolios are less carbon intensive than their respective benchmarks, whereas the Schrodgers and Legal and General portfolios are more carbon intensive than their benchmarks. It should be noted that none of the investment processes have a pre-defined carbon emissions budget or target.

7. Newton Portfolio

7.1 The Newton portfolio was shown to be 65% less carbon intensive than the MSCI All World Index. This was mainly down to not being invested in certain carbon intensive stocks within the Utilities sector of the benchmark index.

7.2 In absolute terms, the largest carbon producers were ConocoPhillips, Centrica, Associated British Foods and Suncor Energy. In terms of carbon intensity, Conoco and Suncor Energy had the highest carbon intensity numbers around 1,500. The majority of other stocks in the portfolio had an intensity number of under 200.

7.3 Trucost also observed that the environmental data provided by several companies, including Japan Tobacco, Walt Disney and Emerson Electric Co, could have been better.

8. Aberdeen Portfolio

8.1 The Aberdeen portfolio was shown to be 26% less carbon intensive than the MSCI All World Index. This was mainly down to the portfolio having a zero exposure to the Utilities sector.

8.2 In absolute terms, the largest carbon producers were Swire Pacific, Praxair and Potash of Saskatchewan. The same three companies had carbon intensity metrics in excess of 2,500. In terms of carbon efficiency, Swire was also ranked last out of the 148 companies in its benchmark sector. Around half of the 51 stocks in the Aberdeen portfolio have a carbon intensity number of around 100 (i.e. very low) The remainder, mainly companies in the Consumer Staples and Energy sectors, have a intensity number ranging from 300 to 1000.

- 8.3 Trucost also observed that the environmental data provided by several companies, including Pepsi and Taiwan Semiconductors was out of date.

9. Schroder Portfolio

- 9.1 The Schroder portfolio was shown to be 63% more carbon intensive than the FTSE All Share index. This was down to the Schroder allocations to the Materials and Utilities Sectors.
- 9.2 The largest carbon contributors in absolute terms of CO₂ tonnes produced were Drax, South32, Anglo American, BP and Shell. However, in terms of the Carbon intensity number, Drax and South32 both had a metric in excess of 5,000 – the greatest by some margin. The majority of other Schroder portfolio holdings had a carbon intensity of under 100.
- 9.3 Trucost also observed that the environmental data provided by two companies, WM Morrison and Old Mutual was quite old.

10. Legal and General Fundamental Weighting

- 10.1 The L&G Fundamental Weighting (Smart Beta) portfolio was shown to be 6% more carbon intensive than its benchmark - the FTSE RAFI All World 3000 index. This was down to the allocations to Utilities Sector.
- 10.2 With a portfolio of up to 3,000 holdings, the impact that any one company has on the portfolio is greatly reduced. The largest carbon contributors in absolute terms of CO₂ tonnes produced were RWE, Tokyo Electric and ArcelorMittal with RWE having the greatest adverse impact on the portfolio.

11. Legal and General Market Cap Passive

- 11.1 The L&G Passive portfolio was shown to be 6% more carbon intensive than its customised benchmark, with allocations to the Energy and Utilities sectors being the largest contributory factor to the negative benchmark position.
- 11.2 Intuitively, one would expect the carbon intensity of a tracking portfolio such as L&G Market Cap (and L&G Fundamental Weighting) to match its benchmark index. This highlights that the carbon footprint is a snapshot in time. The portfolio was overweight in energy and underweight in financials on the date the carbon footprint was measured. Such sector (and stock) deviations in a passive portfolio happen for various reasons, including the timing of index changes and rebalancing. On a different day, the portfolio's carbon intensity could have been lower than the benchmark.

12. Aggregate Comparisons

- 12.1 Trucost have also compared the aggregate position of the 5 portfolios ("Aggregate All") with the aggregate position of the 3 active portfolios ("Aggregate Active").

12.2 The main conclusions from this part of the analysis were that:

- the Aggregate Active portfolio has less exposure to green energy than the Aggregate All portfolio
- the Aggregate Active portfolio is better aligned to the 2050 2°C target scenarios than the Aggregate All portfolio for coal but less well aligned for renewables

12.3 In terms purely of power generation, Trucost have also provided a comparison of the two aggregated portfolios with the S & P Global 1200 Carbon Efficient Select Index, the results of which are set out below:

Portfolio	S & P Global 1200 Carbon Efficient Select Index	Falkirk Aggregate Active	Falkirk Aggregate All
Coal	11.77%	25.76%	27.57%
Oil	3.06%	0.00%	1.17%
Natural Gas	28.53%	10.59%	18.53%
Nuclear	41.67%	14.48%	15.27%
Other	0.78%	47.50%	30.88%
Renewables	14.20%	1.66%	6.59%

12.4 Not unexpectedly, Falkirk's allocation to Coal and Oil (captured in the "other" category) exceeds the allocation in the "efficient" portfolio which is designed to exclude the top 20% of companies with the highest carbon footprint.

12.5 Falkirk's allocation to Coal and Oil reflects the view of its Fund managers that whilst these businesses may decline in the coming years, the companies remain sound investments against the backdrop of projected increasing demands for energy. Officers will nonetheless wish to challenge the Managers to ensure that these companies are managing their carbon risk effectively.

13. Further Actions

13.1 The Trucost findings provide a catalyst for more targeted engagement with Fund Managers on the justification for their holdings. The in-house team will pick this up in quarterly calls/meetings with managers.

13.2 In the light of the Trucost findings and the Fund's stewardship aspirations, it would seem appropriate to extend the Fund's level of company engagement beyond what is currently being undertaken through Fund Managers, PIRC and the LAPFF. A consideration of costs would be required but an efficient way to proceed would be to participate in a tender with the Lothian Fund for combined voting and engagement services from a specialist provider.

13.3 A number of investment products are now being marketed which purport to support the transition to a lower carbon world. It remains to be seen whether such products deliver an adequate risk adjusted return for investors and whether such investments would be fully compliant with the Fund's fiduciary duties. The pending

strategic investment review will be an opportunity for the Joint Investment Strategy Panel to consider the merits of such offerings in the first instance.

14. Implications

Financial

- 14.1 Inadequate oversight of ESG risk (including climate change risk) could lead to a fall in Fund values and higher contribution rates for employers.

Resources

- 14.2 The cost of the Trucost carbon measurement exercise has been met from the Fund's Oversight and Governance budget in 2017/18.

Legal

- 14.3 The legal purpose for which the Fund exists is to provide retirement benefits for members and to minimise costs for employers. The Fund cannot therefore make the pursuit of an environmental goal its primary aim. In shaping its approach to such matters, the Fund would have to have regard to the settled legal position which is that:

- the Fund must pursue the best financial position for Fund members (balancing risk and return);
- the precise choice of investments can be influenced by non financial considerations, so long as this is not to the material financial detriment of the Fund

Risk

- 14.4 The Trucost exercise is intended to identify the areas of greatest risk in terms of the carbon exposure.

Equalities

- 14.5 None.

Sustainability/Environmental Impact

- 14.6 The report provides an insight into the carbon emissions "owned" by the Fund. The Committee will wish to consider whether any actions are necessary consistent with its environmental beliefs.

15. Conclusion

- 15.1 The carbon footprinting exercise has generated useful insights into the Fund's carbon exposure, however this has to be tempered with an acceptance of the limitations of both data and methodology.

- 15.2 The major positive of the exercise is the ability to drill down to a stock and sector level and the capacity to use this as an aid to comparing the carbon efficiency of respective companies and challenging them on this.
- 15.3 A number of options for improved monitoring and engagement on carbon risk have been put forward in the paper.

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Date: 6 March 2018

Appendices

Appendix 1 – Trucost Carbon Footprint Audit
Appendix 2 – Changing Dynamics of Supply and Demand

List of Background Papers:

Trucost Carbon Footprint Reports (available on the Objective Connect Portal)

Carbon Footprint Audit

An Assessment of Carbon Risks in Falkirk's Listed Equity Portfolios



S&P Dow Jones Indices
ESG Analysis



November 2017

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Trucost is part of S&P Dow Jones Indices. A leader in carbon and environmental data and risk analysis, Trucost assesses risks relating to climate change, natural resource constraints, and broader environmental, social, and governance factors. Companies and financial institutions use Trucost intelligence to understand their ESG exposure to these factors, inform resilience and identify transformative solutions for a more sustainable global economy. S&P Global's commitment to environmental analysis and product innovation allows us to deliver essential ESG investment-related information to the global marketplace. For more information, visit www.trucost.com.

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EXECUTIVE SUMMARY

Falkirk Council Pension Fund (hereinafter 'Falkirk') has commissioned Trucost to screen five equity portfolios assessing each portfolio's carbon footprint (benchmarked against a relevant index). In addition, two aggregate portfolios are assessed for their fossil fuel exposure and energy transition. The **Aggregate Active** portfolio includes three active portfolios, whereas the **Aggregate All** portfolio contains all five equity portfolios – a mix of active and passive portfolios.

KEY FINDINGS

FIVE EQUITY PORTFOLIOS: CARBON FOOTPRINTING

- The **Aberdeen Asset Management, Legal & General Fundamental Weighting** and **Newton Investment Management** portfolios all outperform their relative benchmarks.
- The **Schroders UK Equity** and **Falkirk Legal & General Market Capitalisation Weighting** portfolios are more carbon intensive compared to their benchmarks due to the impact of sector allocation and stocks selection affects associated with portfolio investments in the **Utilities, Materials** and **Energy sectors**.
- The **Legal & General Fundamental Weighting** portfolio has the highest carbon footprint (577.20tCO₂e/£1m) among the analysed portfolios.

AGGREGATE PORTFOLIOS: FOSSIL FUEL EXPOSURE AND ENERGY TRANSITION

- The **Aggregate Active** outperforms the **Aggregate All** in terms of energy transition alignment as it generates less energy from brown power (36.35% versus 47.26%). However, the **Aggregate Active** generates a lower percentage of green power (1.66%) compared to the **Aggregate All** (6.59%).
- The **Aggregate Active** is slightly more exposed to fossil fuel extractive activities than the **Aggregate All** in terms of weighting in the portfolio (11.94% versus 11.58%), and in terms of revenues apportioned based on ownership (3.53% versus 3.24%).
- The **Aggregate All** invests in 156 companies that derive revenues from coal mining or coal power generation, with a total VOH of £57.47m. While the **Aggregate Active** only invests in four companies that derive revenues from coal mining or coal power generation to varying extents, with a total VOH of £33.66m.
- The **Aggregate All** has a 7.00% lower embedded emissions intensity than the **Aggregate Active**. This means that the future activities of the companies currently included in the **Aggregate All** will potentially emit less CO₂e than the **Aggregate Active**.
- The **Aggregate Active** is better aligned to the International Energy Agency (IEA) 2030 and 2050 2°C scenarios than the **Aggregate All** in terms of its coal mix (25.76% vs. 27.57%), but is less aligned in terms of its renewables mix (1.66% vs. 6.59%).

INTRODUCTION

In order to assess each stock's carbon performance, the analysis of companies' disclosure (through annual reports, regulatory filings, and the CDP) has allowed Trucost to compile all publicly available carbon data from the companies in Falkirk's portfolios. When the disclosed data were absent or insufficient, Trucost has used its environmentally extended input-output model to estimate emissions from financial data and "fill the gaps". These overall CO₂e emissions per company are allocated to Falkirk's portfolios on an ownership basis, and based on market value for the benchmarks' constituents. More details on the carbon footprinting methodology are provided in Appendix A.

Carbon footprints and analyses 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. Companies (and by extension portfolios) that are over-exposed to carbon emissions are likely to face higher adaptation or mitigation costs as regulatory and reputational pressure increases, but also to see their competitiveness affected as low-carbon options emerge. Trucost's assessment of carbon risk in Falkirk's portfolios is performed at several levels:

- **At portfolio level** to detail how much carbon is emitted in total (in absolute terms and relative to companies' revenues to assess their efficiency relative to benchmarks).
- **At sector level** to assess the effect of sector allocation and stock selection within sectors in the carbon footprint (relative to the benchmark).
- **At company level** to underline companies' carbon intensities and to identify key contributors to the portfolio's footprint.
- In addition, for the **aggregate portfolios**, fossil fuel exposure and energy transition are assessed to identify potential stranded asset risk and transitional risk to a low carbon economy.

Portfolio-by-portfolio company details can be found in the five portfolio-specific reports provided alongside this report, which can thus be used to drill down into the details of the findings presented here. The data of analysis is the 30th of June 2017 throughout and the currency used is GBPm across all holdings for comparability.

A glossary of the key terms used in this report can be found in the Appendices. Values expressed in percentage terms have in general been constructed such that a positive (negative) number if "good" ("bad") news for the portfolio's carbon risk exposure.

PORTFOLIO CARBON FOOTPRINTS

Table 1 - Summary of Carbon Footprint Results

Portfolio Name Vs. Benchmark	Carbon Footprint of the Portfolio (tCO ₂ e/£1m)	Carbon Efficiency Compared with Relevant Benchmark (%)
Schroders UK Equity	522.36	-63.43
Falkirk Legal & General Market Capitalisation Weighting	424.03	-5.56
Aberdeen Asset Management	309.4	26.08
Legal & General Fundamental Weighting	577.2	30.13
Newton Investment Management	143.43	65.73
Aggregate All	218.64	N/A
Aggregate Active	178.99	N/A

- The Aberdeen Asset Management, Legal & General Fundamental Weighting and Newton Investment Management portfolios all outperform their relative benchmarks.** As shown in the table above, the **Newton Investment Management** portfolio has the best benchmark-relative performance, outperforming its benchmark, the **MSCI ACWI**, by 65.73%. This positive result is primarily driven by the portfolio managers selecting less carbon intensive **Utilities** stocks compared to the benchmark. At the same time, in contrast to its benchmark, the portfolio has no exposure to the **Materials** sector, a carbon intensive sector. Similarly, the **Utilities** sector also is a main driver of efficiency within the **Legal & General Fundamental Weighting** portfolio as the stocks within the portfolio are over half as carbon intensive as those contained within the benchmark. **Aberdeen Asset Management** on the other hand does not invest in the **Utilities** sector at all, resulting in a high positive sector allocation effect of 26.86% associated with this sector.
- The Schroders UK Equity and Falkirk Legal & General Market Capitalisation Weighting portfolios are more carbon intensive than their benchmarks.** The **Schroders UK Equity** portfolio shows the weakest benchmark-relative performance, underperforming its benchmark, the **FTSE All Share Index**, by 63.43%, as reflected in Figure 2. This result is driven by the portfolio overweighting the carbon-intensive **Utilities** sector relative to the benchmark. In addition, its **Utilities** and **Materials** stocks are significantly more carbon intensive compared to stocks from the same sectors within the benchmark. The most noteworthy sector allocation and stock selection effects associated with the **Legal & General Market Capitalisation Weight** portfolio are those derived from the **Energy** sector. The portfolio

overweighs this carbon intensive sector (7.77%) compared to the benchmark (6.43%), resulting in a negative sector allocation effect of -3.95%. This impact is reflected in the two largest contributors to the portfolio carbon footprint being **Royal Dutch Shell** and **BP** (both of which belong to the **Energy** sector), with contributions of -3.25% and -1.86%, respectively. However, despite this, the **Energy** stocks within the portfolio are marginally less carbon intensive (766.93tCO₂e/£1m) compared to those in the benchmark (821.99tCO₂e/£1m), leading to an overall positive stock selection effect of 1.78%.

- **The Legal & General Fundamental Weighting portfolio has the highest carbon footprint among the analysed portfolios.** Nonetheless, it outperforms its benchmark, the **FTSE RAFI All World 3000**, by 30.13%, as demonstrated in Figure 2. This efficiency is primarily attributed to the portfolio's stock selection in the **Utilities** sector being less carbon intensive than those included in the benchmark in the same sector.

Figure 1 - Carbon Footprints of Portfolios

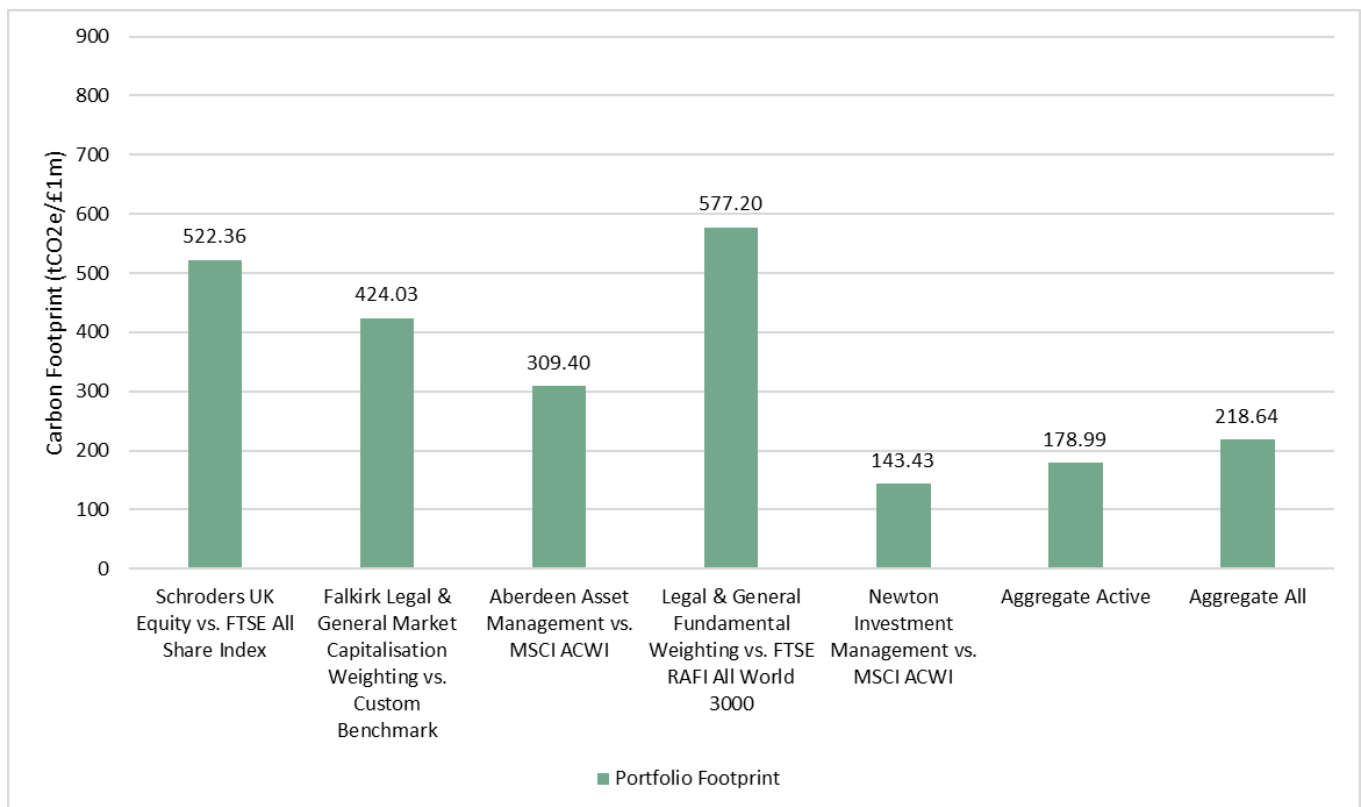
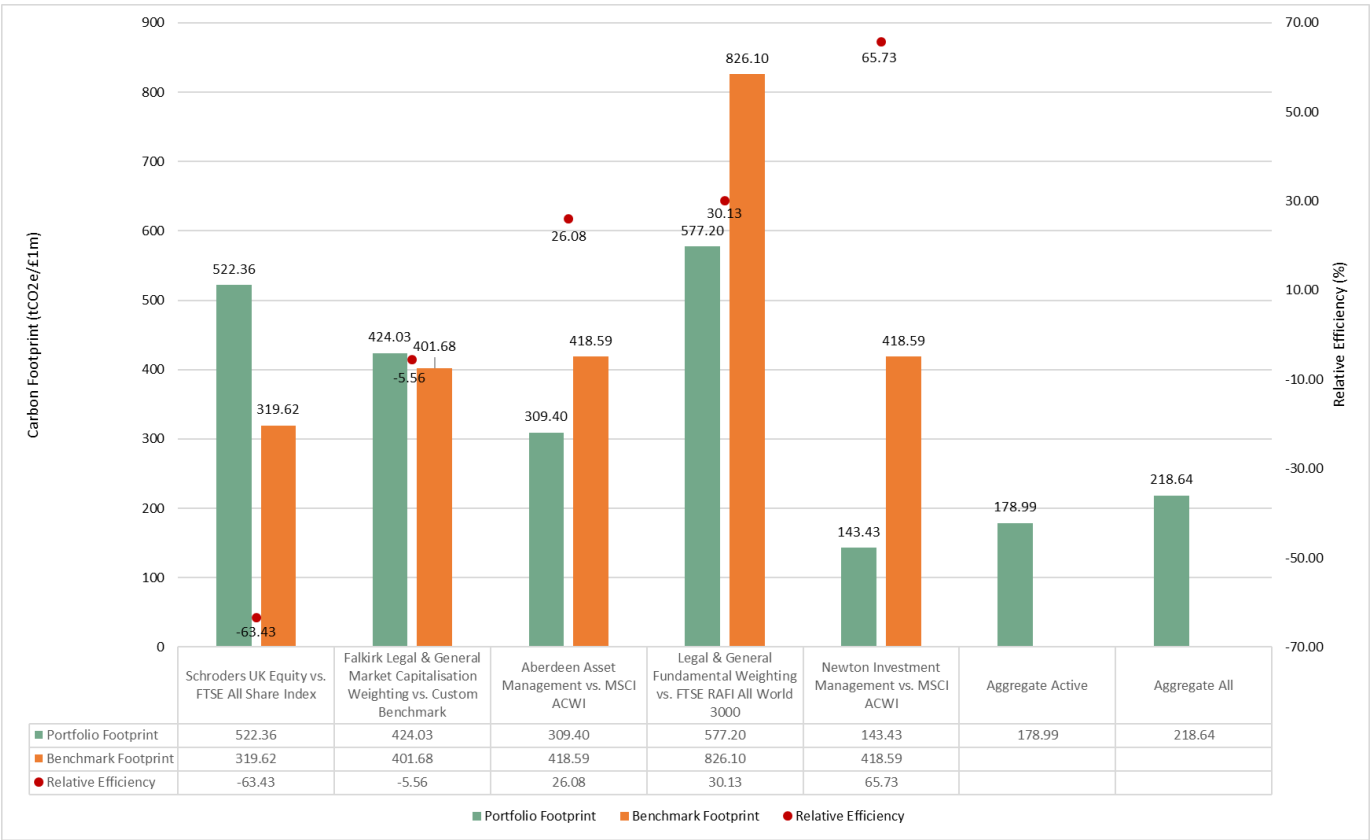


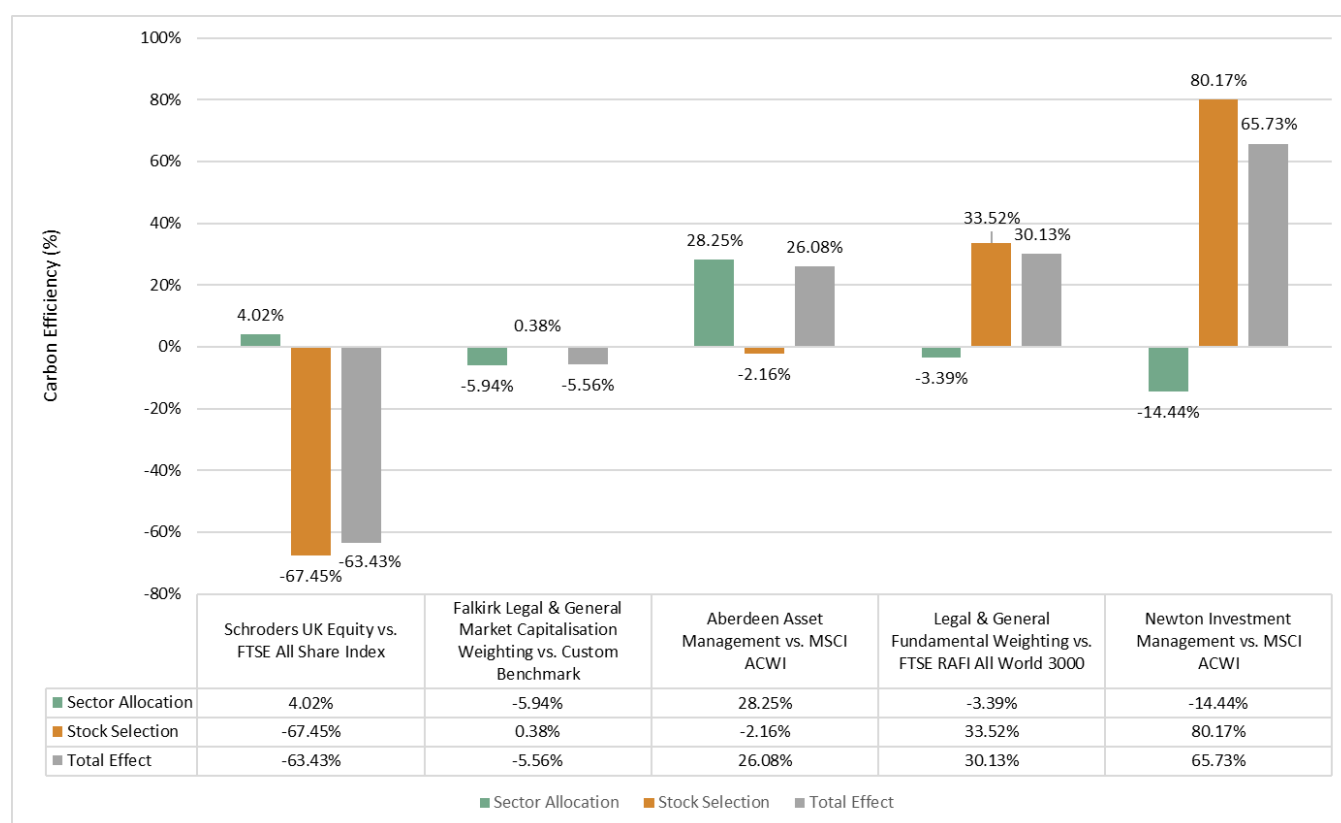
Figure 2 – Carbon Footprints of Portfolios Against Benchmarks



ATTRIBUTION ANALYSIS: SECTOR & STOCK SELECTION EFFECTS

The two principal reasons why the carbon exposure of the portfolio may differ from the benchmark are due to sector allocation and stock selection decisions by the portfolio managers. Sector allocation decisions will cause the carbon intensity of the portfolio to diverge markedly from the benchmark where the sector(s) are either carbon intensive or carbon efficient. If the portfolio is overweight in carbon intensive sectors, the portfolio is likely to be more carbon intensive compared to the benchmark. However, if the stocks within a carbon intensive sector are the most carbon efficient companies, it is possible that the portfolio may still have a lower carbon footprint than the benchmark.

Figure 3: Sector Allocation and Stock Selection Effects



- Sector allocation effects for the Schroders UK Equity and Aberdeen Asset Management portfolios are positive.** In the **Aberdeen Asset Management** portfolio, this is attributed to the portfolio not including any **Utilities** stocks, in contrast to the benchmark. This drives the overall 26.08% carbon efficiency of the portfolio compared to its benchmark, the **MSCI ACWI**. **In contrast, the stock selection effects for the aforementioned portfolios are negative.** This means that the portfolio managers have, on average, selected more carbon intensive stocks compared to the benchmark. Most notable is the overall negative stock selection effect of -67.45% in the **Schroders UK Equity** portfolio. This is driven by stock selection in the **Materials** and **Utilities** sectors, which are more carbon intensive compared

to those selected within the benchmark. This effect offsets the positive sector allocation effect of 4.02% such that the portfolio is 63.43% more carbon intensive than its benchmark, the FTSE All Share Index. This portfolio has the worst benchmark-relative performance of all analysed portfolios.

Table 2: Sector Allocation and Stock Selection Effects for Newton Investment Management

SECTOR	SECTOR WEIGHTING		CARBON INTENSITY (TCO ₂ E/£1M)		FOOTPRINT ATTRIBUTION		
	PORTFOLIO	BENCHMARK	PORTFOLIO	BENCHMARK	SECTOR ALLOCATION	STOCK SELECTION	TOTAL EFFECT
Consumer Discretionary	20.31%	12.42%	52.98	110.04	1.70%	2.49%	4.19%
Consumer Staples	21.11%	9.36%	167.46	251.93	6.11%	5.33%	11.44%
Energy	3.36%	6.08%	1394.63	929.99	7.06%	-3.27%	3.79%
Financials	9.55%	18.60%	13.69	33.51	-11.33%	0.25%	-11.08%
Health Care	10.97%	11.25%	51.10	54.96	1.78%	0.10%	1.88%
Industrials	6.74%	10.70%	88.13	271.52	0.19%	5.93%	6.12%
Information Technology	25.97%	16.77%	40.10	98.66	2.82%	1.81%	4.64%
Materials	0	5.16%	0.00	1586.60	17.95%	0.00%	17.95%
Real Estate	0	3.20%	0.00	144.45	-0.83%	0.00%	-0.83%
Telecommunication	0	3.30%	0.00	81.85	-3.10%	0.00%	-3.10%
Utilities	1.98%	3.17%	254.30	3119.44	-36.79%	67.53%	30.74%
Total	100.000%	100.000%	14.43	418.59	-14.44%	80.17%	65.73%

- **Sector allocation effects are negative for the Falkirk Legal & General Market Capitalisation Weighting, Newton Investment Management and Legal & General Fundamental Weighting portfolios.** The overall sector allocation effect within the **Newton Investment Management** portfolio is the highest, with a -14.44% effect. This negative effect is driven by the **Utilities** sector, despite the portfolio underweighting this sector compared to the benchmark, as shown in Table above. The reason for this is that the sector allocation effect reflects the exposure of revenues to the sector rather than taking the weight in fund directly. The figure below provides a formula to explain sector allocation effect in more detail.

Figure 4: Sector Allocation Effect Formula

Sector Allocation Effect:

$$\frac{[(\text{Portfolio sector revenue as \% of total Portfolio revenue} - \text{Benchmark sector revenue as \% of total Benchmark revenue}) * (\text{Benchmark total footprint} - \text{Benchmark sector footprint})]}{\text{Benchmark total carbon footprint}}$$

A fund is more exposed than the benchmark to sector X if the fund's ownership of the revenue generation of sector X makes up a larger proportion of the total revenue ownership of the portfolio. Thus, the proportion of a company's annual revenue owned by the fund is the fund's VOH in the company divided by the market cap of the company (value "A"); the fund's ownership of revenues in

a sector is the sum of all the owned revenues of the companies in the sector (value “B”); and the fund’s total ownership of revenues is the sum of all the owned revenues of all the holdings in the fund (value “C”). The exposure of a fund to a sector is B divided by C. Ultimately the section allocation is a function of two things: (1) whether the fund is more or less (revenue-) exposed to a particular benchmark and (“) whether the sector is carbon intensive or carbon efficient.

- **However, the stock selection effect for the Falkirk Legal & General Market Capitalisation Weighting, Newton Investment Management and Legal & General Fundamental Weighting portfolios is positive.** This effect has the largest impact in the **Newton Investment Management** portfolio, where the overall stock selection effect is 80.17%. The overall positive effect is credited to the portfolio manager having selected significantly less carbon intensive stocks in **Utilities** sector in the portfolio compared to the benchmark, resulting in a stock selection effect of 67.53%. Consequently, the portfolio is 65.73% less carbon intensive compared to the benchmark.

LARGEST CARBON CONTRIBUTORS

The holdings within the top ten contributors within each portfolio account for a large proportion of the total carbon apportioned to the portfolio's holdings, meaning that if these securities were removed, the carbon footprint of the portfolio could potentially be reduced by the percentage shown the "Carbon Footprint Contribution" column. There are several reasons why a company might appear in the top ten. Firstly, a company might have a carbon footprint that is significantly higher than the sector average or the benchmark's carbon footprint overall. The size of the company's holding in the portfolio can also play a part, whether it is a large position overall in the portfolio (determined by its portfolio weight) or if the holding represents a high equity ownership of the company (measured by the size of the holding as a percentage of the overall consolidated market capitalisation of the company). A large percentage of capital ownership in a company will lead to a higher amount of the carbon emissions for that company being apportioned to the holdings in the portfolio. The rank in benchmark sector column is very useful in assessing the carbon intensity of your top ten contributors relative to their peers.

- The majority of the largest contributors are **Energy, Utilities** and **Materials** stocks, with predictably high carbon footprints. All companies within the top contributors of both of the **Aggregate** portfolios appear on the top of the largest contributor's list for each individual fund, which is due to these companies having a significantly higher carbon footprint than the sector average. **Drax Group, South32 Ltd (South Africa)** and **Anglo American Corp of SA** are the highest contributors, with carbon footprint contributions of 11.05%, 10.42% and 3.40% within the **Aggregate All**, respectively.
- In particular, within the **Schroders UK Equity** portfolio, most of the carbon risk is concentrated in a small number of companies. In fact, 47.99% of the fund's absolute emissions are concentrated in one company, **Drax Group**, which operates in the **Utilities** sector. This is followed carbon contributions from **South32 Ltd (South Africa)** (14.34%) and **Anglo American Corp of SA** (3.78%), both of which operate in the **Materials** sector. If these three holdings were removed from the portfolio, or if the companies are encouraged to transition towards a low carbon economy, the carbon footprint of these portfolios can be reduced by at least 66.11%.
- Within the **Schroders UK Equities** portfolio, a large percentage of the carbon apportioned across the top ten contributors is explained by the portfolio containing a small number of companies and thus, a higher weight is attributed to each stock. The fund contains 33 stocks in total, of which six contribute negatively to the footprint. The same is true for the **Aberdeen Asset Management** and **Newton Investment Management** portfolios, which contain 51 and 44 stocks, respectively. Of these, at least 10 stocks contribute negatively to the footprint.

FOSSIL FUEL EXPOSURE & ENERGY TRANSITION

In addition to the carbon footprint analysis, Trucost had also carried out a basic analysis of the **Aggregate All** and the **Aggregate Active** portfolios' energy transition preparedness and fossil fuel exposure. The energy transition assessment allows an investor to understand a portfolio's contribution to the transition towards a low carbon economy. This analysis will also help to assess a portfolio's alignment with the 2°C scenario. Key figures such as the portfolio's green and brown shares, embedded emissions from fossil fuel reserves are calculated on an ownership basis. The main sources of information as annual reports issued by companies and international data sources on countries' statistics and emissions.

CONTRIBUTION TO THE ENERGY TRANSITION

The table below shows the **Aggregate Active** and the **Aggregate All** portfolios' key transition metrics.

Table 3 - Key Transition Metrics

	Aggregate Active	Aggregate All
GREEN/BROWN SHARE (POWER GENERATION)		
% of GWh from green power	1.66%	6.59%
% of GWh from alternative power	61.98%	46.15%
% of GWh from brown power (fossil)	36.35%	47.26%
% of GWh from coal power	25.76%	27.57%
BROWN SHARE (EXTRACTIVES)		
% weight in fossil fuel extractive activities	11.94%	11.58%
% of revenue from extractive activities	3.53%	3.24%
% of fossil fuel extraction revenue from coal	18.69%	16.09%
STRANDED ASSETS (EXTRACTIVES)		
Embedded CO ₂ e emissions intensity from fossil fuel reserves (in tCO ₂ e/£1m invested)	0.00995	0.00925
Apportioned embedded emissions (in tCO ₂)	8,057,963	11,751,562

Legend:

- Brown: coal, petroleum, natural gas power generation
- Other (or Alternative): nuclear, biomass, landfill gas, other power generation
- Green: Solar, wind, hydro, geothermal, wave/tidal power generation

The **Aggregate Active** only includes four power generating companies, namely **Suncor Energy Inc**, **Centrica**, **Drax Group** and **BP**, whereas the **Aggregate All** includes 140 companies. Trucost has calculated the apportioned power generation of these companies based on the equity ownership. Both aggregate funds

generate a similar proportion of power from coal; however, the **Aggregate Active** generates a larger percentage of power from alternative sources, such as biomass and nuclear (61.98% versus 46.15%). At the same time, the **Aggregate All** demonstrates a higher proportion of power from renewable sources (6.59% versus 1.66%).

In terms of fossil fuel extraction, both aggregate funds have a similar weight in fossil fuel extractive activities, although the **Aggregate Active** derives slightly more revenues from coal extraction (18.69% versus 16.09%).

The overall embedded CO₂e intensity from fossil fuel reserves (in tCO₂e/£1m invested) is marginally higher within the **Aggregate Active** portfolio; however, the apportioned embedded emissions (in tCO₂e) are 31.43% higher for the **Aggregate All** portfolio.

GREEN/BROWN SHARE (POWER GENERATION)

While carbon footprints identify the most efficient companies in an overall index or portfolio, they do not recognise those companies that are contributing positively to the low carbon economy by offering climate-mitigation or adaptation solutions. One approach to address this is to quantify the percentage of constituent revenues in an index deriving from climate solutions (green) versus climate aggravators (brown). In this analysis, this is expressed as a percentage of physical metrics – energy generation. As the **Aggregate Active** derives a higher percentage of its power generation from brown power compared to the **Aggregate All**, the first mentioned may not be resilient in the face of a growing carbon policy in comparison to the **Aggregate All**.

Figures 5 and 6 below show the current green/brown share of the **Aggregate Active** and **Aggregate All** portfolios.

Figure 5: Green/Brown Mix of Aggregate Active

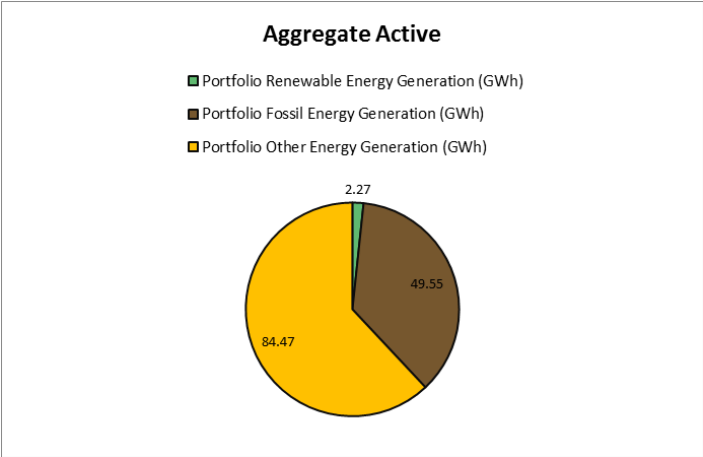
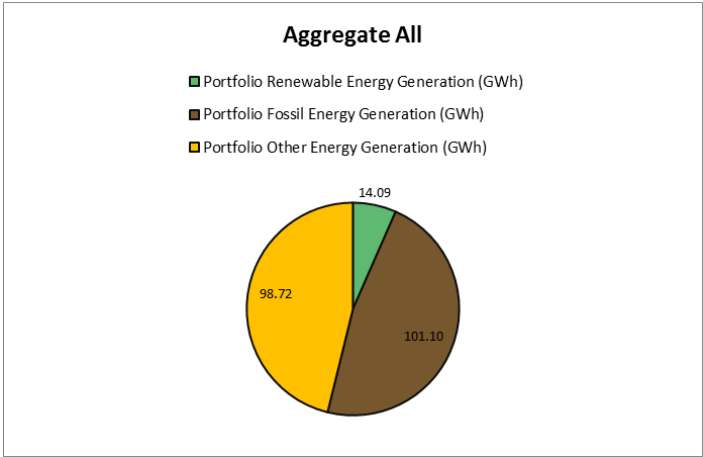


Figure 6: Green/Brown Mix of Aggregate All



Legend:

- Brown: coal, petroleum, natural gas power generation
- Other (or Alternative): nuclear, biomass, landfill gas, other power generation
- Green: Solar, wind, hydro, geothermal, wave/tidal power generation

The **Aggregate Active** is more weighted towards fossil fuel based energy generation and less weighted towards renewable energy generation compared to the **Aggregate All**.

Table 4: Largest Energy Contributors in Aggregate Active

No.	Company Name	Weight in Portfolio (%)	Total Apportioned Electricity Generation (GWh)	Brown Share (%)	Green Share (%)	Other Share (%)
1	Drax Group	0.83%	99.73	35.20%	0.00%	64.80%
2	Centrica	2.25%	35.60	40.56%	4.01%	55.43%
3	BP	1.95%	0.92	0.00%	86.70%	13.30%
4	Suncor Energy Inc	0.46%	0.04	0.00%	100.00%	0.00%

The largest energy contributor in the table above is **Drax Group** with 99.73GWh, the company engages in the generation and supply of electricity in the UK, with its energy mix skewed in favour of biomass power generation, at 64.80%. The second largest contributor is **Centrica**, which is an integrated energy company, which is skewed towards 'other' energy share with 55.4%, closely followed by brown share with 40.6%. **Suncor Energy Inc** has the "cleanest" power mix, with 100% of energy generated from the renewable sources.

Table 5: Largest Energy Contributors in Aggregate All

No.	Company Name	Weight in Portfolio (%)	Total Apportioned Electricity Generation (GWh)	Brown Share (%)	Green Share (%)	Other Share (%)
1	Drax Group	0.54%	101.05	35.20%	0.00%	64.80%
2	Centrica	1.49%	37.36	40.56%	4.01%	55.43%
3	RWE AG	0.02%	5.92	78.36%	6.53%	15.12%
4	Tokyo Electric Power Co. Holding Inc	0.01%	5.92	94.77%	5.23%	0.00%
5	Engie	0.03%	4.12	72.42%	16.67%	10.91%

The **Drax Group** is also the largest contributor within the **Aggregate All**, with 101.05GWh. It is followed by **Centrica** and **RWE AG**, where the latter is exposed to 78.36% from brown energy.

FOSSIL FUEL EXTRACTIVES

In addition to looking at power generation, it is also necessary to look at the presence of companies involved in the extraction of fossil fuels, or for those supporting extractive activities, in a portfolio. Fossil fuel extraction-related activities are defined as any activities that fall in the following sectors: crude petroleum and natural gas extraction, tar sands extraction, natural gas liquid extraction, bituminous coal underground mining, bituminous coal and lignite surface mining, drilling oil and gas wells, and support activities for oil and gas operations. More downstream activities such as petroleum refineries and petrochemical manufacturing, which may encompass the extraction of fossil fuels (ie. Integrated activities), are not covered in this assessment.

As shown in Table 6, the **Aggregate All**, there are 190 companies that derive revenues from extractive activities (coal, oil and gas). Of which, 83 companies derive 50% of their revenues from fossil fuel extraction, and 53 companies derive 100% of their revenues from fossil fuel extraction. The top three companies which derive 100% of their revenues from fossil fuel power generation, and which have high the highest VOH associated with them are ConocoPhillips, EOG Resources and Schlumberger, which represent total VOHs of £7.64m, £7.32m and £3.75m, respectively. In the **Aggregate Active**, there are 10 companies that derive revenues from extractives. Of which, three companies derive 100% of their revenues from fossil fuel power generation, as demonstrated in Table 7. As with the **Aggregate All**, these three companies are ConocoPhillips, EOG Resources and Schlumberger. However, in the **Aggregate Active**, these companies represent total VOHs of £7.03m, £6.97m and £3.10m, respectively.

Table 6 – Exposure to Fossil Fuel Extractives: Aggregate All

% of Revenues Derived from Fossil Fuel Extractives	Number of Companies	Value of Holdings (£1m)	% of Total Holdings Value
>0%	190	146.97	11.58%
>10%	129	110.71	8.72%
>30%	95	37.93	2.99%
>50%	83	23.18	1.83%
100%	53	21.26	1.68%

Table 7 – Exposure to Fossil Fuel Extractives: Aggregate Active

% of Revenues Derived from Fossil Fuel Extractives	Number of Companies	Value of Holdings (£1m)	% of Total Holdings Value
>0%	10	88.38	10.96%
>10%	9	72.62	9.00%
>30%	5	38.33	4.75%
>50%	3	20.75	2.57%
100%	3	20.75	2.57%

Figure 7: Total Extractives Exposure (% Weighting)

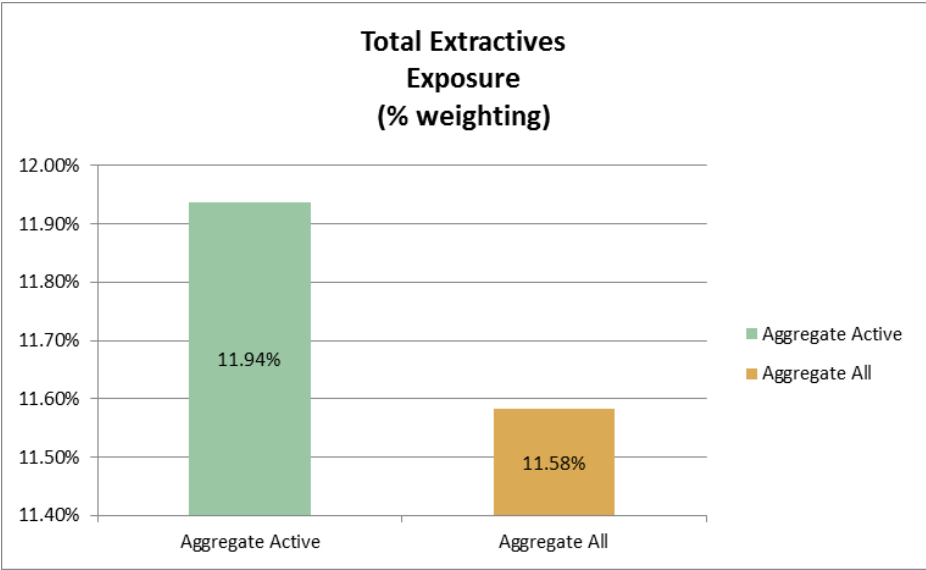


Figure 7 shows the current share of such extractive activities according to the investments’ weights in the **Aggregate Active** and **Aggregate All**. The **Aggregate Active** is slightly more exposed to extractive activities than the **Aggregate All**.

Figure 8: Total Extractives Exposure (% Revenues)

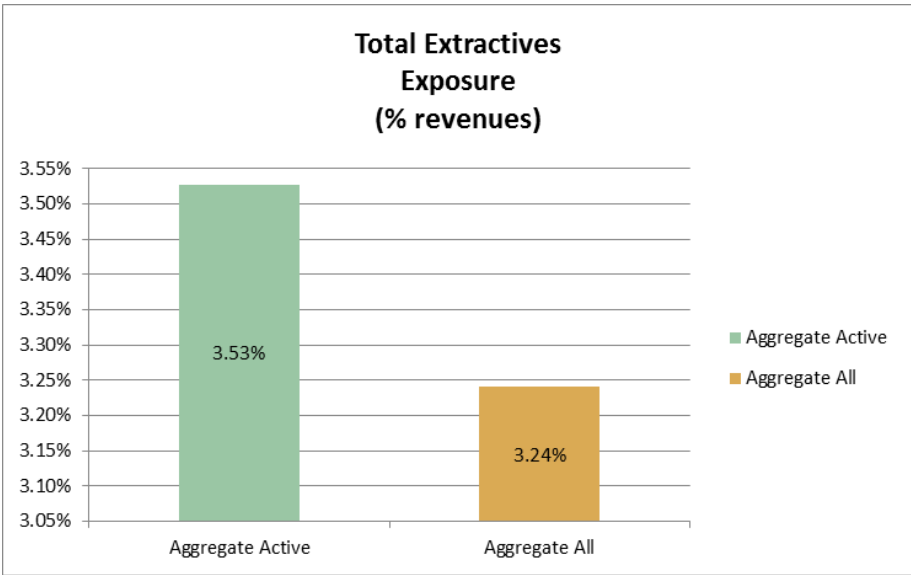


Figure 8 shows the current share of such extractive activities in the **Aggregate Active** and **Aggregate All** according to the revenues apportioned (based on ownership). Again, the **Aggregate Active** is slightly more exposed to extractives with regards to share of revenue.

Figures 9 and 10 show the distribution of revenues related to fossil fuel extraction by sector in the **Aggregate Active** and **Aggregate All** portfolios respectively.

Figure 9: Revenue Distribution Related to Fossil Fuel Extraction by Sector – Aggregate Active

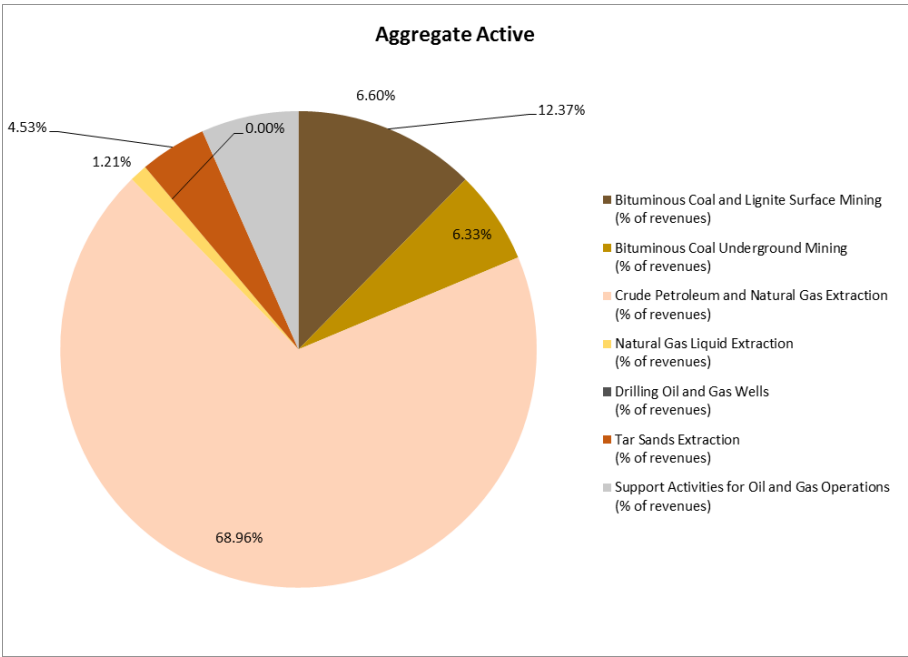
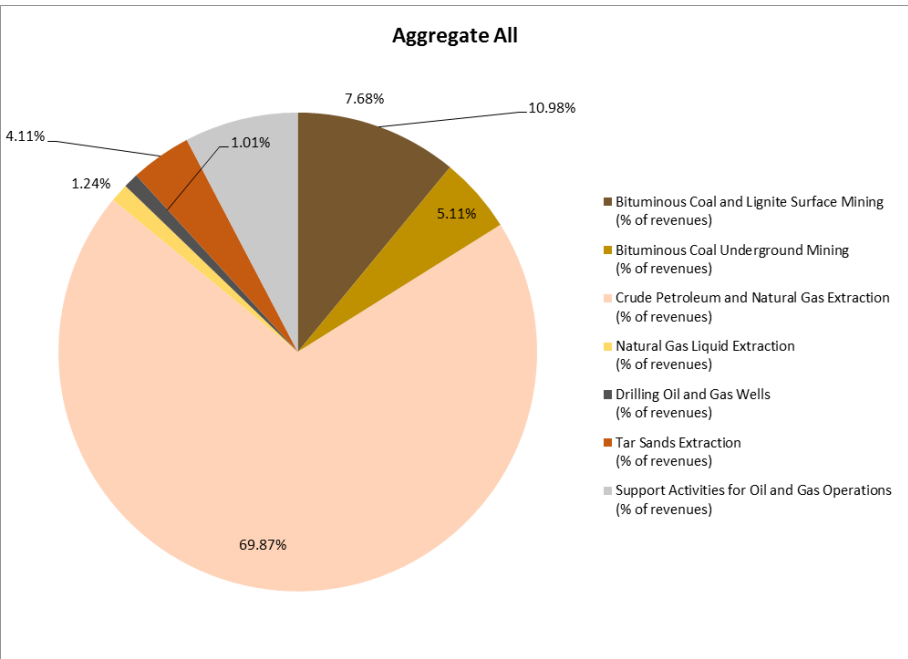


Figure 10: Revenue Distribution Related to Fossil Fuel Extraction by Sector – Aggregate All



The primary fossil fuel revenue source for both aggregate portfolios is crude petroleum and natural gas extraction as well as bituminous coal and lignite surface mining.

COAL EXPOSURE

Coal is considered the most carbon intensive form of energy. In order to comply with a 2°C scenario, exposure to coal worldwide should be significantly reduced. Companies who are directly exposed to coal are extractives (coal mining) and power generation companies. The Aggregate portfolios' screening for coal activities reveal that, the **Aggregate All** invests in 156 companies that derive revenues from coal mining or coal power generation, with a total VOH of £57.47m. Of these 156 companies, 26 (representing a total VOH of £0.49m) derive at least 50% of their revenues from coal mining or coal power generation activities. On the other hand, **Aggregate Active** only invests in four companies that derive revenues from coal mining or coal power generation to varying extents, with a total VOH of £33.66m. These companies are structurally exposed to carbon risks given the nature of their activities and their coal dependency. Of the four companies, **South32 Ltd (South Africa)** derives the highest percentage of its revenues from coal mining activities, with 27.83% of its revenues from coal surface and underground mining.

Table 8 – Coal Screening Results Aggregate Active

% of Revenues Derived from Coal Mining and Coal Power Generation	Number of Companies	Value of Holdings (£1m)	% of Total Holdings Value
>0%	4	33.66	4.17%
>10%	4	33.66	4.17%
>30%	0	-	-
>50%	0	-	-

Table 9 – Coal Screening Results Aggregate All

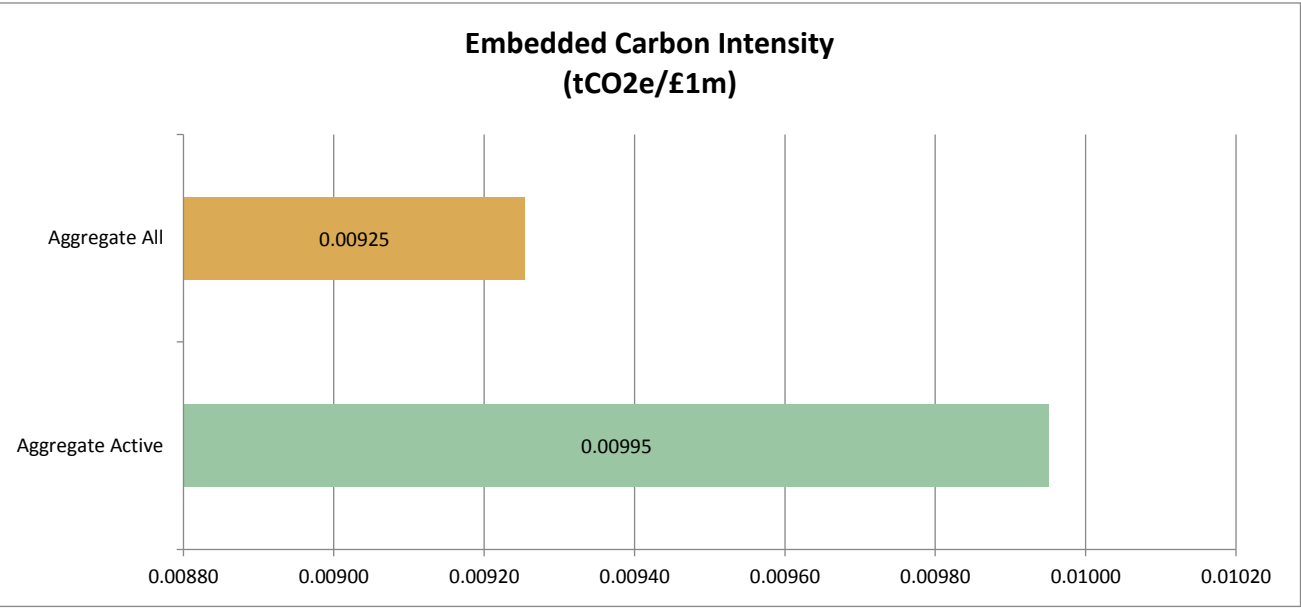
% of Revenues Derived from Coal Mining and Coal Power Generation	Number of Companies	Value of Holdings (£1m)	% of Total Holdings Value
>0%	156	57.47	4.53%
>10%	83	42.24	3.33%
>30%	45	1.46	0.12%
>50%	26	0.49	0.04%
100%	5	0.07	0.01%

FOSSIL FUEL RESERVES

Stranded asset risk results from the ownership of potentially unusable fossil fuel reserves by extractive companies. Fossil fuel reserves are defined as the quantity of reserves that are not yet extracted from the ground, taking into account both proven reserves (1P: >90% change of being present) and probable reserves (2P: >50% change of being present). Only data actually disclosed by companies are assessed. Embedded emissions are CO₂e emissions which would be released if the fossil fuel reserves were combusted. At the portfolio level embedded emissions are apportioned according to investor’s holdings.

The figure below shows the embedded carbon intensity of **Aggregate Active** and **Aggregate All** (excluding annual emissions). The intensity is expressed in tCO₂e per million of investment.

Figure 11: Embedded Carbon Intensity (tCO₂e/£1m)



The **Aggregate All** has a 7.00% lower embedded emissions intensity than the **Aggregate Active**. This means that the future activities of the companies currently included in the **Aggregate All** will potentially emit less CO₂e than the **Aggregate Active**.

A total of 112 companies in the **Aggregate All** portfolio have fossil fuel reserves and, as a result, embedded emissions. These holdings account for 10.93% of the entire portfolio VOH. On an equity ownership basis, the **Aggregate All** portfolio ‘owns’ 3.39m tonnes of potential CO₂ emissions from the future exploitation of coal, oil or gas reserves. In the **Aggregate Active** portfolio, nine companies have fossil fuel reserves, accounting for 11.55% of the entire portfolio VOH. Overall, the portfolio ‘owns’ 6.49m tonnes of potential CO₂ emissions from the future exploitation of coal, oil or gas reserves. These ‘locked in’ emissions are likely to affect the market value of these companies, should the reserves be deemed ‘unburnable’.

2°C ALIGNMENT

The figure below shows the current energy generation mix of the **Aggregate Active** and **Aggregate All** in comparison to targeted 2030 and 2050 world energy mixes, required to stay within the 2°C climate-warming scenario¹. Power generation is often considered the most carbon intensive activity in a portfolio; it is therefore a good proxy for overall 2°C alignment.

Figure 12: 2°C Energy Generation Mix

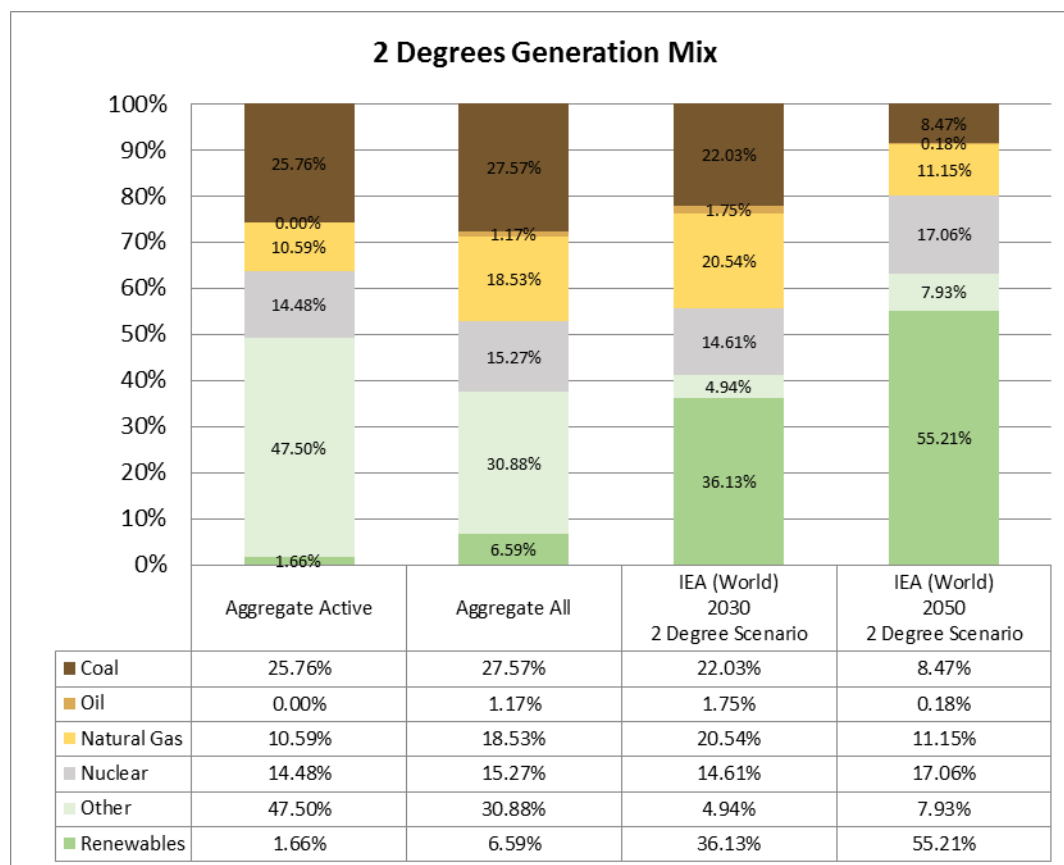


Figure 12 illustrates how the underlying holdings of the **Aggregate Active** and **Aggregate All** are aligned to the IEA 2°C 2030 and 2050 scenarios.

- Focusing on the 2030 scenario, the **Aggregate Active** portfolio's coal mix is higher, with 25.76% versus 22.03%. However, its total mix from fossil fuels (coal, oil and natural gas) (36.35%) is lower than the IEA 2030 scenario (44.32%), due it containing a lower mix of oil and natural gas compared to the 2030 scenario. In terms of renewables, the portfolio's mix is significantly lower, with 1.66% from renewables compared to the 2030 scenario's 36.13%. In regard to the 2050 scenario, the **Aggregate Active** contains a significantly lower percentage of its mix (1.66%) from renewables compared to the 2050

¹ International Energy Agency, 2015.

scenario (55.21%). It also contains a greater proportion (36.35%) from aggregated fossil fuels than the 2050 scenario (25.71%). Its coal mix (25.76%) remains higher than the 2050 scenario's (8.47%).

- The **Aggregate All** has a high share of coal (27.57%) compared to the 2030 (22.03%) and 2050 (8.47%) coal mixes. In addition, its total mix from fossil fuels is 47.26% versus the 44.32% set out in the 2030 scenario. At the same time, the portfolio's renewables mix (6.59%) is significantly lower than those of the 2030 (36.13%) and 2050 (55.21%) scenarios.
- These results suggests that both the aggregate portfolios have far to go to decarbonize their current generation mixes and may subsequently be exposed to transition risk associated with the transition to a low carbon economy.

Table 8: 2°C Alignment Headline Results

	Aggregate Active	Aggregate All	World 2050 (4°C scenario)	World 2050 (2°C scenario)
2°C Alignment (% generation mix from green and alternative power generation)	63.65%	52.74%	50.40%	80.20%

The table above demonstrates that the **Aggregate Active** outperforms the **Aggregate All** in terms of share of power generation from green and alternative power compared to the World 2050 4°C scenario, while it needs an additional 16.55% to be aligned with the World 2050 2°C scenario.

RECOMMENDATIONS

The findings presented in this report should benefit Falkirk in two ways. Firstly, through demonstrating superior and comprehensive monitoring and reporting on operational carbon and stranded asset risks within its equity investments, 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 Falkirk could position its investment portfolios to benefit from the shift to a lower carbon economy. These discussion points could be used to support and inform a climate change tilted investment strategy.

KEY RECOMMENDATIONS

STOCK SELECTION AND DIVERSIFICATION

- Based on stock selection and sector allocation effects, portfolio managers can pinpoint the sectors/stocks that affect their carbon performance negatively. Whilst altering sector allocation might be difficult depending on mandate types (especially for index-tracking mandates), factoring carbon performance into stock selection would greatly improve the portfolios carbon footprint, both in relative and absolute terms. In particular, the **Aberdeen Asset Management** and **Schroders UK Equity** portfolios both display negative stock selection effects and engagement with managers in the short-term is therefore recommended.
- The presence of companies involved in fossil fuel extraction suggests that Falkirk would benefit from diversifying its holdings and continuing to monitor future performance, especially in the **Aggregate All**, where there are 156 companies that are exposed to coal mining activities.

ENGAGEMENT

- High portfolio-level CO₂e intensities and underperformance relative to benchmarks indicates that investees' carbon profiles are not always factored into the managers' investment decisions. This could indirectly affect companies' profitability and ability to pay dividends, should carbon-related risks (regulatory, market, reputational or technology risks) materialise. As a result, all carbon intensive portfolios should be in focus for engagement. This is the case for the **Schroders UK Equity** and **Falkirk Legal & General Market Capitalisation Weighting** portfolios, as they are more carbon intensive than their respective benchmarks.
- 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.

SETTING THRESHOLDS/TARGETS

- Falkirk could use intensity reduction targets at portfolio level, and/or integrate specific thresholds on specific activities' weight (such as coal power generation, coal mining) within its investment strategy. Integrating these elements into mandates, especially on the largest funds with negative relative performance (**Schroders UK Equity** and **Falkirk Legal & General Market Capitalisation Weighting**) would improve both the carbon footprint and broader carbon risk exposure of the portfolios.
- Falkirk should consider setting targets for maximum coal mining and coal power exposure and a minimum renewable energy exposure across the portfolios. This could be benchmarked with reference to a 2°C scenario using the energy transition pathways developed by the IEA.

MONITOR/EXAMINE TRENDS

- It is important to 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.
- In particular, Trucost recommends Falkirk closely monitor carbon intensive sectors like **Energy**, **Materials** and **Utilities** and how they progress towards being more carbon efficient through measures like implementing proactive environmental management strategies.

CONSIDER ALTERNATIVE METRICS, ASSESSMENTS

- The TCFD in its recently published final report also recommends asset owners to disclose how climate related risks and opportunities are factored into their relevant strategies across asset classes. It encourages the use of scenario analysis to inform investment strategies as well as engagement with investee companies to encourage better disclosure to improve data availability.
- There is a growing possibility to consider investment in alternative asset classes, such as 'green' labelled bonds, private equity or climate resilient infrastructure to tilt Falkirk's investments towards a lower carbon economy. The green bond market is with USD93.6bn issued to-date in 2017, and USD130bn estimated to be issued by the end of 2017 according to the Climate Bonds Initiative².
- Assessing how fossil fuel extractive companies integrate a potential carbon pricing in their financial forecasts would provide a more precise view of particular companies' exposure to carbon risks. Trucost's recently developed Carbon Pricing Tool could provide key insights to achieve this.

² The Climate Bonds Initiative, 2017: <https://www.climatebonds.net/>

APPENDICES

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 Falkirk's equity ownership over market capitalization. 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 £1 (£1m) 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 Falkirk 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. 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.

The footprints of the fixed income portfolios are based on the direct and first tier indirect carbon profile of either the issuer, direct parent, or ultimate parent company. Bonds with publicly listed equity issuers/parents have been analysed whereas government bonds, private issuers with no public parents and investment trusts are excluded.

Portfolios were also aggregated on a portfolio level and benchmarked against respective aggregated benchmarks. The analysis was done by comparing the aggregates of individual portfolios with the respective aggregated benchmarks keeping in mind that the weights of the composites of the benchmark match the weight of their portfolios in the aggregate.

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 close to 6,000 companies since 2000 ensures that most of the 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, 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 £1 million of revenue, unless stated otherwise. This quantitative approach enables businesses of different sizes within different industries to be compared.

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 GICS Industry Group 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/£1m, whereas the benchmark’s Oil & Gas sector carbon footprint is 1,382.5 metric tons of CO2e/£1m. The Oil & Gas sector allocation effect would therefore be +24.54%:

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

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

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

1.92% * (1,382.51 – 4,443.62)

664.66

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

GLOSSARY

Benchmark: Equity index against which a portfolio is compared.

Carbon Disclosure: The source of direct carbon emissions is identified and divided into Trucost estimates and company disclosures. The flag details the source of data disclosure and whether Trucost had to perform an adjustment to convert the data into a standardized figure is captured and stated.

Carbon First Tier Indirect (tonnes CO2e): CO2 and other greenhouse gases emitted by the direct suppliers to a company. The most significant sources are typically purchased electricity (Scope 2 of the GHG Protocol) and employees' business air travel.

Carbon Footprint (tonnes CO2e/£1m): The direct and first tier indirect GHG emissions apportioned to the portfolio per million USD 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 portfolio is the sum of these contributions, normalised by revenue owned.

Carbon Intensity - Direct + First Tier indirect (tonnes CO2e/£1m): Direct + first tier indirect CO2e emissions /£1m for selected company against peer companies and peer group (carbon footprint).

Carbon Scope 1 (tonnes CO2e): Greenhouse gas emissions generated from burning fossil fuels and production processes which are owned or controlled by the company (reference

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	CO2 Equivalent
Carbon Dioxide	1
Methane	21
Nitrous Oxide	310
Sulphur Hexaflouride	23,900
Per Fluoro Carbons	7,850
Hydro Flouro Carbons	5,920

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.

GICS Sector: The Global Industry Classification Standard (GICS®) was developed by MSCI and Standard & Poor's (S&P) to enhance the investment research and asset management process for financial professionals worldwide. The GICS structure consists of 10 sectors, 24 industry groups, 67 industries and 156 sub-industries.

Input-Output Model: In economics, a model used to capture how each business sector inter-depends on its own and other sectors for the flow of goods and services

ISIN: International Securities Identification Number (ISIN) is a 12 character alpha-numerical code that uniquely identifies a security listed on a stock exchange.

Sector Carbon Footprint Attribution: Effects of sector allocation and stock allocation in the carbon footprint attribution of the portfolio relative to its benchmark. The sector allocation effect expresses the impact of sector weighting on the carbon footprint i.e. whether portfolio under/over performance from a carbon perspective is due to a higher/lower weight in relative high/low carbon sector with respect to the benchmark. Stock selection effect expresses the extent to which the portfolio's carbon performance is due to picking more or less carbon intensive companies within a sector compared to the benchmark. Total effect is the sum of the stock and sector allocation effects.

Sector Carbon intensity Chart/Table: Analysis of the weighted average carbon intensity (tCO₂e/£1m) in each sector within the portfolio and the benchmark.

Sector Weighting Chart/Table: Analysis of the relative holdings in each sector within the portfolio and the benchmark. The benchmark is market capitalisation weighted as per the market capitalisation as of the end of the month.

Trucost sector: Trucost's granular mapping of companies' business activities to our 464 sector model. Our model is based on the North American Industry Classification System (NAICS).

Turnover: This is the company revenue and is calculated by Trucost from company financial statements as the net interest income plus all positive revenues, and fees and commission income (not including negative incomes or income from assets).

Year: All Trucost environmental data is concurrent with the company's financial information and covers the same reporting period as the accounts. The accounting year given is the balance sheet date.

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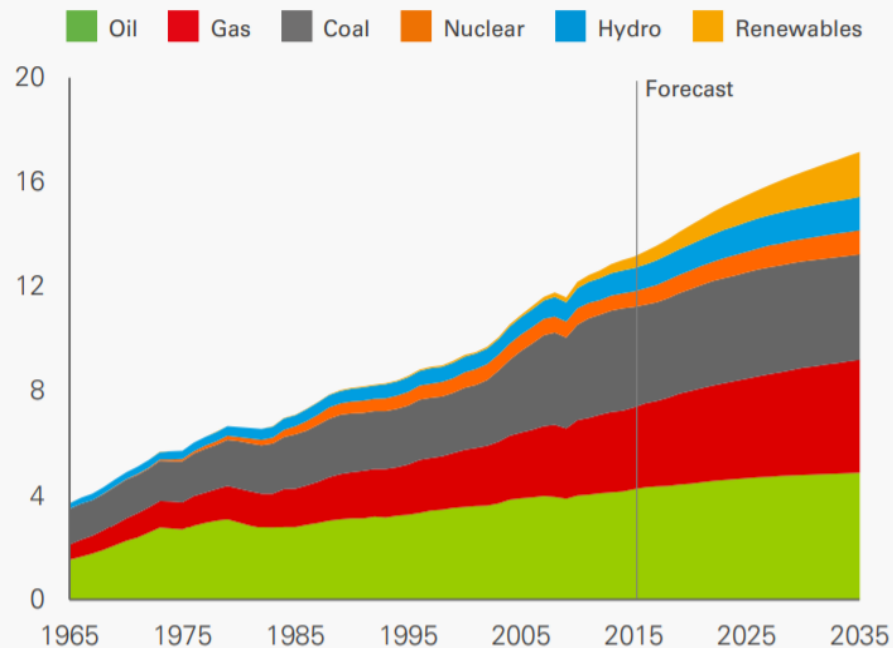
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Changing dynamics of supply and demand

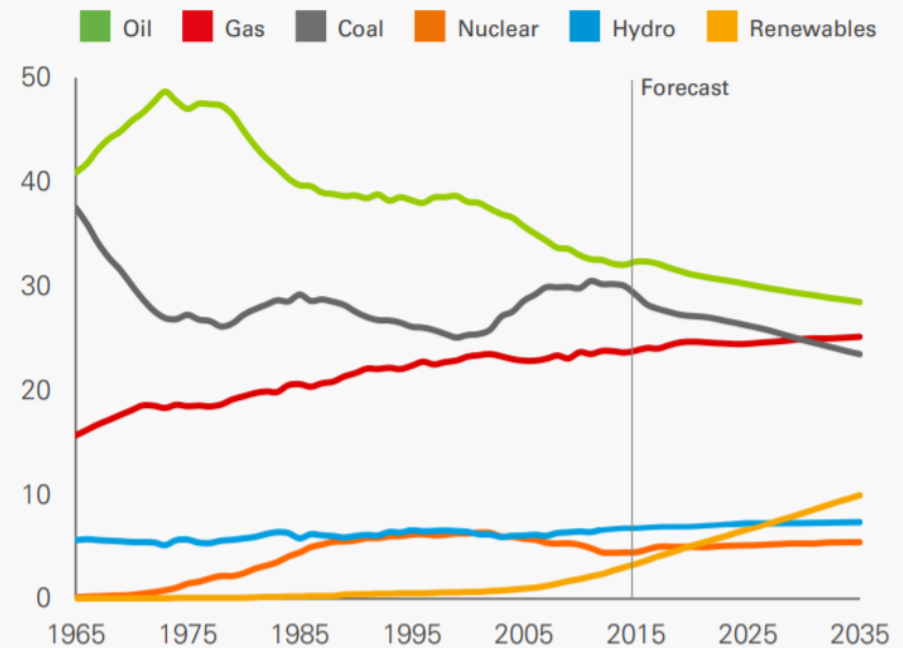
Primary energy consumption by fuel¹

bn tonnes of oil equivalent



Shares of primary energy¹

%



(1) Source: BP Energy Outlook 2017

The charts show that Oil is expected to decline in market share, but this will be offset substantially by overall energy growth. Coal will lose significant market share, and decline in absolute terms, while gas will grow in market share and in absolute terms. This implies that a more sophisticated approach than blanket “divestment” of “fossil fuel” companies is required.